CN20, CN34 SERIES
NON-SPRING RETURN DIRECT-COUPLED DAMPER ACTUATORS
FOR MODULATING AND FLOATING / 2-POSITION CONTROL

PRODUCT DATA

GENERAL
These direct-coupled damper actuators provide modulating control for:
- air dampers,
- VAV units,
- air handling units,
- ventilation flaps,
- louvers, and
- reliable control for air damper applications with up to 4.6 m² / 50 sq. ft. (20 Nm / 177 lb-in) or 7.8 m² / 85 sq. ft. (34 Nm / 300 lb-in) (seal-less dampers; air friction-dependent).

FEATURES
- Self-centering shaft adapter
- Access cover to facilitate connectivity
- Service/off for safe & easy servicing
- Rotation direction selectable by switch
- Declutch for manual adjustment
- Mechanical end limits
- Field-installable auxiliary switches
- Mountable in any orientation (no IP54 if upside down)
- Mechanical position indicator
- CE and UL certified

SPECIFICATIONS
Supply voltage 24 Vac/dc ±15%, 50/60 Hz;
Nominal voltage 24 Vac/dc, 50/60 Hz;
All values stated hereinafter apply to operation under nominal voltage conditions.
Power consumption CN7220A2007 6 VA / 3 W
CN7234A2008 6 VA / 3 W
Ambient limits
Ambient operating limits -20...+60 °C (-5...+140 °F)
Ambient storage limits -40...+80 °C (-40...+175 °F)
Relative humidity 5...95%, non-condensing
Safety
Protection standard IP54 as per EN 60529
Protection class II as per EN 60730-1
Overvoltage category II
Lifetime
60000
Repositions 1.5 million
Mounting
Round damper shaft 10...27 mm (3/8...1-1/16")
Square damper shaft 10...18 mm (3/8...11/16");
45° steps
Shaft length min. 22 mm (7/8")
Control signal
0(2)...10 Vdc
Input impedance >100 kΩ [0...10 V]
500 Ω [0...20 mA]
Feedback signal
Limits ± 1 mA at 0...10 V
End switches (when included)
Rating 5 A (resistive) / 3 A (inductive)
Triggering points 5° / 85°
Torque rating
CN7220A2007 20 Nm (177 lb-in)
CN7234A2008 34 Nm (300 lb-in)
Runtime
95 sec (60 Hz) / 110 sec (50 Hz or DC supply)
Rotation stroke
95° ± 3°
Dimensions see "Dimensions" on page 8
Weight (without cables) 1.35 kg (3 lbs.)
Noise rating 40 dB(A) max. at 1 m
Certification CE & UL
MODELS

<table>
<thead>
<tr>
<th>Model #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CN7220A2007</td>
<td>20Nm, 24Vac/Vdc, Modulating and floating/2-position control, Non-Spring return, Voltage Feedback Signal and without aux. Switch</td>
</tr>
<tr>
<td>CN7234A2008</td>
<td>34Nm, 24Vac/Vdc, Modulating and floating/2-position control, Non-Spring return, Voltage Feedback Signal and without aux. Switch</td>
</tr>
</tbody>
</table>

PRODUCT IDENTIFICATION SYSTEM

<table>
<thead>
<tr>
<th>Model #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>Direct Coupled Actuator</td>
</tr>
<tr>
<td>N</td>
<td>Fail Safe Function (Non-Spring Return)</td>
</tr>
<tr>
<td>61</td>
<td>24V Floating/2-position Control</td>
</tr>
<tr>
<td>72</td>
<td>24V Modulating and Floating/2-position Control</td>
</tr>
<tr>
<td>46</td>
<td>230V Floating/2-position Control</td>
</tr>
<tr>
<td>20</td>
<td>20 Nm (177 lb-in)</td>
</tr>
<tr>
<td>34</td>
<td>34 Nm (300 lb-in)</td>
</tr>
<tr>
<td>A</td>
<td>Standard Model</td>
</tr>
<tr>
<td>1</td>
<td>No Feedback</td>
</tr>
<tr>
<td>2</td>
<td>Voltage Feedback Signal</td>
</tr>
<tr>
<td>0</td>
<td>No Internal Auxiliary Switches</td>
</tr>
<tr>
<td>2</td>
<td>Two Internal Auxiliary Switches</td>
</tr>
<tr>
<td>XX</td>
<td>System Controlled Numbers</td>
</tr>
</tbody>
</table>

OPERATION / FUNCTIONS

Legend for Fig.2:
1 Self-centering shaft adapter
2 Retainer clip
3 Rotational angle scales (0…90° / 90…0°)
4 Mechanical end limits
5 Declutch button
6 Anti-rotation bracket
7 Function Selection Switch
8 Access cover

Contents of Package
The delivery package includes the actuator itself, parts 1 through 8 (see Fig.2), the anti-rotation bracket screws, and installation instruction.

RUN MODES
The function selection switch (see Fig 3) is used to place the actuator into any one of five different modes:
- 2-10V, modulating control; floating/2-position control, cw run
- 0-10V/Dir, modulating control; floating/2-position control, cw run
- Service/Off, actuator stop running
- 10-0V/Rev, modulating control; floating/2-position control, ccw run
• 10-2V, modulating control; floating/2-position control, ccw run

Fig.3. Function selection switch

Power-Off Behavior
If power is removed, the actuator retains its position.

Service/Off
If the function selection switch is set to the "Service/Off" position, all rotary movement is cancelled, and all control signals are ignored, thus allowing the actuator to be safely manually operated.

Floating/2-Position Run Mode
If the function selection switch has been set to one of the four positions (2-10V, 0-10V/Dir, 10-0V/Rev, 10-2V) – and the actuator is wired as Floating/2-position mode (see A2 and A3) – then as soon as operating power is applied, the actuator will run clockwise or counterclockwise.

Modulating Run Mode
If the function selection switch has been set to one of the four positions (2-10V, 0-10V/Dir, 10-0V/Rev, 10-2V) – and the actuator is wired as modulating mode (see A1) – as soon as operating power is applied, the actuator will run according to the control signals applied. The actuator will output the voltage feedback signal (0/2-10V) proportional to the actuator's actual position. Alternatively, if terminal 4 is wired and powered on, the actuator will override the control signal and immediately come to a position of 0% of max. stroke.

Table 1 describes the actuator behavior (stops, rotates CCW, or rotates CW) for the floating mode in relation to the control signals applied to terminals 3 and 4 and to the function selection switch setting.

Table 2 describes the actuator behavior (stops, rotates CCW, or rotates CW) for the 2-position mode in relation to the control signals applied to terminals 3 and 4 and to the function selection switch setting.

Table 3 describes the actuator behavior (stops, rotates CCW, rotates CW, runs in proportional position, or runs to 0% of max. stroke) for the modulating mode in relation to the control signals applied to terminals 3 and 4 and to the function selection switch setting.

<table>
<thead>
<tr>
<th>Control signal at</th>
<th>Function selection switch settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal 3</td>
<td>Terminal 4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2...10V</th>
<th>0...10V /Dir</th>
<th>Service / Off</th>
<th>10...0V /Rev</th>
<th>10...2 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>open</td>
<td>open</td>
<td>stops</td>
<td>stops</td>
<td>stops</td>
</tr>
<tr>
<td>24 Vac/dc</td>
<td>open</td>
<td>CCW</td>
<td>CCW</td>
<td>stops</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Control signal at</th>
<th>Function selection switch settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal 3</td>
<td>Terminal 4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2...10V</th>
<th>0...10V /Dir</th>
<th>Service / Off</th>
<th>10...0V /Rev</th>
<th>10...2 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 Vac/dc</td>
<td>open</td>
<td>CW</td>
<td>CW</td>
<td>stops</td>
</tr>
<tr>
<td>24 Vac/dc</td>
<td>24 Vac/dc</td>
<td>CCW</td>
<td>CCW</td>
<td>stops</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Control signal at</th>
<th>Function selection switch settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal 3</td>
<td>Terminal 4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2...10V</th>
<th>0...10V /Dir</th>
<th>Service / Off</th>
<th>0...10V /Rev</th>
<th>10...2 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open</td>
<td>open</td>
<td>0% (most left)</td>
<td>0% (most left)</td>
<td>stop</td>
</tr>
<tr>
<td>24 Vac/dc</td>
<td>open</td>
<td>0% (most left)</td>
<td>0% (most left)</td>
<td>stop</td>
</tr>
<tr>
<td>&lt; min. control signal plus 0.24V</td>
<td>open</td>
<td>0% (most left)</td>
<td>0% (most left)</td>
<td>stop</td>
</tr>
<tr>
<td>24 Vac/dc</td>
<td>open</td>
<td>proportional</td>
<td>proportional</td>
<td>proportional</td>
</tr>
<tr>
<td>between min. control signal plus 0.24V and max. control signal minus 0.24V</td>
<td>open</td>
<td>proportional</td>
<td>proportional</td>
<td>proportional</td>
</tr>
<tr>
<td>&gt; max. control signal minus 0.24V</td>
<td>open</td>
<td>0% (most left)</td>
<td>0% (most left)</td>
<td>stop</td>
</tr>
<tr>
<td>24 Vac/dc</td>
<td>open</td>
<td>0% (most left)</td>
<td>0% (most left)</td>
<td>stop</td>
</tr>
</tbody>
</table>
Adaption will be carried out only when:
- Modulating models only, such as CN7220A2007, CN7234A2008, etc,
- actuator is wired in modulating mode (see Fig. A1)
- the control signal's value rises up into the upper dead band (i.e., to more than the max. control signal minus 0.14V) or drops down into the lower dead band (i.e., to less than the min. control signal plus 0.14V), and if the shaft adapter can remain at the respective (upper or lower) mechanical end limit at least 3 seconds, the actuator will recognize the new position automatically, and auto-adaption is happened (see Fig. 4).

**Sleep Mode**

When actuator reaches end stop or any obstacles blocking its running, it will fall into sleep mode automatically. Actuator will periodically start up and try to resume running, which will save energy significantly through whole service life.

**Overriding**

An override is a condition in which a 24 V signal is applied to terminal 4 of an actuator in the modulating mode, thus causing the actuator to ignore the control signal at terminal 3, whereupon it will instead move to a position of 0% of its maximum stroke. It would be the most left side [0/2~10V mode] or most right side [10~0/2 V mode] (see Table 3).

**Feedback**

If correspondingly wired (see A1), the actuator provides, via terminal 5, a feedback signal (0/2~10V) proportional to the actual position of the actuator (see Fig. 5).

**Dip Switches**

The actuator is equipped with two dip switches (only switch 1 selectable) accessible after removing the access cover (see Fig. 7).
Voltage/Current Control Signal Selection Dip Switch
In its default shipping position, the voltage/current control signal dip switch (see Fig. 7) is set to **OFF** (= voltage control), as shown in Fig. 7. Setting it to **ON** results in current control 4...20mA.

Position Indication
The hub adapter indicates the rotation angle position by means of the rotational angle scales (0...90° / 90...0°).

Manual Adjustment

**IMPORTANT**
In order to prevent equipment damage, you must remove power set the rotation direction switch to the "Service/Off before manual adjustment. After removing power or setting the rotation direction switch to the "Service/Off" position, the gear train can be disengaged using the declutch button, permitting the actuator shaft to be manually rotated to any position. The feedback signal will then follow the new position.

Limitation of Rotation Stroke
Two mechanical end limits (adjustable in 5° increments) are provided to limit the angle of rotation as desired (see Fig.9).

Internal End Switches
**NOTE:** Applicable to models with internal switches only.
The internal end switches are set to change from "common" to "normally open" at angles of 5° and 85°, respectively, from the totally counterclockwise position.

INSTALLATION
These actuators are designed for single-point mounting.

**IMPORTANT**
In order to prevent equipment damage, you must remove power or set the rotation direction switch to the "Service/Off" position before manual operation.

Mounting Instructions
All information and steps are included in the installation instructions supplied with the actuator.

Mounting Position
The actuators can be mounted in any desired orientation (no IP54 if mounted upside down; see Fig.11). Choose an orientation permitting easy access to the actuator's cables and controls.

Mounting Bracket and Screws
If the actuator is to be mounted directly on a damper shaft, use the mounting bracket and screws included in the delivery package.

Self-Centering Shaft Adapter
The self-centering shaft adapter can be used for shafts having various diameters (10...27 mm [3/8...1-1/16"]) and shapes (square or round).

In the case of short shafts, the shaft adapter may be reversed and mounted on the duct side.
Stroke Limitation with Mechanical End Limits
The mechanical end limits enable the stroke to be limited from 0...90° in increments of 5°.

Wiring
Connecting to the Power Supply
In order to comply with protection class II, the power source of 24 V actuators must be reliably separated from the network power supply circuits as per DIN VDE 0106, part 101.

Access cover
To facilitate wiring the actuator to the controller, the access cover can be detached from the actuator.

**IMPORTANT**
Remove power before detaching the access cover. Once the access cover has been removed, please take care to avoid damaging any of the parts now accessible.

Fig. 12. Access cover(models with internal switches)
Depending upon the model, the access cover may have one or two terminal strips, including a layout with a description for each of the terminals.

Fig. 13. Actuator with access cover removed

(models with internal switches)

**OPTIONAL ACCESSORIES**
The following optional accessories can be ordered separately.

**Auxiliary Switch Kit**
Order no.: SW2

The auxiliary switches are field-installable parts providing two SPDT freely-adjustable switches.

**SPARE PARTS**

**Spare Parts Kit**
Order no.: A7209.2071
The spare parts kit contains the following items:

- Anti-rotation bracket and screws
- Access cover screw
- Plastic protective cap for protection standard IP54
- Mechanical end limit screw and retainer

**Anti-Rotation Bracket Kit**
Order no.: A7209.2073
The anti-rotation bracket kit can be ordered separately.

Contains:

- 10 anti-rotation brackets
- 20 screws
Wiring Diagrams

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Function selection switch</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A1 CN7220A2007, CN7234A2008 MODULATING</strong></td>
<td><strong>A2 CN7220A2007, CN7234A2008 FLOTTING</strong></td>
</tr>
<tr>
<td>1</td>
<td>24 V~/+/</td>
</tr>
<tr>
<td>2</td>
<td>↓/−</td>
</tr>
<tr>
<td>3</td>
<td>Y 0[2]−10V</td>
</tr>
<tr>
<td>4</td>
<td>0%</td>
</tr>
<tr>
<td>5</td>
<td>POS 0[2]−10V</td>
</tr>
<tr>
<td>6</td>
<td>override option</td>
</tr>
</tbody>
</table>

**NOTE:** Internal end switches S1 and S4 must be connected to the same power source.

Below 2 tables summarize the information presented in the preceding wiring diagrams.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Modulating</th>
<th>Floating</th>
<th>2-position</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>24 V ~/+ (power)</td>
<td>unused</td>
<td>unused</td>
</tr>
<tr>
<td>2</td>
<td>common ↓/−</td>
<td>common ↓/−</td>
<td>common ↓/−</td>
</tr>
<tr>
<td>3</td>
<td>0[2]...10 V (control)</td>
<td>24 V ~/+ (control signal)</td>
<td>24 V ~/+ (control signal)</td>
</tr>
<tr>
<td>4</td>
<td>24 V ~/+ (override)</td>
<td>24 V ~/+ (control signal)</td>
<td>24 V ~/+ (control signal)</td>
</tr>
<tr>
<td>5</td>
<td>0[2]...10 V (feedback)</td>
<td>unused</td>
<td>unused</td>
</tr>
</tbody>
</table>

**NOTE:** All cables connected to these terminals must be equipped with spark suppression.

<table>
<thead>
<tr>
<th>Connecting cable</th>
<th>Terminal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>End switches (Models with internal switches only)</td>
<td>CCW (left) 5°</td>
<td>S1 common</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S2 normally closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S3 normally open</td>
</tr>
<tr>
<td></td>
<td>CW (right) 85°</td>
<td>S4 common</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S5 normally closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S6 normally open</td>
</tr>
</tbody>
</table>
DIMENSIONS