



Safety Precautions

Be sure to read this section before use.

Refer to Intro Page 63 for precautions for general pneumatic components.

Product-specific cautions: F.R.L. unit (modular design)

Design/selection

1. Common

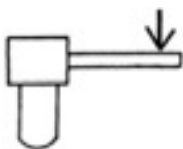
WARNING

- This product is designed for industrial use. Do not use for medical purposes, or in any equipment or circuit that concerns human life.
- Air filter, lubricator, drain separator plastic bowl, lubricator drip window, and pressure gauge lens. Material is polycarbonate. It cannot be used in environments containing synthetic oil, organic solvents, chemicals, coolant, screw locking agent, leak detection solutions, or hot water, etc., or where these substances may come in contact with the product.
Refer to page 361 for details on plastic bowl chemical resistance.

Piping load torque

Avoid applying piping load or torque to the body or pipes.

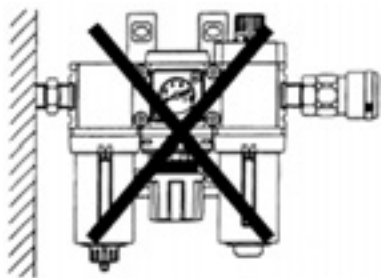
Series	1000-W	2000-W	3000-W	4000-W	6000-W	8000-W
Max. torque N·m	15	15	50	50	100	100



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 piping fixed with a single support, as this can result in excessive force and lead to 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-ring groove for modular connection on its OUT side. Select piping that can be sealed at or below the O-ring groove diameter.

Series	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
Take measures to prevent chlorine-based substances from entering the compressed air.
- Use the auto-drain under the working conditions below. Failure to observe this could result in operation faults.
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 working pressure to 0.1 MPa or more. (Air is purged with initial drainage until pressure reaches 0.1 MPa.)
NC auto-drain (no exhaust when not pressurized): For "F1" and "FF1"
 - A compressor with a capacity of 0.75 kw or less can also be used.
 - Set the working pressure to 0.15 MPa or more.
For 1000 Series NC auto-drain
 - Set the working flow rate to less than or equal to the max. working 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, which may lead to malfunctions.

2. Regulator, filter/regulator

WARNING

- Output pressure exceeding the regulator's set pressure could result in damage or faulty operation of the secondary side devices. Be sure to install a safety device.
- The regulator 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.
- When using the regulator for secondary side sealed circuits or balance circuits contact CKD regarding these applications.

CAUTION

- Pulsation may occur depending on the working conditions or piping conditions.
Lower the primary pressure if pulsation occurs. Select the proper size as pulsation can occur easily if the flow rate is extremely small in respect to the max. flow rate.

F.R.L.
F.R.
F (Filtr)
R (Reg)
L (Lub)
Drain Separ
Mech Press SW
Res press exh valve
SlowStart
Anti-bac/Bac-
remove Filtr
Film Resist FR
Oil-Prohr
Med Press FR
No Cu/PTFE FRL
Outdrs FRL
Adapter Joiner
Press Gauge
CompFRL
LgFRL
PrecsR
VacF/R
Clean FR
ElecPneUR
AirBoost
Speed Ctrl
Silncr
CheckV/other
Fit/Tube
Nozzle
Air Unit
PrecsCompn
Electro Press SW
ContactSW
AirSens
PresSW Cool
Air Flo Sens/Ctrl
WaterRtSens
TotAirSys (Total Air)
TotAirSys (Gamma)
Gas generator
RefrDry
DesicDry
HiPolymDry
MainFiltr
Dischrg etc
Ending

F.R.L. unit (modular design)

Product-specific cautions

⚠ CAUTION

- The setting range for the regulator's secondary side 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 working 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 sensor PPX, avoid using it together with the lubricator. The switch is not a drip-proof structure, so operation could be disabled if the lubrication oil comes in contact with it.

5. Residual pressure exhaust valve

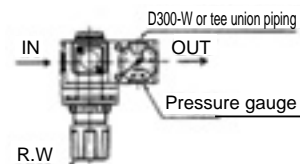
⚠ WARNING

- Precautions for the residual pressure exhaust valve
 - The EXH port is dedicated for installation of the silencer. Tighten with a torque of 3 N·m or less (manual tightening). Do not connect pipes where their loads or torque, etc., may be applied to the EXH port.
 - If exhaust operations are incomplete due to air quality, manually discharge air by operating the knob (turn and raise).

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.



■ 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

Chemicals	Chem catgeg	Main products of chemicals	General applications	Lens
Inorganic chemicals	Acids	Hydrochloric acid, sulfuric acid, hydrofluoric acid, phosphoric acid, chromic acid, etc.	Acid metal wash, acid degreasing soln, coating treatment soln, etc.	×
Organic chemicals	Aromatic hydrocarbons	Benzene, toluene, xylene, ethyl benzene, styrene, etc.	Contained in paint thinner (benzene, toluene, and xylene)	×
	Alcohols	Methyl alcohol, ethyl alcohol, cyclohexanol, benzyl alcohol	Used as antifreezing agent Leakage detection agent	×
	Phenol	Carbolic acid, cresol, naphthol, etc.	Disinfectant solution	×
	Ketones	Acetone, methyl ethyl ketone, cyclohexanone, acetophenone, etc.		×
	Carboxylic acids	Formic acid, acetic acid, butyl acid, acrylic acid, oxalic acid, phthalic acid, etc.	Dyes/oxalic acid for aluminum processing, phthalic acid for paint base and leakage detection agents	×
	Oxyacids	Glycol acid, lactic acid, malic acid, citric acid, tartaric acid		×
	Amines	Methylamine, dimethylamine, ethylamine, aniline, acetanilide, etc.	Additive of brake oil	×

×: Not available (Lens will break.)

7. Flame-resistant Series

⚠ WARNING

- The regulator's diaphragm, check valve resin parts (inside aluminum plate), and silencer element are not made of flame-resistant materials. Avoid use where spatter could accumulate.

8. Oil-prohibited Series

⚠ CAUTION

- Check the working circuit and working 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.
- Pulsation may occur depending on the usage conditions and piping conditions. Lower the primary pressure if pulsation occurs. 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-prohibited regulator are required, use the clean regulator RC2000 Series.

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Oil-ProhR
Med Press FR
No Cu/ PTFE FRL
Outdrs FRL
Adapter Joiner
Press Gauge
CompFRL
LgFRL
PreCsR
VacF/R
Clean FR
ElecPneuR
AirBoost
Speed Ctrl
Silncr
CheckV/ other
Fit/Tube
Nozzle
Air Unit
PreCsCompn
Electro Press SW
ContactSW
AirSens
PresSW Cool
Air Flo Sens/Ctrl
WaterRISens
TotAirSys (Total Air)
TotAirSys (Gamma)
Gas generator
RefrDry
DesicDry
HiPolymDry
MainFiltr
Dischrg etc
Ending

F.R.L. unit (modular design)

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- Anti-bac/Bac-remove Filtr
- Film Resist FR
- Oil-Prohr
- Med Press FR
- No Cu/PTFE FRL
- Outdrs FRL
- Adapter Joiner Press Gauge
- CompFRL
- LgFRL
- PrecsR
- VacF/R
- Clean FR
- ElecPneur
- AirBoost
- Speed Ctrl
- Silncr
- CheckV/other
- Fit/Tube
- Nozzle
- Air Unit
- PrecsCompn
- Electro Press SW
- ContactSW
- AirSens
- PresSW Cool
- Air Flo Sens/Ctrl
- WaterRtSens
- TotAirSys (Total Air)
- TotAirSys (Gamma)
- Gas generator
- RefrDry
- DesiccDry
- HiPolymDry
- MainFiltr
- Dischrg etc
- Ending

Design/selection

⚠ CAUTION

- Pressure and flow characteristics and relief start pressure may be less than the standard regulator (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 higher 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 primary side pressure or restrict the secondary line. If pulsation continues, 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.

9. Outdoor Series

⚠ WARNING

- This product has outdoor specifications, but should not be used in the following environments.
 - When the ambient temperature and product temperature exceed the range of -10 to 60 °C. (The product temperature is at risk of exceeding the ambient temperature when exposed to direct sunlight.)
 - Where air freezes.
 - In atmospheres containing corrosive gases, liquids and chemicals.
 - Locations with vibration or impact.

Mounting, installation and adjustment

1. Common

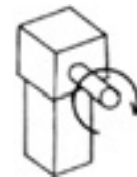
⚠ CAUTION

- Avoid installing this product where it is subject to direct ultraviolet.
- Flush and clean the pipes.
Dirt or foreign matter remaining in the piping will deteriorate product performance.
- Make sure that no foreign matter enters the pipes when connecting the pipes and fittings.
When screwing in piping or fittings, check that swarf from port threads or sealant does not get inside. Dirt or foreign matter remaining in the piping will deteriorate product performance.
- To use F.R.L. correctly
 1. Set the regulator pressure setting upward. After setting the pressure, lock the handle. Check the primary pressure carefully before setting pressure.
 2. Confirm the direction of the arrow indicating the air inlet before connecting. A reverse connection could result in improper operation.
 3. Install the air filter and the lubricator case downward vertically. Drainage may be defective or drip check may become impossible.
 4. Use of the auto-drain where vibration is present could cause faults and malfunctions.

- Drain piping of the auto-drain should be piped under the following conditions.
Otherwise, malfunctions may result.
Use an inner diameter of $\phi 5.7$ or more and piping of 5 m or more for the drain discharge section. Do not route it vertically. Pipe so that no lateral load is applied on the bowl. When you tighten a fitting into an Rc1/4 female thread, hold the hexagon part of the cock.

- Piping screw-in torque
Make sure that excessive torque is not applied on the body and piping when piping.

Series	1000-W	2000-W	3000-W	4000-W	6000-W	8000-W
Max. torque N·m	15	30	30	30	70	70

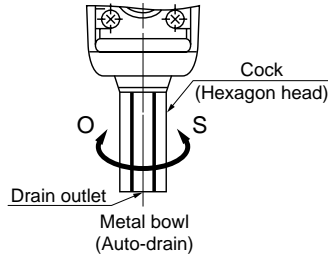


- Drain piping
 - The drain piping for the plastic bowl has a barbed nipple, and can be directly installed. However, confirm that the drain cock is closed before inserting the tube. Pipe so that no lateral load is applied on the bowl. Do not fix the tube connected to the drain outlet with a lateral load applied. If drainage is performed with a lateral load applied, external leakage may occur. Contact CKD when attaching a separate valve to the tube tip that is inserted to the drain outlet to control drainage.
- Tightening torque of drain cock
 - The maximum tightening torque of the drain cock of the bowl is as follows.
 - 1000 Series: 0.1 N·m
 - Others: 0.5 N·m

F.R.L. unit (modular design)

Product-specific cautions

- Drain piping of metal bowl with auto-drain
 - When you tighten a fitting into the drain outlet female thread, hold the hexagon part of the cock.
 - When using the metal bowl with auto-drain, if the drain is piped with a tightening fitting, manual operation is not possible.

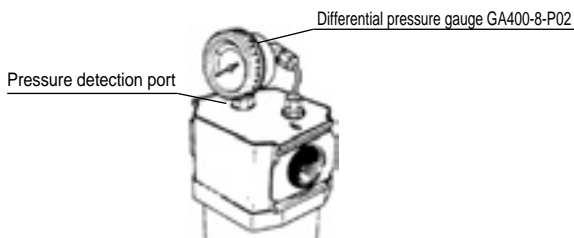


- Piping units with pressure detection port

F6000-□-W-Q/M6000-□-W-Q
 MX6000-□-W-Q/F8000-□-W-Q
 For M8000-□-W-Q/MX8000-□-W-Q

A pressure detection port is available as an option for F6000-W, M6000-W, MX6000-W, F8000-W, M8000-W, and MX8000-W.

The life of the filter element or oil mist filter mantle assembly is visually checked by assembling the differential pressure gauge GA400-8-P02 into the pressure detection port. When selecting option Q and X1 simultaneously for F6000-W and M6000-W and mounting differential pressure gauge GA400, raise the gauge with piping material so that it does not interfere.



Check the port position of the differential pressure gauge, the high pressure side, and low pressure side, and mount properly.

2. Regulator, filter/regulator

⚠ CAUTION

- Regulator, filter/regulator
 - Lightly tighten (0.6 N·m or less) mounting screws for embedded pressure gauge G401-OP, G401, and gauge plug.
 - When installing the pressure gauge with a safety mark on the gauge plug, or when installing a general screw-in pressure gauge, tighten with a torque of 10 to 15 N·m or less.
 - Do not move or swing the product by the adjustment knob on the regulator.
 - Check that pressure exceeding the pressure gauge's full scale is not applied. The pressure gauge could be damaged. (Pay special attention when using the full scale 0.2 or 0.4 MPa pressure gauge.)

- Panel mount of regulator

When mounting the panel and L type bracket, the knob must be removed.

(The knob does not need to be removed for the 2000 Series. Panel mount is not available for the 8000 Series.)

When removing the knob, turn it about 3 times in the H direction, then remove the knob by turning the nut as you would for a jack-up.

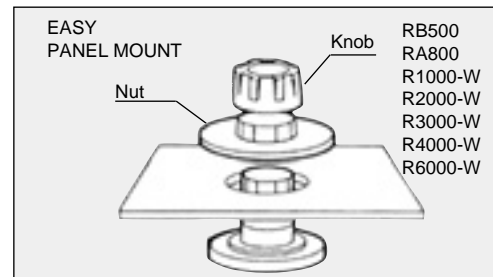
Turning the knob in the L direction from the set pressure 0 activates the stopper and the knob does not turn.

If torque is additionally applied in the L direction, the knob may lock and become inoperable.

To keep the knob from locking, be sure to turn the knob in the H direction three times before turning the nut. At this time, do not turn the knob together. Note that the knob may suddenly pop out when jacked up by the nut.

At this point, insert the cover into the panel or L type bracket, and secure it with the nut.

Finally, insert the knob and tap it to snap in.



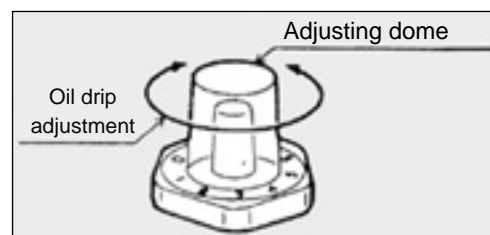
Note: Install the nut before installing the knob. (The nut of R2000-W can be removed without removing the knob.)

3. Lubricator

⚠ CAUTION

- Adjustment of the lubricator oil drip

- Adjust the oil rate by turning the adjusting dome with bare hands. For closing, tighten with a torque of 0.5 N·m or less. The numbers (scale) on the dial are a guide used after adjustment, and do not indicate the oil drip rate.



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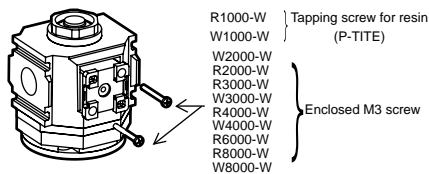
Mounting, installation and adjustment

4. Pressure switch

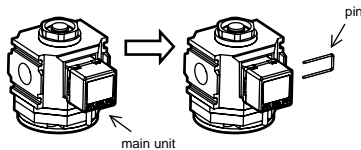
CAUTION

Mounting of pressure switch (PPR)

- Insert the O-ring into the adaptor
 - * Insert the O-ring into the 2 O-ring grooves
 - Handle the O-rings with clean hands
- Mount the adaptor onto the body
 - Mount the adaptor with the included 2 bolts (M3)
 - * Be careful of the mounting location and direction so that the O-ring will not fall off.
 - * Do not screw in one of the bolts completely, but to screw in both bolts as evenly as possible. (Tightening torque $0.5 \pm 0.1 \text{ N}\cdot\text{m}$)



- Mount the main unit, and then attach the included pin on the face on the adaptor side.



Note) Insert the pin all the way to the end. Also, confirm that the pin has been attached before pressurization.

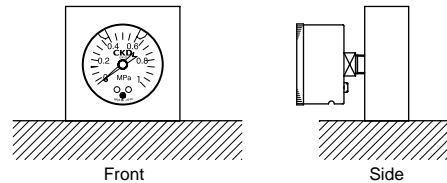
5. Pressure gauge

CAUTION

Pressure gauge

Repeated and sudden increase and decrease in pressure and pressure pulsation must be avoided because it could adversely affect the life of the pressure gauge. Either ease the pressure fluctuation in the circuit or contact CKD so that a pressure gauge with a cushioning screw can be prepared. Pressure exceeding the pressure range may damage the gauge.

- Mount vertically in respect to the ground so that the scale can be viewed straightforward. (See below) Mounting in any other direction can cause the needle movement to become unstable, and can cause the accuracy to drop.



6. Flame-resistant Series

CAUTION

- When installing a general screw-in pressure gauge on the gauge plug, tighten with a torque of 3 to 5 N·m or less.

Use/maintenance

1. Common

WARNING

- Perform a periodic inspection once every six months or less to check for any cracks, scratches, and other damages of the air filter and plastic bowl of the lubricator.
 - Replace the bowl with a new plastic or metal one if you find any damage.
- Check the air filter, lubricator plastic bowl, and lubricator drip window periodically for contamination.
 - If parts are heavily contaminated or if transparency has decreased, replace with a new bowl or drip window.
 - Use water and household detergent to wash parts. Rinse them out well with clean water afterward.
- Removing bowl of filter and lubricator
 - Stop the compressed air supply. Release the pressure in the bowls completely and make sure that there is no residual pressure before removing the bowls.

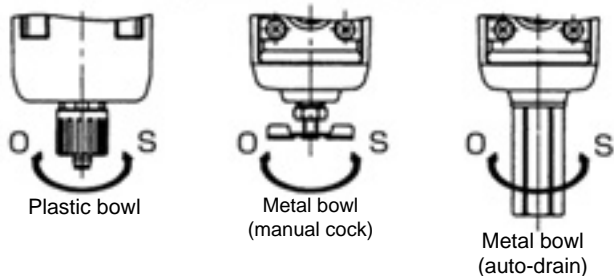
CAUTION

- Check the oil drip rate once a day.
 - If the oil drip is faulty, problems could occur in the unit being lubricated.
- Do not use a distributor to separate the air with oil mist and the air without oil mist. Oil in the lubricator may flow backward.
- As a clogged filter element may cause degradation of the performance, perform periodical inspection and replacement of the element.
- Do not disassemble or modify the product.
- Read the instructions and precautions enclosed with the product before use or maintenance.

F.R.L. unit (modular design)

Product-specific cautions

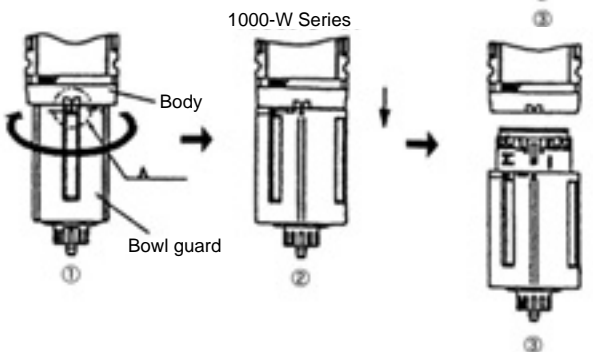
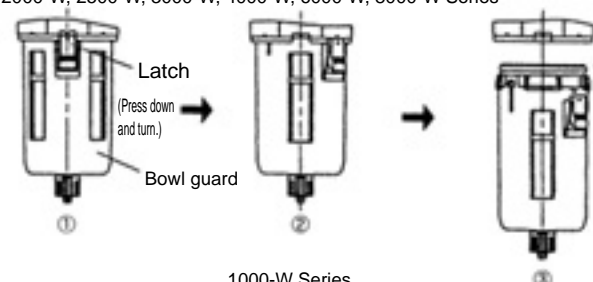
Drainage method



- Drainage starts when the cock is turned in the O direction, and the discharge stops when the cock is turned in the S direction. Tighten by hand in the S direction.
- When auto-drain is available, drainage is discharged automatically when it accumulates. Drainage can also be discharged manually.

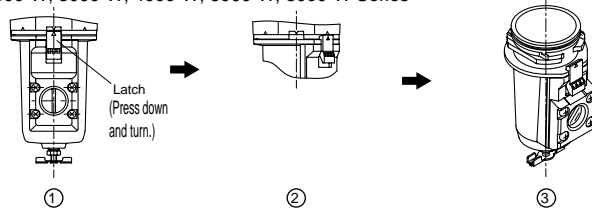
Removing the resin bowl

2000-W, 2500-W, 3000-W, 4000-W, 6000-W, 8000-W Series



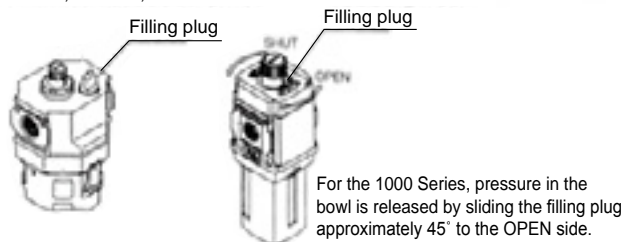
Removing the metal bowl

2000-W, 3000-W, 4000-W, 6000-W, 8000-W Series



Removing the filling plug

3000-W, 4000-W, 8000-W Series 1000-W Series

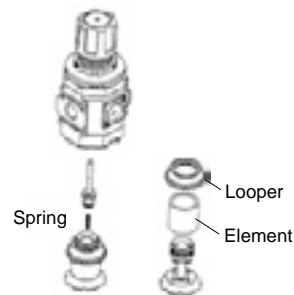


- Close the filling plug after lubricating.
- Never remove the bowl without removing the filling plug (while the bowl is pressurized). (L3000-W to L8000-W)
- For the 1000 Series, never remove the bowl with the filling plug at the SHUT side (while the bowl is pressurized). (L1000-W)

2. Filter/regulator

CAUTION

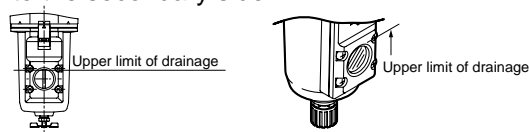
- Elements of W1000-W to W8000-W
Inspect the valve assembly when it is removed during maintenance.
Do not lose springs, etc., during maintenance.



3. Filter

WARNING

- Drain so that air filter moisture does not accumulate beyond the upper limit.
Components could malfunction if moisture flows into the secondary side.



Metal bowl

Metal bowl (flame-resistant, M1)

- The resin bowl must not be filled above the "upper drain limit" or "MAX LEVEL" markings stamped on the bowl guard.
- Ensure that large amounts of drainage do not flow directly from the piping. Install a drain discharger if there is a large amount of direct drainage.

CAUTION

- Submicron 0.3 μm element
This filter cannot be flushed with air, water, etc., and be reused. When the pressure drops to 0.07 MPa, replace the element with a new one. (excluding 1000 and 2000 Series)
- Oil mist filter
The mantle (element) life ends after one year (6000 hours) or when pressure drops to 0.1 MPa. (Excluding the X type) Replace the mantle with a new one at the end of its life. (Do not touch the urethane foam layer when replacing the mantle.)
- If a differential pressure indicator is provided, replace the mantle (element) before the differential pressure indicator's color changes completely to red.

4. Regulator, filter/regulator

CAUTION

- Pull the pressure adjustment knob and release the lock before setting the regulator pressure. The regulator could be damaged if the pressure is set without unlocking it.

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R (Reg)
L (Lub)
Drain Separ
Mech Press SW
Res press exh valve
SlowStart
Anti-bac/Bac-remove Filtr
Film Resist FR
Oil-ProhR
Med Press FR
No Cu/ PTFE FRL
Outdris FRL
Adapter Joiner
Press Gauge
CompFRL
LgFRL
PrecsR
VacF/R
Clean FR
ElecPneuR
AirBoost
Speed Ctrl
Silncr
CheckV/ other
Fit/Tube
Nozzle
Air Unit
PresCompn
Electro Press SW
ContactSW
AirSens
PresSW Cool
Air Flo Sens/Ctrl
WaterRISens
TotAirSys (Total Air)
TotAirSys (Gamma)
Gas generator
RefrDry
DesicDry
HiPolymDry
MainFiltr
Dischrg etc
Ending

F.R.L. unit (modular design)

F.R.L.
F.R.
F (Filtr)
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Gas generator
RefrDry
DesicDry
HiPolymDry
MainFiltr
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Ending

Use/maintenance

- Pull the pressure adjustment knob and release the lock before setting the regulator pressure. The regulator could be damaged if the pressure is set without unlocking it.
- Turning the knob in the L direction from set pressure 0 activates the stopper, and the knob will not turn. Note that if torque is forcibly applied in the L direction, the knob may lock and become inoperable.
- Pulsation may occur depending on the usage and piping conditions. If pulsation occurs, the working conditions or piping conditions should be changed, such as by lowering the primary pressure.
- When the regulator is left with the primary pressure released for long periods, return the set pressure to 0. External leakage may occur due to valve sticking.
- The facilities pressure changes from the initial setting due to the working environment and conditions, as well as aging of part materials. Check the pressure regularly, and reset if conditions have changed. Recompressing after discharging the primary pressure from the pressurized setting using the regulator and filter regulator may cause relief leakage. In this case, stop the supply air pressure, discharge, turn the pressure-adjusting knob in the step-down direction, and then supply the primary pressure. Then readjust the secondary pressure by turning the pressure regulator knob in the step-up direction.

5. Lubricator

⚠ WARNING

- Use Class 1 turbine oil (no additives) ISO VG32 for the lubricator. Other oils could cause breakage or improper operation.
- Removing lubricator filling plug
To prevent the filling plug from popping out, loosen the filling plug by one turn, and then completely depressurize the bowl before removing the filling plug. Wipe away any dirt around the filling plug that could scatter.

⚠ CAUTION

- Periodically replenish oil in the lubricator bowl so that it does not drop below the lower limit.
- When lubricating the L1000-W, pressure in the bowl is released by turning the filling plug. Refer to the section of Warnings **Use and maintenance** above for details on using the filling plug. (Lubrication is done while pipes are pressurized.) Check that there is no pressure in the bowl, remove the bowl and bowl guard, and then directly lubricate to the bowl. Refer to the previous page for details on removing the bowl.

- When lubricating the L3000-W to L8000-W, loosen the filling plug slightly to release pressure in the bowl, and then remove the filling plug. Refer to Warnings **Use and maintenance** on the previous page for details on using the filling plug. (Removing the filling plug enables lubrication to be done while pipes are pressurized.) Relubrication can also be done through the filling plug hole. The bowl can also be directly lubricated by removing the bowl and the bowl guard. Refer to the previous page for details on removing the bowl. With L8000, oil is supplied to the spacer by lubricating from the filling plug hole.

6. Pressure gauge

- Make sure that impact and vibration are not applied directly to the body.
- Leave a clearance of two scale marks or more between limit markers. Attempting to apply force at two scale marks or lower may lead to deformation or damage.

7. Oil-prohibited Series

⚠ CAUTION

- Before conducting maintenance, stop fluid supply and make sure that there is no residual pressure.
- Storage
Do not store this product in a hot, humid atmosphere or atmospheric conditions outside of the specified range for a prolonged period of time. Resin or rubber parts could deteriorate, and the resin bowl could become discolored. Contact CKD when storing products exceeding specifications.
- Release the lock before adjusting the pressure. Forcibly turning a locked pressure adjustment knob could cause damage.
- Adjust pressure in the direction of the pressure increase. The correct pressure cannot be set if pressure is adjusted downward.
- For non-relief, pressure reduction is not possible without consumption on the secondary side.

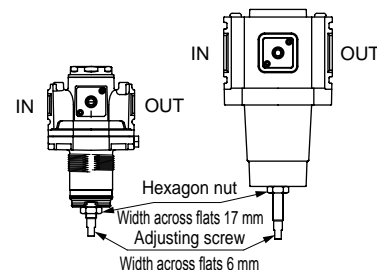
8. Outdoor Series

⚠ WARNING

- Do not disassemble the cover of the filter/regulator or regulator.

⚠ CAUTION

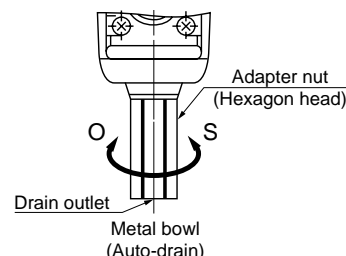
- Except when adjusting the pressure, tighten the hex nut and secure the adjusting screw. (Use without tightening may lead to damage.)



F.R.L. unit (modular design)

Product-specific cautions

- Do not apply a load to the product outside the parameters of use. (Do not climb/step onto the product.)
- Using the regulator with the cover facing downward may cause the pressure regulation to fail due to freezing. Be especially careful in low-temperature environments.
- The set pressure changes from the initial set point due to the working environment and conditions, as well as aging of part materials. Check the pressure regularly, and reset if conditions have changed.
- Perform regular maintenance every six months to one year.
- Consumable parts (metal bowl assembly, valve assembly, bottom spring, element, mantle assembly and O-ring) must be replaced every other year. Contact a CKD sales representative for details regarding consumable parts.
- When the set pressure is high, the operating force for rotating the adjusting screw (knob) will increase.
- Use only compressed air. Air containing corrosive gases, fluids or chemicals could result in improper pressure adjustment due to body damage or rubber deterioration.
- This product guarantees outdoor use, but not corrosion resistance (no rust or discoloration).
- Turning the knob in the L direction from set pressure 0 activates the stopper, and the knob will not turn. Note that if torque is forcibly applied in the L direction, the knob may lock and become inoperable.
- Fix the hex side of the adapter nut before screwing the fitting, etc., into the drain outlet of the metal bowl with auto-drain. If the the hex side of the adapter nut is not fixed, the product may break due to excessive screw-in of the adapter nut. When using the metal bowl with auto-drain, if the drain is piped with a tightening fitting, manual operation is not possible.
- Piston drain uses automatic discharge for intermittent flow. Drainage is not discharged under working conditions where air flows constantly.



Chemical resistance of plastic

⚠ WARNING

- The chemical resistance of plastic parts is shown below.
- Avoid using products where the compressed air or atmosphere contains chemicals, or where they could adhere to parts.
- Use in the above state could lead to bowl damage and accidents.
- Avoid using with these types of 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. Check whether the testing solutions, sealants and adhesives contain the following chemicals.

Types of chemicals	Categories of chemicals	Main products of chemicals	General applications	Polycarbonate bowl	Nylon Bowl	Nylon Body
Inorganic chemicals	Acids	Hydrochloric acid, sulfuric acid, hydrofluoric acid, phosphoric acid, chromic acid, etc.	Acid washing of metals, acidic degreasing / coating treatment solutions, etc.	×	×	×
	Alkalines	Caustic soda, caustic potash, calcium hydroxide, aqueous ammonia, alkalis such as sodium carbonate	Alkaline degreasing solution for metals Soluble coolant, leakage detection agent	×	○	○
	Inorganic salts	Sodium sulfide, sodium nitrate, potassium bichromate, sulfate of soda, etc.		×	○	○
Organic chemicals	Aromatic hydrocarbons	Benzene, toluene, xylene, ethyl benzene, styrene, etc.	Contained in paint thinner (benzene, toluene, and xylene)	×	×	×
	Chlorinated aliphatic hydrocarbons	Methyl chloride, ethylene chloride, methylene chloride, acetylene chloride, chloroform, trichlene, perchlene, carbon tetrachloride	Organic solvent-based washing solution for metals (trichlene, perchlene, carbon tetrachloride, etc.)	×	○	○
	Chlorinated aromatic hydrocarbons	Chlorobenzene, dichlorobenzene, benzene hexachloride (B/H/C), etc.	Agricultural chemicals	×	○	○
	Petroleum components	Solvent naphtha, gasoline, kerosene		×	○	○
	Alcohols	Methyl alcohol, ethyl alcohol, cyclohexanol, benzyl alcohol	Used as antifreezing agent Leakage detection agent	×	×	×
	Phenol	Carbolic acid, cresol, naphthol, etc.	Disinfectant solution	×	×	×
	Ethers	Methyl ether, methyl ethyl ether, ethyl ether	Additive of brake oil	×	○	○
	Ketones	Acetone, methyl ethyl ketone, cyclohexanone, acetophenone, etc.		×	×	×
	Carboxylic acids	Formic acid, acetic acid, butyl acid, acrylic acid, oxalic acid, phthalic acid, etc.	Dyes; oxalic acid for aluminum processing; phthalic acid for paint base Used as leakage detection agent	×	×	×
	Esters	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	×	○	○
	Oxyacids	Glycol acid, lactic acid, malic acid, citric acid, tartaric acid		×	×	×
	Nitro compounds	Nitromethane, nitroethane, nitroethylene, nitrobenzene, etc.		×	○	○
	Amines	Methylamine, dimethylamine, ethylamine, aniline, acetanilide, etc.	Additive of brake oil	×	×	×
	Nitriles	Acetonitrile, acrylonitrile, benzonitrile, acetoisonitrile, etc.	Raw material for nitrile rubber	×	○	○

○: Resistant, ×: Non-resistant (plastic will become damaged.)

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