AD20-P, AD34-P
NON-SPRING RETURN DAMPER ACTUATOR
20/34 Nm (177/300 lb-in) FOR MODULATING CONTROL

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

- **New self-centering shaft adapter**
- **Access cover to facilitate connectivity**
- **Declutch for manual adjustment**
- **Mechanical end limits**
- **Field-installable auxiliary switches**
- **Rotation direction selectable by switch**
- **Mountable in any orientation (no IP54 if upside down)**
- **Mechanical position indicator**

SPECIFICATIONS

Supply voltage	24 Vac ±20%, 50/60 Hz; 24 Vdc -10...+20%
Nominal voltage	24 Vac, 50/60 Hz; 24 Vdc

All values stated hereinafter apply to operation under nominal voltage conditions.

Power consumption	
AD20-P	6 VA / 6 W
AD34-P	8 VA / 6 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
Protection class	II as per EN 60730-1
Overvoltage category	II
Lifetime	
Full strokes	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 0(4)...20 mA
Input impedance	100 kΩ [0...10 V] 500 Ωm [0...20 mA]
Feedback signal	
Limits	± 1 mA at 0...10 V
Auxiliary switches	
Optional accessory ACCA-AD2034-SW2	
Torque rating	
AD20-P	20 Nm (177 lb-in)
AD34-P	34 Nm (300 lb-in)
Runtime	95 sec (60 Hz) / 110 sec (50 Hz)
Rotation stroke	95° ± 3°
Dimensions	see "Dimensions" on page 8
Weight	1.35 kg (3 lbs.)
Noise rating	45 dB(A) max. at 1 m
Software	Class A as per EN 60730-1

MODELS

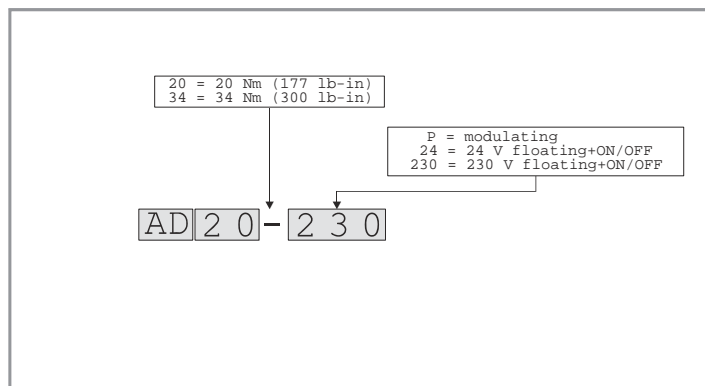| order number	supply voltage	aux. switches	control signal	feedback	torque
AD20-P	24 Vac	--	0...10 Vdc / 0...20 mA	0...10 Vdc	20 Nm (177 lb-in)
AD34-P	24 Vac	--	0...10 Vdc / 0...20 mA	0...10 Vdc	34 Nm (300 lb-in)

Product Identification System

Fig. 1. Product Identification System
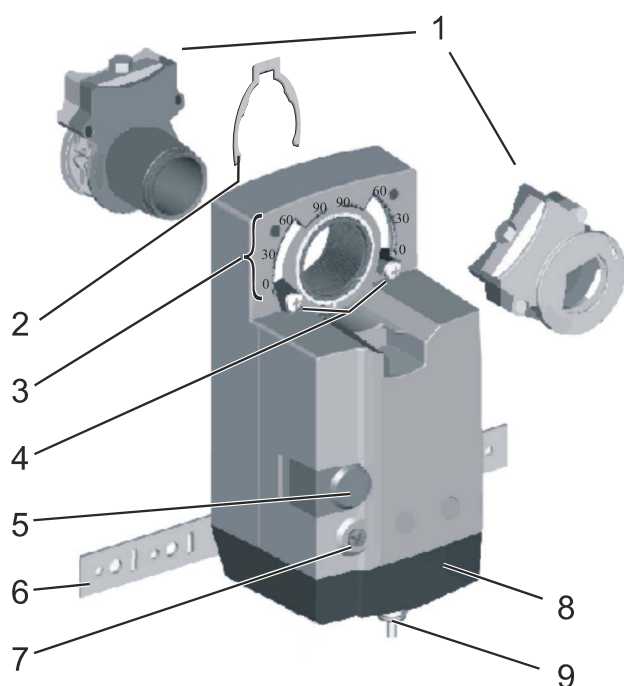
OPERATION / FUNCTIONS

Fig. 2. Setting units and control elements

Legend for Fig. 2:
1 Self-centering shaft adapter
2 Retainer clip
3 Rotational angle scales (0...90° / 90...0°)
4 Mechanical end limits (20 Nm [177 lb-in] models, only)
5 Declutch button
6 Anti-rotation bracket
7 Rotation direction switch
8 Access cove
9 M20 cable gland

Contents of Package

The delivery package includes the actuator itself, parts 1 through 9 (see Fig. 2), the anti-rotation bracket screws, and the SM mounting plate and screws.

Modulating Control

The actuator is capable of being operated by several controllers providing Vdc or mA output.

Rotary Movement

The control signal and the corresponding rotation direction (clockwise or counterclockwise) can be selected using the rotation direction switch (see part 7 in Fig. 2), thus eliminating the need to re-wire. To ensure tight closing of the dampers, the actuator has a total rotation stroke of 95°.

As soon as operating power is applied, the actuator may start to run. When power is removed, the actuator remains in position. For actuator-controller wiring instructions, see section "Wiring" on page 5.
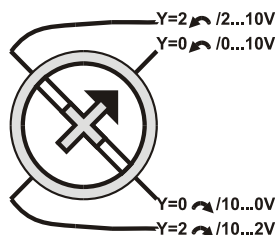
Rotation Direction Switch

Fig. 3. Rotation Direction Switch

Table 1. Feedback/control signal values

rotation direction switch position	feedback/control signal when actuator is	
	totally ↶	totally ↷
Y=2 ↶/2...10V	U = 2 V	U = 10 V
Y=0 ↶/0...10V*	U = 0 V	U = 10 V
Y=0 ↷/10...0V	U = 10 V	U = 0 V
Y=2 ↷/10...2V	U = 10 V	U = 2 V
* Default shipping position.		

Feedback Signal and Manual Adjustment

If, while the actuator is not rotating, the user declutches it and manually repositions the shaft adapter, the feedback signal will then follow the new position at which the shaft adapter has been left.

Power OFF/ON Behavior

In case the power to the actuator fails, after re-applying power, the actuator aknowledges its present position and follows the signal from the controller. This makes it unnecessary for the actuator to employ autoadaption in order to re-map the control signal settings.

Dip Switches

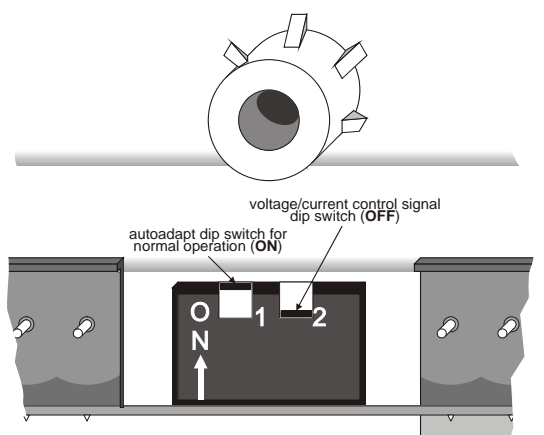The actuators are equipped with two dip switches accessible after removing the access cover (see Fig. 4).

Fig. 4. Dip switches (view with PCB at bottom)

Autoadapt Dip Switch for Normal Operation

In its default shipping position, the autoadapt dip switch for normal operation is set to **ON** as shown in Fig. 4. If it is set to OFF, no autoadapting is performed, and the control signal map remains constant.

The autoadapt functionality does not have to be triggered. Rather, the SmartAct actuator does this automatically when the min. and max. control signals are provided (see Fig. 5); the feedback signal is likewise autoadapted.
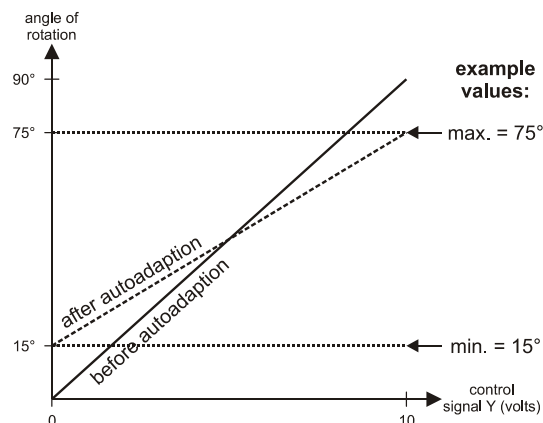

Fig. 5. Actuator positioning curve

Adjusting the Actuator for Autoadapt

In order to make use of the autoadapt functionality, proceed as follows:

1. Set the autoadapt dip switch to the ON position.
2. If necessary, limit the stroke to the desired range using the mechanical end limits.
3. Drive the actuator to the left end limit (totally counter-clockwise) by setting the control signal as specified in Table 1.
4. Drive the actuator to the right end limit (totally clockwise) by setting the control signal as specified in Table 1. The stroke has now been limited to 0...100% of the control signal range.

Voltage/Current Control Signal Selection Dip Switch

In its default shipping position, the voltage/current control signal dip switch (see Fig. 4) is set to **OFF** (= voltage control). as shown in Fig. 4. Setting it to ON results in current control.

Position Indication

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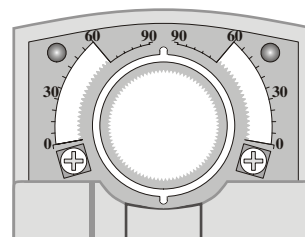

Fig. 6. Position indication

Manual Adjustment

IMPORTANT

In order to prevent equipment damage, you must remove power before manual adjustment.

After removing power, 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 3° increments) are provided (20 Nm [177 lb-in] models, only) to limit the angle of rotation as desired (see Fig. 7).
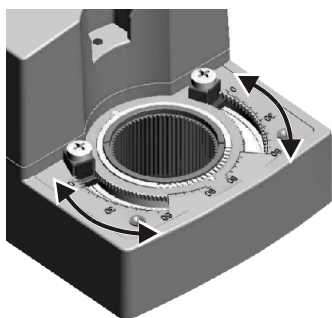

Fig. 7. Mechanical end limits

The mechanical end limits must be securely fastened in place as shown in Fig. 8. Specifically, it is important that they properly mesh with the rotational angle scales when the screws are tightened.
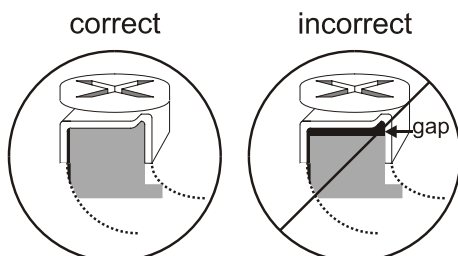

Fig. 8. Correct / incorrect tightening of end limits

Auxiliary Switches

NOTE: End switch functionality is provided by optional accessory ACCA-AD2034-SW2.

ACCA-AD2034-SW2 provides auxiliary switches which are freely adjustable between 0 and 90 °

Override

If terminal Y of the terminal strip (see section "Wiring Diagrams" on page 6) is unplugged, the stroke will be 0%; reversing the rotation direction using the rotation direction switch will result in a max. stroke of 100%. If terminal Y is jumped with terminal 1 (24 Vac), the stroke will be 50%.

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. 9). Choose an orientation permitting easy access to the actuator's cables and controls.
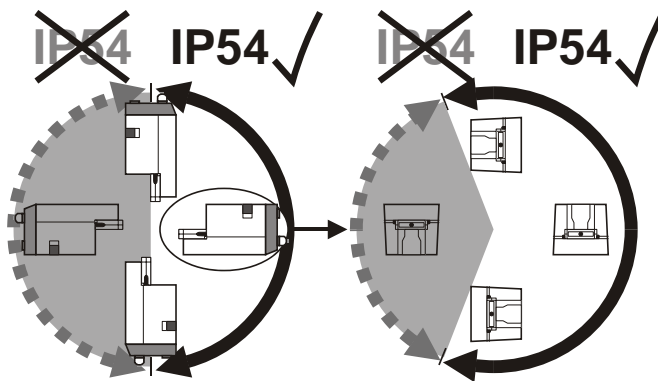

Fig. 9. Mounting for IP54

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 (20 Nm [177 lb-in] models, only) enable the stroke to be limited from 0...90° in increments of 3°.

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.
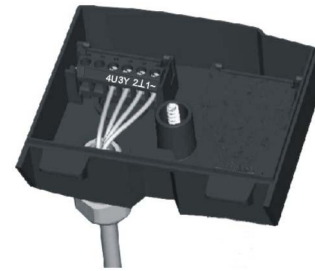

Fig. 10. Access cover (AD20-P)

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.
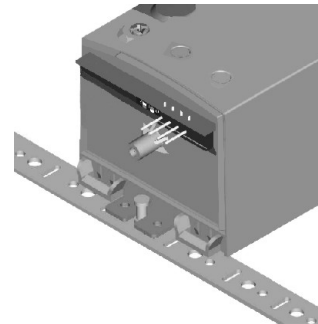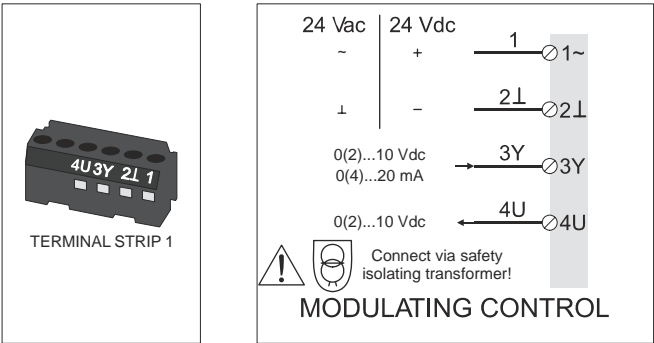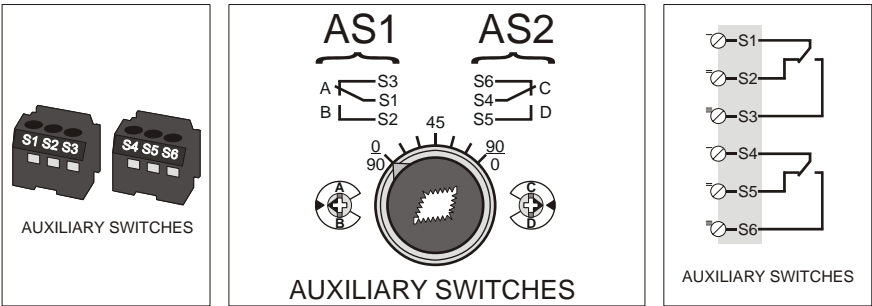

Fig. 11. AD20-P with access cover removed

Wiring Diagrams

AD20-P / AD34-P

TERMINAL STRIP 1

24 Vac	24 Vdc		
~	+	1	⊘1~
⊥	–	2⊥	⊘2⊥
0(2)...10 Vdc		3Y	⊘3Y
0(4)...20 mA			
0(2)...10 Vdc		4U	⊘4U

⚠ Connect via safety isolating transformer!

MODULATING CONTROL

ACCA-AD2034-SW2

AUXILIARY SWITCHES

AS1   AS2

A — S3   S6 — C
B — S1   S4 —
    S2   S5 — D

0 / 90   45   90 / 0

AUXILIARY SWITCHES

⊘—S1
⊘—S2
⊘—S3
⊘—S4
⊘—S5
⊘—S6

AUXILIARY SWITCHES

connecting cable	terminal	name
supply and signal lines (must be equipped with spark suppressors)	1~	24 Vac ~ / 24 Vdc +
	2⊥	24 Vac ~ / 24 Vdc -
	3Y	0(2)…10 Vdc / 0(4)…20 mA control signal
	4U	0(2)…10 V feedback signal

OPTIONAL ACCESSORIES

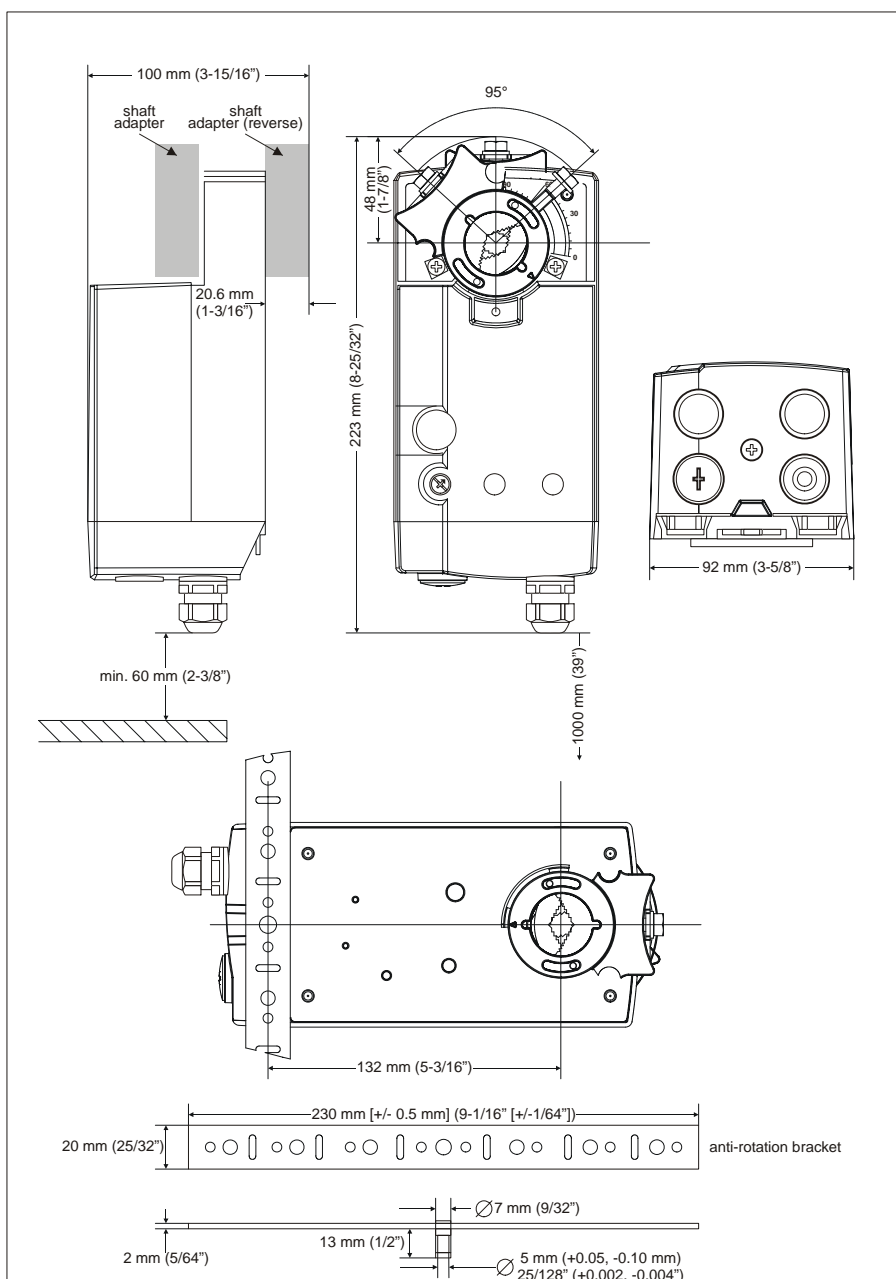The following optional accessories can be ordered separately.

Auxiliary Switch Kit

Order no.: ACCA-AD2034-SW2
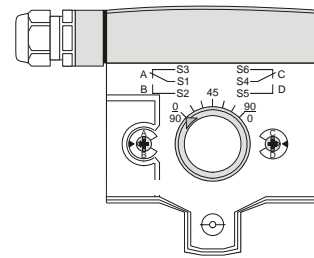
The auxiliary switches are field-installable parts providing two SPDT freely-adjustable switches.

DIMENSIONS

DISPOSAL

WEEE Directive:

At the end of their useful life the packaging and product should be disposed of by a suitable recycling centre.
Do not dispose of with normal household waste.
Do not burn.

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