



Pneumatic components (F.R.L. unit (large bore size))

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 (large bore size regulator, filter/regulator)

Design/selection

1. Common

⚠ WARNING

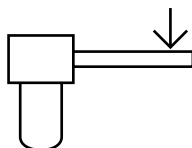
- The air filter, lubricator plastic bowl, lubricator drip window and pressure gauge lens are all made of polycarbonates. They cannot be used in environments containing synthetic oil, organic solvents, chemicals, coolant, screw locking agent, leak detection solutions, or hot water, etc., or where these substances may come in contact with the product.

Refer to page 485 for details on plastic bowl chemical resistance.

■ Piping load torque

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

	Rc1/8, Rc1/4	Rc3/8, Rc1/2, Rc3/4	Rc1 or higher
Max. torque N·m	15	50	100



⚠ 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.

■ Ultra 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.

- "F" NO auto-drain (exhaust when not pressurized)
- A compatible compressor must be used at 0.75 kW and over (discharge flow rate 0.09 m³/min. [ANR]). Air is purged with initial drainage until pressure reaches 0.1 MPa just after compressor operates.

- Set the working pressure to 0.1 MPa or more. "F1" NC auto-drain (no exhaust when not pressurized)
- 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. Piston drain "D"
- Set the working pressure to 0.1 MPa or more.
- Do not use this device on equipment that experiences impacts.
- Automatic discharge used for intermittent flow. Drainage is not discharged under working conditions where air flows constantly.

2. Filter

⚠ CAUTION

- Do not select using the port size.

- Use a pre-filter before the micro alescra filter/micro-naught. Use a filter (5 μm) or submicron filter as the pre-filter.

- Use a micro-naught micro alescra before the odor naught micro alescra air filter.

3. Regulator, F.R. unit

⚠ WARNING

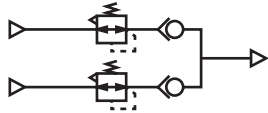
- Output pressure exceeding the regulator's set pressure could result in damage or faulty operation of the secondary side devices. Be sure to install a safety device.

- 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.
- The setting range for the regulator's secondary-side pressure should be within 85% of that of the primary side.
- The dial regulator cannot be used when the secondary pressure differs at high frequency or back pressure is applied on the secondary side with a balancer, etc.
- After setting pressure, do not release primary pressure or depressurize.
- 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.



4. 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.
- The Econo-mist has a check valve that allows the oil to be supplied in the pressurized state without stopping primary pressure.
Check that the bowl is not pressurized before supplying oil.
Check that the oil level in the bowl is between the upper and lower limits.

Mounting, installation and adjustment

1. Common

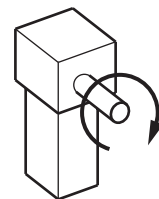
CAUTION

- Using the F.R.L. correctly
 - Avoid installing this product where it is subject to direct ultraviolet.
 - Set the regulator pressure setting upward. After setting the pressure, lock the handle. Check primary pressure carefully before setting pressure.
 - Check the arrow indicating the air inlet before connecting.
A reverse connection could result in improper operation.
 - Install the air filter and lubricator vertically with the bowl facing downward. Drainage may be defective or drip check may become impossible.
 - 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 use vertical piping.
Do not route it vertically. Pipe so that no lateral load is applied on the bowl.

Piping screw-in torque

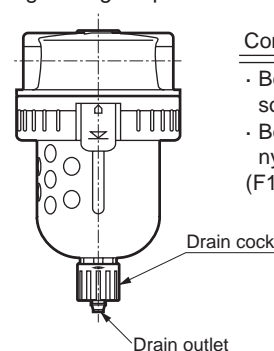
Make sure that excessive torque is not applied on the body and piping when piping.

	Rc1/8, Rc1/4	Rc3/8, Rc1/2	Rc3/4 or higher
Max. torque N·m	30	75	100



Plastic bowl drain piping

- The drain piping for the plastic bowl with manual drain cock has a barbed nipple and can be directly installed. However, confirm that the drain cock is closed before inserting the tube. Do not route it vertically. Pipe so that no lateral load is applied on the bowl.
The max. tightening torque of the drain cock is 0.5 N·m.



Compatible tube

- Bore size $\phi 5$ soft vinyl tube
- Bore size $\phi 5.7$ to $\phi 6$ nylon tube (F1508)

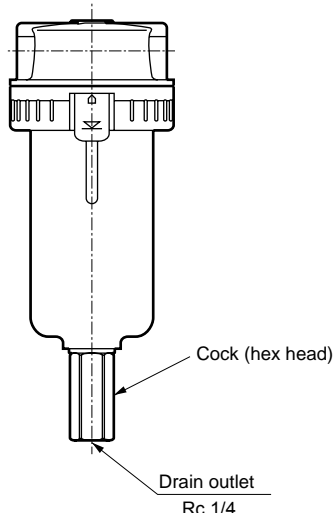
F.R.L.
F.R.
F (Filtr)
R (Reg)
L (Lub)
Drain Separ
Mech Press SW
Res press exh valve
SlowStart
Anti-bac/Bac-remove Filt
Film Resist FR
Oil-ProhR
Med Press FR
No Cu/ PTFE FRL
Outdrs FRL
Adapter Joiner Press Gauge
CompFRL
LgFRL
PrecsR
VacF/R
Clean FR
ElecPneuR
AirBoost
Speed Ctrl
Silncr
CheckV/ other
Fit/Tube
Nozzle
Air Unit
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

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Nozzle
Air Unit
PrecsCompn
Electro Press SW
ContactSW
AirSens
PresSW Cool
Air Flo Sens/Ctrl
WaterRtSens
TotAirSys (Total Air)
TotAirSys (Gamma)
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Ending

Mounting, installation and adjustment

CAUTION

- Drain piping of metal bowl with auto-drain
 - Fix the hex side of the cock before screwing the fitting, etc., into the Rc 1/4 female thread. When using the metal bowl with auto-drain, if the drain is piped with a tightening fitting, manual operation is not possible. Do not route it vertically. Pipe so that no lateral load is applied on the bowl.



2. F.R. unit

CAUTION

- Turn the pressure adjustment handle clockwise to increase the secondary pressure and counterclockwise to lower the pressure.
- Set the pressure while checking primary pressure.
- If the pressure cannot be adjusted, check the valve assembly for the adherence of foreign matter and check the O-ring for damage, etc.

3. Filter

CAUTION

- When piping, remove coolant and rust preventing agent, etc. Failure to observe will obstruct initial performance of the micro naught micro alescer filter and shorten its life. Coolant and rust preventing agent on the inside of pipes enters compressed air and adversely affects expensive pneumatic components or devices.

4. Regulator, F.R. unit

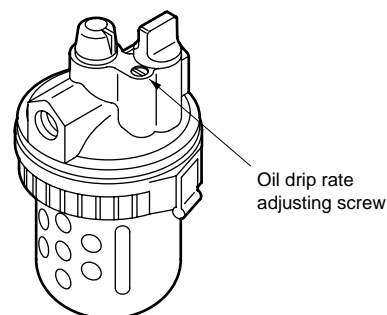
CAUTION

- When using the dial air regulator, turn the adjusting knob clockwise to increase the secondary pressure and counterclockwise to lower the pressure. Adjust pressure so the primary pressure is 0.1 MPa or more higher than set pressure. Do not turn ON and OFF frequently using the air valve.
- 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.

5. Lubricator

CAUTION

- Adjustment of the lubricator oil drip
 - Turn the adjusting screw to adjust oil drip. Check that the adjusting screw does not protrude past the body side. Failure to observe this could cause DANGER such as the adjusting screw dislocating and popping out.



Use/maintenance

1. Common

⚠ WARNING

- Check the air filter, lubricator plastic bowl and lubricator drip window for cracks, damage and other deterioration.
Replace the bowl with a new plastic or metal one and new window 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.
- Assembling parts for maintenance
 - For maintenance, wash parts and assemble without entry of cutting chips or other foreign matter.

⚠ CAUTION

- Check the oil drip rate once a day.
If the oil drip is faulty, problems could occur in the unit being lubricated.

■ Drain discharger

- Note that the compressor may generate oil oxides such as tar and carbon, so use clean air.
- Release air in the bowl before checking for draining problems of the 5100. After washing the drain unit, dry it with compressed air.

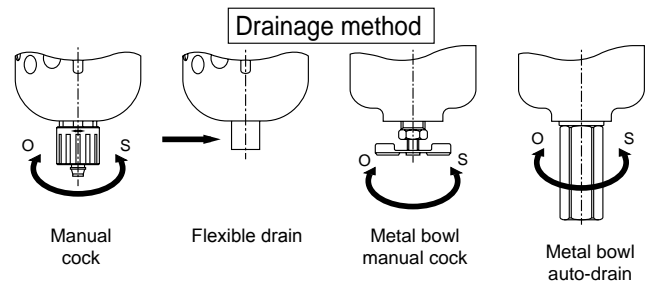
■ Storage

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.

2. 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.



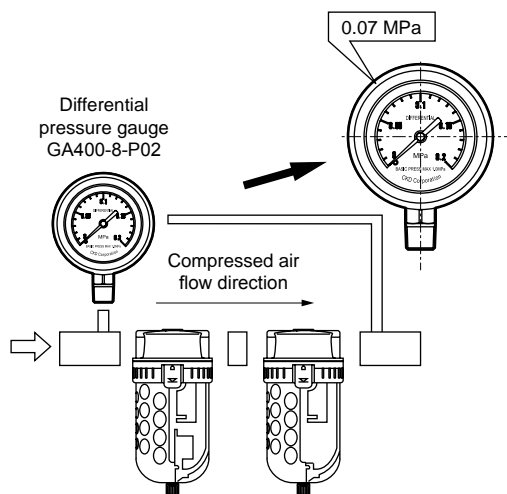
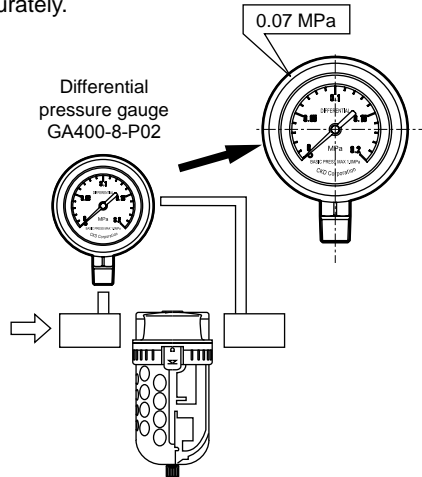
- Drainage starts when the cock is turned in the O direction and the discharge stops when the cock is turned in the S direction.
- When auto-drain is available, drainage is discharged automatically when it accumulates. Drainage can also be discharged manually.
- When using the flexible drain, the drainage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

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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

CAUTION

Filter

- Use the differential pressure gauge GA400-8-P02 to measure pressure drop. Measure the pressure drop accurately.



- The odor naught micro alescser air filter adsorbs odors with activated carbon, so life cannot be measured. When the micro naught micro alescser's pressure drops to 0.07 MPa, replace the mantle for the micro naught micro alescser at the same time.

Submicron 0.3 μm element

This filter cannot be washed and reused. When the pressure drops to 0.07 MPa, replace the Y element with a new one.

- The micro alescser (oil removal filter) mantle (element) service life is reached when the pressure drops to 0.07 MPa. Replace the mantle with a new one at the end of its life. (Do not touch the urethane foam layer when replacing the mantle.)

3. Regulator

CAUTION

- 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.
- For the remote control dial regulator, attach a pressure gauge to the body's gauge port and adjust the pilot pressure.

4. Lubricator

WARNING

- Use Class 1 turbine oil (no additives) ISO VG32 for the lubricator. Other oils could cause breakage or improper operation.
- Removing filling plug of lubricator
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.
- Periodically replenish oil in the lubricator bowl so that it does not drop below the lower limit.

Chemical resistance of plastic

⚠ 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.
- Using in the above state could lead to bowl damage and accidents.

- Avoid use 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 solution, coating treatment solution, etc.	×	×	×
	Alkalines	Alkalis such as caustic soda, caustic potash, calcium hydroxide, aqueous ammonia, 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, trichloroethylene, perchloroethylene, carbon tetrachloride	Organic solvent-based washing solution for metals (trichloroethylene, perchloroethylene, carbon tetrachloride)	×	○	○
	Chlorinated aromatic hydrocarbons	Chlorobenzene, dichlorobenzene, benzene hexachloride (BHC), 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 and leakage detection agents	×	×	×
	Esters	Dimethyl phthalate (DMP), diethyl phthalate (DEP), dibutyl phthalate (DBP), dioctyl phthalate (DOP)	Lubricant, synthetic coolant, rust preventing agent additive 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.)

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 Filt
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
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