Air-hydro Unit
Series CC

The air-hydro unit consists of a converter and a valve unit that are compactly integrated. It converts air pressure to an equivalent hydraulic pressure, and this hydraulic pressure is used for operating an actuator, thus solving the problem that is associated with the compression characteristics of air. Thus, in spite of using pneumatic equipment, it performs similarly to a hydraulic unit, operating at a constant speed during starting or in the presence of load fluctuations, and at the same time solving the problems of sticking and slipping associated with low speed operations. This unit is ideal for achieving accurate and constant speed of the cylinder, intermediate stopping, skip movement, or for slow operation of a rotary actuator.

A selection of valve units is available to suit your application.

Although the converter and the valve unit are integrated, they can also be operated by connecting individual piping.

High cylinder operation speed
Through the availability of a wide range of series in terms of converter capacity and valve unit flow rate control capability, speeds as high as 200mm/s (throttle valve) can be achieved with a ø80 cylinder. (Operating pressure: 0.5MPa, unloaded, piping: bore 19mm X 1m)

Examples of Application

1. Function of stop valve
   Prevents load dropping (in an emergency)

2. Function of skip valve
   Fast forward to working process

3. Flow control valve (With pressure compensation)
   Uniform driving for load fluctuations

4. Throttle valve/Speed controller
   Working without jumping at low speeds or when starting
   Control with throttle valve and speed controller when transferring and carrying

Fixed end point
(Not only solid but also liquid is available if there is pump mechanism at the end.)
Air-hydro Unit

Caution

Be sure to read before handling.

Data [A] Volume of cylinder/Capacity of converter

How to Select

1. Select the bore size of air-hydro cylinder
   First of all, select a bore size from data [G], <Theoretical Output Table>. When making a selection, the ratio between the theoretical output and the load should be 0.5 or less.

2. Select converter
   Select the nominal diameter and the effective oil level stroke from data [G], <Cylinder Displacement and Converter Capacity Diagram>. When selecting a converter by its nominal diameter, the converter's oil level speed should be 0.2m/s or less.

3. Select required function for valve unit
   Select a model from data [G], <Converter and Valve Unit Combinations and Applications Table> by determining the functions that are needed for the valve unit in accordance with your application.

4. Select the size of valve unit
   Using data [G], <Air-Hydro Cylinder's Maximum Operating Speed> as a reference, determine the size of a valve unit by determining whether it meets the desired cylinder operating speed.
   The model of an air-hydro unit that is suitable for a particular application is determined by the combination of the converter that was selected in steps 1 and 2, and the valve unit that was selected in steps 3 and 4. Refer to <How to Order> for details on how the models are indicated.

Cautions of Selection

1. Make sure to select a cylinder and a rotary actuator for an air-hydro operation. Do not use these for pneumatic operations because they will lead to oil leaks.
   Air-hydro cylinder: CA1(3 to 63), CQ2(3 to 63), CS1(3 to 63), CM1(63 to 180), CG1(63 to 180)
   Air-hydro rotary actuator: CRA1H(3 to 63)

2. When determining the size of a converter based on the <Cylinder Displacement and Converter Capacity Diagram>, do not select a converter bore that is too small for the cylinder's bore size because this will increase the oil level speed, causing the oil to blow out. Thus, select a converter bore so that the oil level speed will be 200mm/s or less.

Data [B] Combination of converter and valve unit/Operating purpose

How to view the diagram (ex: when using a ø100 to 450st cylinder): Draw a line perpendicularly from the cylinder stroke of 450 to the point at which it intersects the (curve) cylinder bore size of ø100, and extend it to the left to obtain the displacement of approximately 5,300cm³. Then, select a converter with a larger capacity. The converter will be ø160 to 300. To obtain the effective oil level stroke (mm), refer to the converter capacity diagram. The converter capacity diagram shows the effective oil level stroke (mm) and the oil level speed will be 200mm/s or less.

Operating purpose

For applications that do not require speed control, as long as objects are moved smoothly. For applications in which a pneumatic speed control surface (ø63mm), provided that fluctuation caused by operating pressures and loads are permissible.

Cautions of Selection

Air-hydro Unit

Caution

Be sure to read before handling.
How to Select an Applicable Model

Data Max. driving speed of valve unit and cylinder

<table>
<thead>
<tr>
<th>Cylinder: Operating press.: 0.3 to 0.7MPa</th>
<th>Cylinder: Operating press.: 0.5MPa</th>
<th>Cylinder: Operating press.: 0.5MPa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load ratio: 50% or less</td>
<td>Load ratio: 50% or less</td>
<td>Load ratio: 50% or less</td>
</tr>
<tr>
<td>Operating oil: Additive turbine oil Class 1 (ISO VG32)</td>
<td>Operating oil: Additive turbine oil Class 1 (ISO VG32)</td>
<td>Operating oil: Additive turbine oil Class 1 (ISO VG32)</td>
</tr>
<tr>
<td>Oil piping length: 1m</td>
<td>Oil piping length: 1m</td>
<td>Oil piping length: 1m</td>
</tr>
</tbody>
</table>

CCVS10, 11, 12, 13

CCVS20, 21, 22, 23

CCVS02

CCVS30, 31, 32, 33

CCVL20, 21, 22, 23

CCVL02

CCVL10, 11, 12, 13

Cautions of Circuit Construction

1. The converter’s oil level must be properly maintained because a slight oil leak from the sliding of the seal of the air-hydro cylinder can not be avoided.
2. Make sure to install an exhaust cleaner (AMC Series) on the direction switching valve.

Within the reciprocating movement of the actuator, if only the movement in one direction must be controlled, connect an air-hydro unit to the cylinder piping port of the control direction as shown in Fig. 1.

To operate (without synchronizing) two or more actuators with a single converter, use a valve unit with individual cylinders as shown in Fig. 2. The actuators will operate starting with the one that is the easiest to operate.

[Synchronized operation]

It is practically impossible to completely synchronize the operation of two or more cylinders. Therefore, a mechanical device must be used for regulating the operation of individual cylinders. The mechanical device must provide a level of rigidity that is appropriate for the cylinder thrust. If it lacks rigidity, it could apply an unbalanced load on the cylinders, leading to a considerable reduction in the durability of the cylinders.

Figure 1

Converter
Air-hydro unit
Operating direction

Figure 2

Converter
Valve unit
Converter
Valve unit
**How to Select an Applicable Model**

**Data**

<table>
<thead>
<tr>
<th>Bore (mm)</th>
<th>Piston (mm²)</th>
<th>Operating pressure (MPa)</th>
<th>Unit: N</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>8</td>
<td>OUT 314 62.8 94.2 126 157 188 220 251 283 314</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>10</td>
<td>IN 264 52.8 75.2 106 132 159 185 211 238 264</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>12</td>
<td>OUT 804 161 241 322 402 482 563 643 724 804</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>14</td>
<td>IN 1100 200 330 440 550 660 770 880 990 1100</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>20</td>
<td>OUT 1800 362 558 754 960 1160 1360 1560 1760 1960</td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>20</td>
<td>IN 1650 330 465 590 725 860 995 1130 1265 1400</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>25</td>
<td>OUT 2120 470 650 830 1010 1190 1370 1550 1730 1910</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>30</td>
<td>IN 2750 580 760 940 1120 1300 1480 1660 1840 2020</td>
<td></td>
</tr>
<tr>
<td>125</td>
<td>36</td>
<td>OUT 3560 770 960 1150 1340 1530 1720 1910 2100 2290</td>
<td></td>
</tr>
<tr>
<td>140</td>
<td>36</td>
<td>IN 4370 960 1250 1440 1630 1820 2010 2200 2390 2580</td>
<td></td>
</tr>
<tr>
<td>160</td>
<td>40</td>
<td>OUT 5380 1250 1540 1830 2120 2410 2700 2990 3180 3370</td>
<td></td>
</tr>
<tr>
<td>180</td>
<td>45</td>
<td>IN 6490 1540 1830 2120 2410 2700 3000 3300 3590 3780</td>
<td></td>
</tr>
<tr>
<td>200</td>
<td>50</td>
<td>OUT 7850 1870 2160 2450 2740 3030 3320 3610 3900 4190</td>
<td></td>
</tr>
<tr>
<td>250</td>
<td>60</td>
<td>IN 9600 2260 2550 2840 3130 3420 3710 4000 4290 4580</td>
<td></td>
</tr>
<tr>
<td>300</td>
<td>70</td>
<td>OUT 11300 2650 2940 3230 3520 3810 4100 4390 4680 4970</td>
<td></td>
</tr>
</tbody>
</table>

**Cautions for Designing the Circuit**

**Skip valve**

1. When using a skip valve, the maximum allowable ratio between the high speed and the low speed is approximately 4:1. If this ratio is too large, air bubbles could form due to cavitation, and air bubbles could lead to the conditions described in the single-side hydro pages 1), 2), 3), and 4) of the "Cautions/Common Precautions".

2. If the skip valve of an air-hydro unit with skip valve is operated, because it is not equipped with a speed control valve, the fast-forward speed will be determined by the model, piping conditions, and the actuator used. In this case, the cylinder could operate at extremely high speeds if the cylinder bore size is small. If it is necessary to control the fast forward speed, use a pneumatic speed controller as shown in Fig. 3.

3. If the cylinder is operated facing up, when the stop valve that is provided on the rod side is closed, the piston rod could descend when the pressure on the head side is turned to zero. To prevent this, a stop valve must also be provided on the head side.

4. Because the stop valve uses a metal seal, it has a slight leak. Due to this leakage, the cylinder could move in the amount that is shown in the diagram, after making an intermediate stop.

**Surge pressure**

- When the cylinder is operated at high speeds and reaches the stroke end, surge pressure could be created in the rod side or in the head side. At this time, if the stop valve of the rod side or the head side is closed, the surge pressure could become sealed in, preventing the stop valve from operating. This can be solved by closing the stop valve 1 to 2 seconds later.

**Temperature rise**

- When the cylinder is stopped at the stroke end, if the stop valve located opposite to the stroke end (which is the stop valve on the rod cover during retraction), and the stop valve on the head cover during extension) remains closed, the cylinder's internal pressure could increase with temperature, preventing the stop valve from opening. Therefore, do not close the stop valve in this condition.

**Jumping of pressure compensating mechanism**

- Be aware that the amount of jumping that is shown in Fig. 5 applies to the pressure compensating mechanism during the operation of the cylinder. "Jumping" is a condition in which the cylinder operates without control at a speed that is higher than the control speed.

**How to Operate the Stop Valve**

1. Operate the stop valve under meter-out control.
2. If the movement must be stopped at an intermediate position in both directions through the use of a stop valve, make sure to provide a stop valve for both the head side and the rod side.

3. Refer to the list below for response time of stop valve.

<table>
<thead>
<tr>
<th>Model</th>
<th>Response time</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCVL</td>
<td>0.11±0.015sec.</td>
</tr>
<tr>
<td>CCVLS</td>
<td>0.11±0.02sec.</td>
</tr>
</tbody>
</table>

**Intermediate stop accuracy of CCVS: 50mm/s X ±0.015sec. = ±0.75mm in case of 50mm/s**

**Figure 3**

**Figure 4**

**Figure 5**
Air-hydro Unit Series CC

Caution/Common Precautions

Be sure to read before handling

Air supply

- A mist separator prevents the intermixing of drainage, preventing the air hydro unit from malfunctioning, and prolonging the life of the oil.

Environment

- Avoid use near fire.
- Don't use in the clean room.

Mounting

- Install the converter vertically.
- Install the converter at a position that is higher than the cylinder. If placed lower than the cylinder, air accumulates in the cylinder. Use the air bleed valve on the cylinder to bleed the air. If the cylinder is not provided with an air bleed valve, loosen the hydraulic pipe to bleed.
- Leakage associated with the sliding movement inevitably occurs. In particular, with the single side hydro unit, the operating oil that leaks to the pneumatic side will be discharged from the switching valve, thus soiling the switching valve. Thus, install an exhaust cleaner (AMC Series). (Fig.6)

When the oil case of the exhaust cleaner becomes full, operating oil will blow out of the exhaust cleaner. Therefore, open the drain valve on a regular basis.

- The stop and skip valves must be "normally closed".
- Be aware that the specified speed might not be attained if there is restriction in the fittings or there are 90° bends.
- Air bubbles could form during operation due to cavitation. To prevent this:
  1) Configure the piping from the cylinder to the converter to have an ascending gradient.
  2) Shorten the hydraulic piping.

Maintenance

Double-side hydro

- Open as a double side hydro unit, leakage occurs with the sliding movement of the air-hydro cylinder, increasing the converter's operating fluid in one area and decreasing it in the other. Fig. 7 provides a countermeasure circuit. Maintain the converter's oil level at an appropriate level by opening valve A.

- Open the air bleeder valve on top of the cylinder, in order to fill it with oil.

- When the air no longer comes out intermixed with oil, close the oil filler plug. Then, introduce air pressure of approximately 0.05MPa into the converter's air port to push the oil into the cylinder. When air no longer comes out intermixed with oil, close the cylinder's air bleeder valve. Make sure that the oil level is near the upper limit mark on the level gauge, and replenish with oil if needed.

If the converter is positioned lower than the cylinder:

After filling with oil as described in step 1) above, close the oil filler plug. Then, introduce air pressure of approximately 0.05MPa into the converter's air port to push the oil into the cylinder. When air no longer comes out intermixed with oil, close the cylinder's air bleeder valve.

Perform the remaining steps in the same way as when the converter is located higher than the cylinder, in order to fill it with oil.

Turbine oil of ISO VG32

Use petroleum based turbine hydraulic operating oil. The use of non-combustible operating oil could lead to problems.

An appropriate viscosity is about 40 to 100cSt at the operating temperature. Using ISO VG32 oil, the temperature range will be between 15 and 35°C. To operate in a temperature range that exceeds that of the ISO VG32 oil, use ISO VG46 (25 to 45°C).

Fluid (Hydraulic fluid)

Use petroleum based turbine hydraulic operating oil. The use of non-combustible operating oil could lead to problems.

- An appropriate viscosity is about 40 to 100cSt at the operating temperature. Using ISO VG32 oil, the temperature range will be between 15 and 35°C. To operate in a temperature range that exceeds that of the ISO VG32 oil, use ISO VG46 (25 to 45°C).

Piping

- Before connecting the pipes, remove any foreign matter.
- The (T Series W (white)) nylon tubing can be used for hydraulic piping. Self-aligning fittings can be used for hydraulic piping, but one-touch fittings cannot be used.
- Make sure that there are no extreme differences in the bore of the pipes used for hydraulic piping. Also check for protrusions or burrs.
- Prevent air from being drawn into the hydraulic piping.
- When operating a stop valve or a skip valve with a solenoid valve, considering it is an external pilot, provide pneumatic piping with 0.3 to 0.7MPa of air pressure. The pressure for the pilot must be set to the operating pressure of the cylinder.
- To pneumatically operate a stop valve or a skip valve, set the signal air pressure to 0.3 to 0.7MPa. The pneumatic operating pressure must be set to the cylinder's operating pressure or higher.

Lubrication

If the converter is positioned higher than the cylinder:

1) Make sure to move the cylinder's piston to the stroke end of the side that will be filled with oil.

2) Open the air bleeder valve on top of the cylinder.

3) If equipped with a stop valve, provide a pilot pressure of approximately 0.2MPa to the stop valve, and maintain the stop valve in an open position through manual operation or by applying current.

4) Open the oil filler plug to fill with oil. When air no longer comes out intermixed with oil, close the cylinder's air bleeder valve. Make sure that the oil level is near the upper limit mark on the level gauge, and replenish with oil if needed.

5) Next, fill the opposite side with oil. Move the piston to the stroke end of the side that will be filled with oil, and perform steps 1) through 5) in the same sequence as described above.
Air-hydro Unit
Series CC

How to Order

Converter nominal size
63 63mm
100 100mm
160 160mm

Effective oil level stroke (mm)
S Small flow
L Large flow

Control valve
0 Flow control valve
1 Throttle valve
3 Timid flow control valve

Solenoid valve
1 100V AC (50/60Hz)
2 200V AC (50/60Hz)
3 24V DC
5 Others
0 Air operated valve
*: Options

Combined valve
0 None
1 Stop valve, Skip valve
2 Stop valve
3 Skip valve

A selection of valve units is available to suit your application.

High cylinder operation speed.
Through the availability of a wide range of series in terms of converter capacity and valve unit flow rate control capability, speeds as high as 200mm/s (throttle valve) can be achieved with a ø60 cylinder.
(Operating pressure: 0.5MPa, unloaded, piping: bore 19mm x 1m)

Although the converter and the valve unit are integrated, they can also be operated by providing individual piping.

Prevents condensation when air enters, thus minimizing the formation of drainage. Also prevents oil from splashing out during exhaust.
Prevents the contact of air and oil, and the intermixing of air and oil, thus stabilizing the operation speed.
Prevents the formation of air bubbles that is associated with the mixing of oil with air, thus stabilizing the speed.
The stop valve for intermediate stopping and the skip valve for fast-forwarding are compound integrated. It is also possible to use only one of the valves, depending on the application.
Enables constant movement even if there are load fluctuations.
## Air-hydro Unit Series CC

### Hydro Unit

![Diagram of Air-hydro Unit Series CC]

**Effective oil level stroke**

<table>
<thead>
<tr>
<th>Mode</th>
<th>Air port size (Rc (PT))</th>
<th>Oil port size (Rc (PT))</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>DA</th>
<th>DB</th>
<th>DL</th>
<th>EA</th>
<th>EB</th>
<th>EL</th>
<th>F</th>
<th>GA</th>
<th>GB</th>
<th>GL</th>
<th>H</th>
<th>KA</th>
<th>KB</th>
<th>KL</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC63-2/G</td>
<td>7/16</td>
<td>5/8</td>
<td>104</td>
<td>186</td>
<td>64</td>
<td>86</td>
<td>53</td>
<td>121.8</td>
<td>98</td>
<td>151.5</td>
<td>35</td>
<td>18</td>
<td>35</td>
<td>104</td>
<td>45</td>
<td>86</td>
<td>45</td>
<td>83</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>CC100-2/G</td>
<td>7/16</td>
<td>5/8</td>
<td>139</td>
<td>259</td>
<td>92</td>
<td>116</td>
<td>123</td>
<td>61</td>
<td>121.8</td>
<td>98</td>
<td>156.5</td>
<td>35</td>
<td>18</td>
<td>35</td>
<td>109</td>
<td>65</td>
<td>96</td>
<td>45</td>
<td>88</td>
<td>65</td>
</tr>
<tr>
<td>CC100-2/G</td>
<td>7/16</td>
<td>5/8</td>
<td>139</td>
<td>259</td>
<td>92</td>
<td>116</td>
<td>123</td>
<td>61</td>
<td>133.8</td>
<td>124</td>
<td>185.5</td>
<td>40</td>
<td>24</td>
<td>50</td>
<td>140</td>
<td>65</td>
<td>116</td>
<td>66</td>
<td>112</td>
<td>85</td>
</tr>
<tr>
<td>CC160-2/G</td>
<td>7/16</td>
<td>5/8</td>
<td>202.5</td>
<td>319.5</td>
<td>144</td>
<td>180</td>
<td>183</td>
<td>60</td>
<td>133.8</td>
<td>134</td>
<td>181.5</td>
<td>40</td>
<td>24</td>
<td>50</td>
<td>136</td>
<td>93</td>
<td>116</td>
<td>66</td>
<td>108</td>
<td>81</td>
</tr>
</tbody>
</table>

### L dimension

<table>
<thead>
<tr>
<th>Mode</th>
<th>NB</th>
<th>NL</th>
<th>P</th>
<th>QB</th>
<th>QL</th>
<th>S</th>
<th>T</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC63-2/G</td>
<td>62.5</td>
<td>28</td>
<td>3</td>
<td>86</td>
<td>30</td>
<td>0</td>
<td>11</td>
<td>9.5</td>
</tr>
<tr>
<td>CC100-2/G</td>
<td>82.5</td>
<td>33</td>
<td>5</td>
<td>120</td>
<td>32</td>
<td>2</td>
<td>13</td>
<td>7</td>
</tr>
<tr>
<td>CC100-2/G</td>
<td>92</td>
<td>33</td>
<td>5</td>
<td>120</td>
<td>32</td>
<td>2</td>
<td>13</td>
<td>7</td>
</tr>
<tr>
<td>CC160-2/G</td>
<td>120</td>
<td>29</td>
<td>0</td>
<td>185</td>
<td>46</td>
<td>2.5</td>
<td>20</td>
<td>7</td>
</tr>
</tbody>
</table>

### Effective oil level stroke

<table>
<thead>
<tr>
<th>Mode</th>
<th>Effective oil level stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC63-2/G</td>
<td>29.5</td>
</tr>
<tr>
<td>CC100-2/G</td>
<td>53</td>
</tr>
<tr>
<td>CC160-2/G</td>
<td>53</td>
</tr>
</tbody>
</table>

*Hexagon socket head cap screw is used for mounting hole.*
Air-hydro Converter
Series **CCT**

### How to Order

- **CCT** 63 100

<table>
<thead>
<tr>
<th>Air-hydro converter</th>
<th>Effective oil level stroke (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Converter nominal size/stroke (mm)</td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>50, 100, 200, 300, 400, 500</td>
</tr>
<tr>
<td>100</td>
<td>100, 200, 300, 400, 500, 600</td>
</tr>
<tr>
<td>160</td>
<td>200, 300, 400, 500, 600, 700, 800</td>
</tr>
</tbody>
</table>

### Specifications

<table>
<thead>
<tr>
<th>Operating pressure</th>
<th>0 to 0.7MPa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proof pressure</td>
<td>1.05MPa</td>
</tr>
<tr>
<td>Ambient and fluid temperature</td>
<td>5 to 50°C</td>
</tr>
<tr>
<td>Fluid</td>
<td>Turbine oil (40 to 100cSt)</td>
</tr>
</tbody>
</table>

#### Converter standard effective oil level stroke/effective volume (cm³)

<table>
<thead>
<tr>
<th>Nominal size (mm)</th>
<th>Standard effective oil level stroke (mm)</th>
<th>Limited flow (l/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>63</td>
<td>150 300 600 890 1190 1485</td>
<td>—</td>
</tr>
<tr>
<td>100</td>
<td>750 1510 2260 3010 3770 4620</td>
<td>—</td>
</tr>
<tr>
<td>160</td>
<td>— 3660 5490 7320 9150 12810 14640 217</td>
<td></td>
</tr>
</tbody>
</table>

*Limited flow shows the limit of converter oil level speed (0.2m/s) which can maintain stability of converter oil level.

### CCT40 Effective oil level stroke

- **CCT40**

Because the CCT40 is a converter for an actuator with a small capacity, it cannot be made into an air-hydro unit. Instead, use an individual CC valve unit or a speed controller (AS2000, AS3000, AS4000, etc.) through a pipe connection.

### Specifications

<table>
<thead>
<tr>
<th>Operating pressure</th>
<th>0 to 0.7MPa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proof pressure</td>
<td>1.05MPa</td>
</tr>
<tr>
<td>Ambient and fluid temperature</td>
<td>5 to 50°C</td>
</tr>
<tr>
<td>Fluid</td>
<td>Turbine oil (40 to 100cSt)</td>
</tr>
<tr>
<td>Nominal size (mm)</td>
<td>40</td>
</tr>
</tbody>
</table>

#### Converter standard effective oil level stroke/effective volume

<table>
<thead>
<tr>
<th>Standard effective oil level stroke (mm)</th>
<th>50 100 150 200 300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective volume (cm³)</td>
<td>60 120 180 250 370</td>
</tr>
</tbody>
</table>

*Limited flow shows the limit of converter oil level speed (0.2m/s) which can maintain stability of converter oil level.
Air-hydro Converter Series CCT

Air-hydro Converter/CCT63/CCT100/CCT160

<table>
<thead>
<tr>
<th>Model</th>
<th>Air port size Rc (PT)</th>
<th>Oil port size Rc (PT)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>DA</th>
<th>DB</th>
<th>DL</th>
<th>H</th>
<th>NL</th>
<th>P</th>
<th>QG</th>
<th>QL</th>
<th>S</th>
<th>T</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCT63-□</td>
<td>3/4</td>
<td>3/4</td>
<td>104</td>
<td>88</td>
<td>64</td>
<td>86</td>
<td>88</td>
<td>53</td>
<td>45</td>
<td>28</td>
<td>3</td>
<td>86</td>
<td>30</td>
<td>0</td>
<td>11</td>
<td>9.5</td>
</tr>
<tr>
<td>CCT100-□</td>
<td>3/4</td>
<td>1</td>
<td>139</td>
<td>125</td>
<td>92</td>
<td>116</td>
<td>128</td>
<td>61</td>
<td>65</td>
<td>33</td>
<td>5</td>
<td>120</td>
<td>32</td>
<td>2</td>
<td>13</td>
<td>7</td>
</tr>
<tr>
<td>CCT160-□</td>
<td>3/4</td>
<td>1/2</td>
<td>202.5</td>
<td>185</td>
<td>144</td>
<td>180</td>
<td>183</td>
<td>60</td>
<td>93</td>
<td>29</td>
<td>0</td>
<td>185</td>
<td>46</td>
<td>2</td>
<td>20</td>
<td>10</td>
</tr>
</tbody>
</table>

Effective oil level stroke (mm)

- CCT63-□ : 228.5, 278.5, 328.5, 378.5, 403.5, 463.5, 520.5
- CCT100-□: 286, 316, 341, 386, 416, 431, 461
- CCT160-□: 399, 424, 459, 524, 569, 624

L dimension

Effective oil level stroke (mm)

**Air-hydro Converter/(CCT40)**

**L dimension (Effective oil level stroke)**

<table>
<thead>
<tr>
<th>Effective oil level stroke (mm)</th>
<th>50</th>
<th>100</th>
<th>150</th>
<th>200</th>
<th>300</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>213.5</td>
<td>263.5</td>
<td>313.5</td>
<td>363.5</td>
<td>463.5</td>
</tr>
</tbody>
</table>

* Hexagon socket head cap screw is used for mounting.
Valve Unit
Series CCVS/CCVL

How to Order

CCV S 1 1 U1

Valve unit size
S: Small flow
L: Large flow

Control valve
0: None
1: Flow control valve (With pressure compensator)
2: Throttle valve
3: Timed flow control valve

Combined valve
0: None
1: Stop valve + Skip valve
2: Stop valve
3: Skip valve

Additional symbol
S: Single valve
U: Unit for CC63 (Unit mounted to CCT63)
U: Unit for CC100 and CC160 (Unit mounted to CCT100 and 160)

Electrical entry
0: Air operated
G: Grommet
C: Conduit
D: DIN terminal

Solenoid valve rating voltage
0: No combined valve
1: 100V AC (50/60Hz)
2: 200V AC (50/60Hz)
5: 24V DC
9: Others
0: Air operated

Specifications

- Operating pressure
  Combined valve: 0 to 0.7MPa
  Throttle valve: 0 to 0.7MPa
  Flow control valve: 0.3 to 0.7MPa

- External pilot pressure
  Combined valve: 0.3 to 0.7MPa

- Proof pressure
  Combined valve: 1.05MPa

- Ambient & fluid temperature
  Fluid: 5 to 50°C

- Fluid
  Combined valve: Turbine oil (40 to 100cSt)

- Effective area
  Combined valve
  Control valve free open
  Control valve free flow

- Min. control flow l/min
  Combined valve
  Control valve free open
  Control valve free flow

- Pressure compensating ability
  Combined valve
  S: ±10%

- Pressure compensating range
  Combined valve
  Load ratio: 40% compared to theoretical

- Valve type
  N.C.
### Valve Unit Series CCVS/CCVL

#### Solenoid valve specifications of combined valve (stop valve/skip valve)

<table>
<thead>
<tr>
<th>Valve unit</th>
<th>Nominal size (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small flow</td>
<td>63, 100</td>
</tr>
<tr>
<td>Large flow</td>
<td>100, 160</td>
</tr>
</tbody>
</table>

#### Applicable converter

<table>
<thead>
<tr>
<th>Model</th>
<th>Series CCVS/CCVL</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCVS02-CL-S</td>
<td></td>
</tr>
<tr>
<td>CCVS21-22/23-CL-S</td>
<td></td>
</tr>
<tr>
<td>CCVL02-CL-S</td>
<td></td>
</tr>
<tr>
<td>CCVL21-22/23-CL-S</td>
<td></td>
</tr>
</tbody>
</table>

#### Solenoid valve function plate

<table>
<thead>
<tr>
<th>Solenoid valve style</th>
<th>N.C.*</th>
<th>N.O.**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stop valve</td>
<td>CL</td>
<td>OP</td>
</tr>
<tr>
<td>Skip valve</td>
<td>CL</td>
<td>OP</td>
</tr>
</tbody>
</table>

*Valve opens when solenoid valve conducts electricity.
**Valve opens when solenoid valve stops conducting electricity.

#### Valve Unit Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Series CCVS/CCVL</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCVS02-CL-S</td>
<td></td>
</tr>
<tr>
<td>CCVS21-22/23-CL-S</td>
<td></td>
</tr>
<tr>
<td>CCVL02-CL-S</td>
<td></td>
</tr>
<tr>
<td>CCVL21-22/23-CL-S</td>
<td></td>
</tr>
</tbody>
</table>

#### Diagrams

- Stop valve side
- Skip valve side
- Oil port size
- Screw for mounting on the wall

#### Notes

- *Pitch of mounting on the wall is CA and CL.
- Valve opens when solenoid valve stops conducting electricity.

---

**Valve Unit Series CCVS/CCVL**

4.12-11
If intricate speed control is unnecessary and the changes in speed due to load fluctuations can be tolerated, the pneumatic speed controller can be used as a control valve. The minimum controllable flow volume of the speed controller is 3 l/min. The speed controller and the converter must have individual pipe connections. They cannot be integrated into a unit.