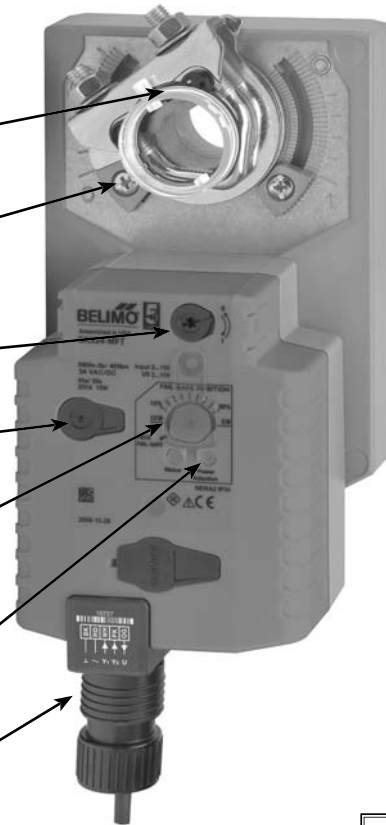


# A CLOSER LOOK...

- Brushless DC Motor for Added Accuracy and Controllability
- Cut Labor Costs with Simple Direct Coupling
- Self-Centers on 1.05" or 3/4" with the Standard Clamp
- Check Damper Position with Clear Position Indicator
- Don't Worry about Actuator Burn-Out; Belimo is Overload Proof throughout Rotation
- Enjoy Added Flexibility with Easy Mechanical Stops to Adjust Angle of Rotation
- Need to Change Control Direction? Do it easily with a Simple Switch
- Easily Accessible Manual Override Button helps you Pre-Tension Damper Blades
- Auxiliary Switch and Feedback Potentiometer Add-Ons Mount Directly on Clamp, Includes Conduit Connector
- Added Flexibility to Select Clamp, Electrical Connection, and Running Time to fit your Specific Application with Belimo's New Flexible Line of Actuators
- Preset the Fail Position in 10% increments
- Patented loading of the caps for longer life
- Programmable delay for brown outs and quick power dips
- Front Panel LED to notify if there are issues with the caps
- Standard 3ft Plenum Rated Cable and Conduit Connector Provided on Basic Models



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## The Belimo Difference

- *Customer Commitment*  
Extensive product range. Application assistance.  
Same-day shipments. Free technical support. Five year warranty.
- *Low Installation and Life-Cycle Cost*  
Easy installation. Accuracy and repeatability.  
Low power consumption. No maintenance.
- *Long Service Life*  
Components tested before assembly. Every product tested before shipment.  
30+ years direct coupled actuator design.

# GKB24-3, GKX24-3

On/Off, Floating Point, Electronic Fail-Safe, Direct Coupled, 24V



Technical Data	GKB24-3, GKX24-3
Power supply	24VAC ±20% 50/60Hz
Power consumption	12W (3W)
Transformer sizing	21VA (class 2 power source)
Electrical connection	18 GA plenum rated cable ½" conduit connector protected NEMA 2 (IP54) 3 ft [1m] 10 ft [3m] 16 ft [5m]
Overload protection	electronic throughout 0 to 95 rotation
Operation range Y	on/off, floating point
Input impedance	1500 Ω
Feedback output U	2 to 10VDC, 0.5mA max, VDC variable
Angle of rotation	max. 95°, adjustable with mechanical stop electronically variable
Torque	360 in-lb [40 Nm]
Direction of rotation	reversible with  switch
Fail-safe position	adjustable with dial, 0 to 1 in 10° increments
Position indication	reflective visual indicator (snap-on)
Manual override	external push button
Running time	
normal operation	150 seconds (default), variable 90 to 150 seconds
fail-safe	35 seconds
Humidity	5 to 95% RH non-condensing (EN 60730-1)
Ambient temperature	-22°F to +122°F [-30°C to +50°C]
Storage temperature	-40°F to +176°F [-40°C to +80°C]
Housing	NEMA2, IP54, UL enclosure type 2
Housing material	UL94-5VA
Agency list	cULus acc. to UL 60730-1A/-2-14 CAN/CSA E60730-1:02 CE acc. to 2004/108/EC and 2006/95/EC
Noise level	< 45dB(A)
Servicing	maintenance free
Quality standard	ISO 9001
Weight	3.85 lbs [1.75 kg]
Initial charge	5 to 20 seconds
Bridge time	2 second delay before fail-safe activates

Torque min. 360 in-lb for control damper surfaces up to 90 sq ft.

## Application

For on/off and floating point, fail-safe control of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications. The actuator is mounted directly to a damper shaft up to 1.05" in diameter by means of its universal clamp. The actuator is mounted directly to a damper shaft up to 1.05" in diameter by a universal clamp. A crank arm and several mounting brackets are available for applications where actuator cannot be direct coupled to the damper shaft. Control is floating point from a triac or relay, or On/Off from an auxiliary contact from a fan motor contactor, controller or manual switch.

## Operation

The GK..24-3 actuator provides 95° of rotation and a visual indicator shows the position of the actuator. When reaching the damper or actuator end position, the actuator automatically stops. The gear can be manually disengaged by pressing the button located on the actuator cover. The GK..24-3 actuators use a brushless DC motor, which is controlled by an Application Specific Integrated Circuit (ASIC). The ASIC monitors and controls the actuators rotation and provides a digital rotation sensing (DRS) function to prevent damage to the actuator in a stall condition. Power consumption is reduced in a holding mode. The actuator is electronically protected against overload. The anti-rotation strap supplied with the actuator will prevent lateral movement. Add-on auxiliary switches or feedback potentiometers are easily fastened directly onto the actuator body for signaling and switching functions.

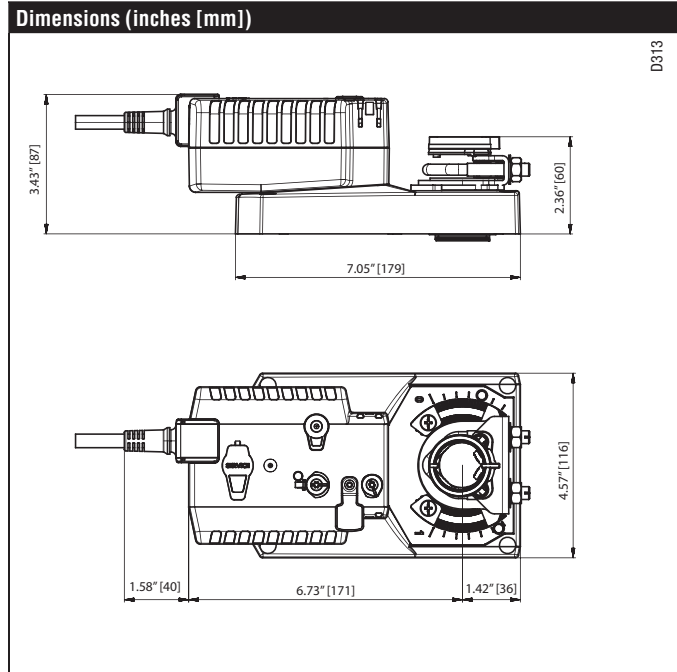
## Fail-Safe Indication

Green LED status indicator light sequence:

On: operation ok, no faults

Blinking: fail-safe mechanism is active

Off: fault is detected or not in operation / capacitors charging



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### Accessories

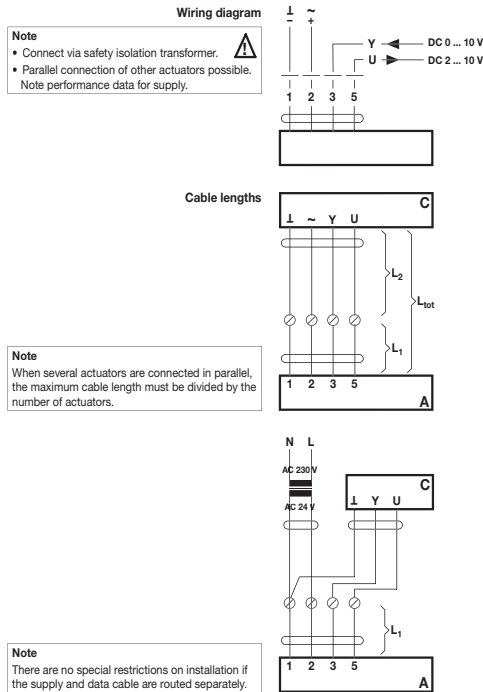
K-GM20	3/4" [20mm] Shaft Clamp
ZG-102	Multiple Actuator Mounting Bracket
ZG-GMA	Crank arm Adaptor Kit
ZG-JSA (-1,2,3)	Jackshaft Adaptors for Hollow Jackshafts
ZS-100	Weather Shield - Steel
ZS-150	Weather Shield - Polycarbonate
ZS-260	Explosion Proof Housing
ZS-300 (-1) (-5)	NEMA 4X Housing
Tool-07	13 mm Wrench
PS-100	Actuator Power Supply Simulator
S1A, S2A	Auxiliary Switch(es)
P370	Shaft Mount Auxiliary Switch
P...A	Feedback Potentiometers

**Note:** When using GKB24-3, GKX24-3 actuators, only use accessories listed on this page.

### Typical Specification

On/off, floating point control damper actuators shall be electronic direct-coupled type, which require no crank arm and linkage and be capable of direct mounting to shaft up to 1.05" diameter. Actuators shall have brushless DC motor technology and be protected from overload at all angles of rotation. Actuators shall have reversing switch and manual override on the cover. Run time shall be constant and independent of torque. Actuators shall be cULus listed, have a 5-year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

### Electrical Installation



**Cable colors:**

- 1 = black
- 2 = red
- 3 = white
- 4 = pink

- A = Actuator
- C = Control unit
- L1 = Belimo connecting cable, 1 m (4 x 0.75 mm<sup>2</sup>)
- L2 = Customer cable
- Ltot = Maximum cable length

Cross section L2 I / ~	Max. cable length Ltot = L1 + L2		Example for DC
	AC	DC	
0.75 mm <sup>2</sup>	≤30 m	≤5 m	1 m (L1) + 4 m (L2)
1.00 mm <sup>2</sup>	≤40 m	≤8 m	1 m (L1) + 7 m (L2)
1.50 mm <sup>2</sup>	≤70 m	≤12 m	1 m (L1) + 11 m (L2)
2.50 mm <sup>2</sup>	≤100 m	≤20 m	1 m (L1) + 19 m (L2)

- A = Actuator
- C = Control unit
- L1 = Belimo connecting cable, 1 m (4 x 0.75 mm<sup>2</sup>)

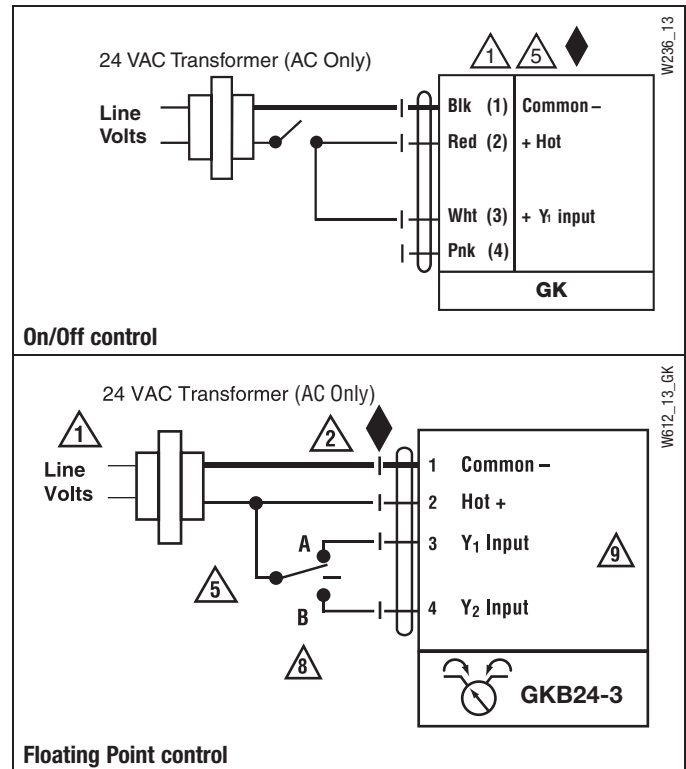
### Wiring Diagrams

#### INSTALLATION NOTES

- Provide overload protection and disconnect as required.
- CAUTION Equipment Damage!** Actuators may be connected in parallel if not mechanically mounted to the same shaft. Power consumption and input impedance must be observed.
- Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.
- Contact closures A & B also can be triacs.
- A & B should both be closed for triac source and open for triac sink.
- For triac sink the common connection from the actuator must be connected to the hot connection of the controller.

#### APPLICATION NOTES

- Meets UL requirements without the need of an electrical ground connection.
- WARNING Live Electrical Components!** During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



# GKX24-3-T N4, GKB24-3-T N4H

NEMA 4, On/Off, Floating Point Control, Electronic Fail-Safe, Direct Coupled, 24V



Technical Data	GKX24-3-T N4, GKB24-3-T N4H
Power supply	24 VAC ±20% 50/60Hz
Power consumption	12W (3W) / heater 21 W
Transformer sizing	21VA (class 2 power source) / heater 21 VA
Electrical connection	screw terminal (for 22 to 12 GA wire) ½" conduit connector
Overload protection	electronic throughout 0 to 95° rotation
Control	on/off, floating point
Input impedance	1500 Ω
Angle of rotation	max. 95°, adjustable with mechanical stop
Torque	360 in-lb [40 Nm] minimum
Direction of rotation	reversible with  switch
Fail-safe position	adjustable with dial, 0 to 1 in 10° increments
Position indication	dial
Running time	150 seconds
motor (fail-safe)	35 seconds
Humidity	max. 95% RH non-condensing
Ambient temperature	-22°F to 122°F [-30°C to 50°C]
with heater	-40°F to 122°F [-40°C to 50°C]
Storage temperature	-40°F to 176°F [-40°C to 80°C]
Housing	UL Type 4, NEMA 4, IP66
Housing material	polycarbonate
Agency listings†	cULus acc. to UL 60730-1A/-2-14 CAN/CSA E60730-1, CSA C22.2 No. 24-93, CE acc. to 2004/108/EC
Noise level	<45dB(A)
Servicing	maintenance free
Quality standard	ISO 9001
Weight	8.95 lbs [4.05 kg]; 9.45 lbs [4.3 kg] with heater
Initial charge	5 to 20 seconds
Bridge time	2 second delay before fail-safe activates

†Rated Impulse Voltage 800V, Type of action 1, Control Pollution Degree 3.

Torque min. 360 in-lb for control of damper surfaces up to 90 sq ft.

## Application

For on/off and floating point, fail-safe control of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications. The actuator is mounted directly to a damper shaft up to 1.05" in diameter by means of its universal clamp. The actuator is mounted directly to a damper shaft up to 1.05" in diameter by a universal clamp. Control is floating point from a triac or relay, or On/Off from an auxiliary contact from a fan motor contactor, controller or manual switch.

## Operation

The GK..24-3-T N4 actuator provides 95° of rotation and a visual indicator shows the position of the actuator. When reaching the damper or actuator end position, the actuator automatically stops. The gears can be manually disengaged by pressing the button located on the actuator cover. The GK..24-3-T N4 actuator uses a sensorless brushless DC motor, which is controlled by an Application Specific Integrated Circuit (ASIC). The ASIC monitors and controls the actuator's rotation and provides a digital rotation sensing (DRS) function to prevent damage to the actuator in a stall condition. Power consumption is reduced in a holding mode. The actuator is electronically protected against overload. The anti-rotation strap supplied with the actuator will prevent lateral movement. Add-on auxiliary switches or feedback potentiometers are easily fastened directly onto the actuator body for signaling and switching functions.

## Fail-Safe Indication

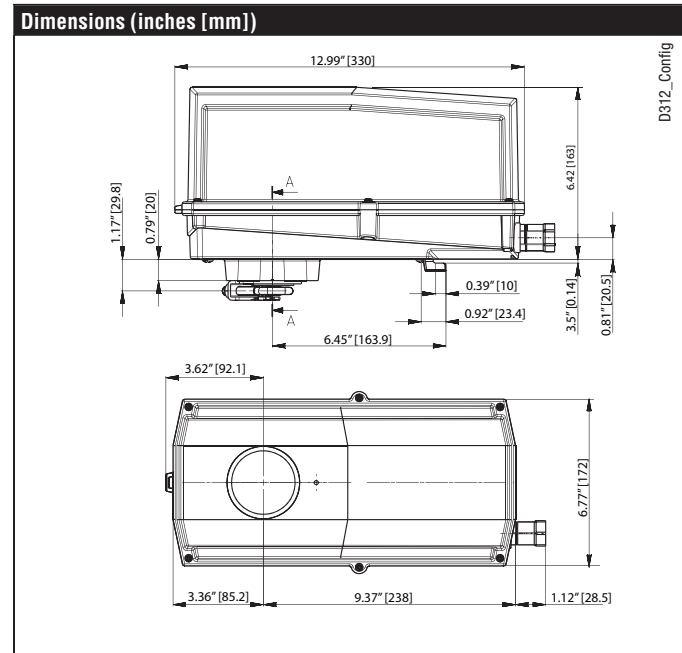
Green LED status indicator light sequence:

On: operation ok, no faults

Blinking: fail-safe mechanism is active

Off: fault is detected or not in operation / capacitors charging

Installation Note: Use suitable flexible metallic conduit or its equivalent with the conduit fitting. Not suitable for plenum applications.



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**Accessories**

PS-100	Actuator Power Supply Simulator
S1A, S2A	Auxiliary Switch(es)
P...A	Feedback Potentiometers
43442-00001	Gland (needed for additional wires)
11097-00001	Gasket for Gland

**Note:** When using GKX(B)24-3-T N4(H) actuators, only use accessories listed on this page.

**Typical Specification**

On/off, floating point control damper actuators shall be electronic direct-coupled type, which require no crank arm and linkage and be capable of direct mounting to shaft up to 1.05" diameter. Actuators shall have brushless DC motor technology and be protected from overload at all angles of rotation. Actuators shall have reversing switch and manual override on the cover. If required, actuators needing auxiliary switches, can be provided as an add-on accessory. Actuators with auxiliary switches must be constructed to meet the requirements for double insulation so an electrical ground is not required to meet agency listings. Run time shall be constant and independent of torque. Actuators shall be cULus listed, have a 5-year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

**Wiring Diagrams**

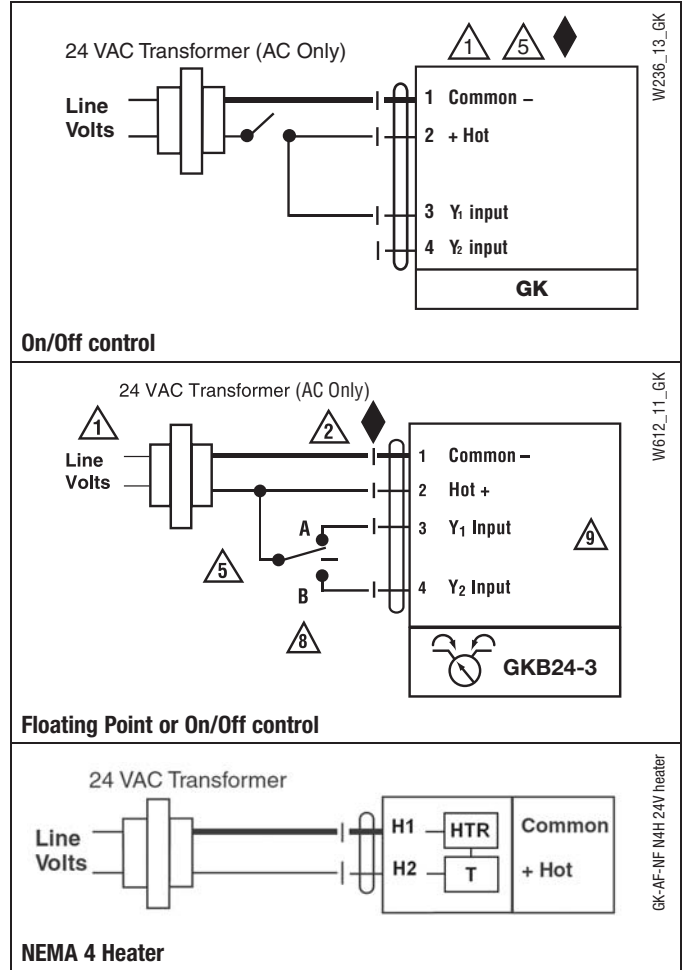
**INSTALLATION NOTES**

- Provide overload protection and disconnect as required.
- Equipment damage!  
Actuators may be connected in parallel. Power consumption and input impedance must be observed.
- Actuators with plenum rated cable do not have numbers on wires; use color codes instead.
- Contact closures A & B also can be triacs. A & B should both be closed for triac source and open for triac sink.
- For triac sink the common connection from the actuator must be connected to the hot connection of the controller.

**APPLICATION NOTES**

Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

**WARNING Live Electrical Components!**  
 During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



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# GKB24-SR, GKX24-SR

Proportional Control, Electronic Fail-Safe, Direct Coupled, 24V, for 2 to 10 VDC and 4 to 20mA



Technical Data	GKB24-SR, GKX24-SR
Power supply	24VAC $\pm 20\%$ 50/60Hz 24VDC $\pm 10\%$
Power consumption	12W (3W)
Transformer sizing	21VA (class 2 power source)
Electrical connection	18 GA plenum rated cable $\frac{1}{2}$ " conduit connector protected NEMA 2 (IP54) 3 ft [1m] 10 ft [3m] 16 ft [5m]
Overload protection	electronic throughout 0 to 95 rotation
Operation range Y	2 to 10 VDC, 4 to 20mA
Input impedance	100 k $\Omega$ (0.1 mA), 500 $\Omega$
Feedback output U	2 to 10VDC, 0.5mA max
Angle of rotation	max. 95°, adjustable with mechanical stop electronically variable
Torque	360 in-lb [40 Nm]
Direction of rotation	reversible with  switch
Fail-safe position	adjustable with dial, 0 to 1 in 10° increments
Position indication	reflective visual indicator (snap-on)
Manual override	external push button
Running time	
normal operation	150 seconds (default), variable 90 to 150 seconds
fail-safe	35 seconds
Humidity	5 to 95% RH non-condensing (EN 60730-1)
Ambient temperature	-22°F to +122°F [-30°C to +50°C]
Storage temperature	-40°F to +176°F [-40°C to +80°C]
Housing	NEMA2, IP54, UL enclosure type 2
Housing material	UL94-5VA
Agency list	cULus acc. to UL 60730-1A/-2-14 CAN/CSA E60730-1:02 CE acc. to 2004/108/EC and 2006/95/EC
Noise level	< 45dB(A)
Servicing	maintenance free
Quality standard	ISO 9001
Weight	3.85 lbs [1.75 kg]
Initial charge	5 to 20 seconds
Bridge time	2 second delay before fail-safe activates

Torque min. 360 in-lb for control damper surfaces up to 90 sq ft.

## Application

For fail-safe, proportional control of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications. The actuator is mounted directly to a damper shaft up to 1.05" in diameter by means of its universal clamp. A crank arm and several mounting brackets are available for applications where the actuator cannot be direct coupled to the damper shaft. The actuator operates in response to a 2 to 10 VDC or, with the addition of a 500 $\Omega$  resistor, a 4 to 20 mA control input from an electronic controller or positioner. A 2 to 10 VDC feedback signal is provided for position indication. Not to be used for a master-slave application.

## Operation

The GK..24-SR actuator provides 95° of rotation and a visual indicator shows the position of the actuator. When reaching the damper or actuator end position the actuator automatically stops. The gear can be manually disengaged by pressing the button located on the actuator cover. The GK..24-SR actuators use a brushless DC motor, which is controlled by an Application Specific Integrated Circuit (ASIC). The ASIC monitors and controls the actuators rotation and provides a digital rotation sensing (DRS) function to prevent damage to the actuator in a stall condition. Power consumption is reduced in a holding mode. The actuator is electronically protected against overload. The anti-rotation strap supplied with the actuator will prevent lateral movement. Add-on auxiliary switches or feedback potentiometers are easily fastened directly onto the actuator body for signaling and switching functions.

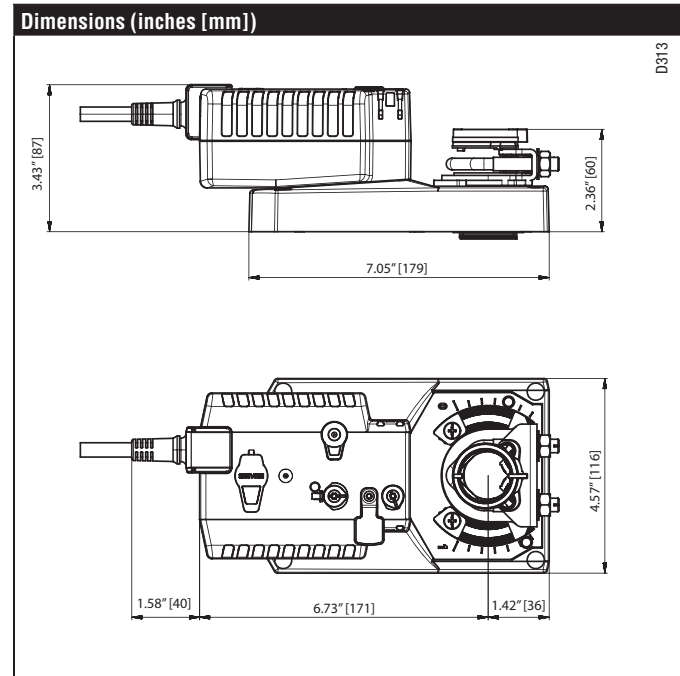
## Fail-Safe Indication

Green LED status indicator light sequence:

On: operation ok, no faults

Blinking: fail-safe mechanism is active

Off: fault is detected or not in operation / capacitors charging



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### Accessories

K-GM20	3/4" [20mm] Shaft Clamp
ZG-102	Multiple Actuator Mounting Bracket
ZG-GMA	Crank arm Adaptor Kit
ZG-JSA (-1,2,3)	Jackshaft Adaptors for Hollow Jackshafts
ZS-100	Weather Shield - Steel
ZS-150	Weather Shield - Polycarbonate
ZS-260	Explosion Proof Housing
ZS-300 (-1) (-5)	NEMA 4X Housing
Tool-07	13 mm Wrench
PS-100	Actuator Power Supply Simulator
S1A, S2A	Auxiliary Switch(es)
P370	Shaft Mount Auxiliary Switch
P...A	Feedback Potentiometers

**Note:** When using GKB24-SR and GKX24-SR actuators, only use accessories listed on this page.

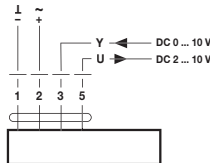
### Typical Specification

Proportional control damper actuators shall be electronic direct-coupled type, which require no crank arm and linkage and be capable of direct mounting to shaft up to 1.05" diameter. Actuators must provide proportional damper control response to a 2 to 10 VDC or, with the addition of a 500Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. Actuators shall have brushless DC motor technology and be protected from overload at all angles of rotation. Actuators shall have reversing switch and manual override on the cover. Run time shall be constant and independent of torque. Actuators shall be cULus listed, have a 5-year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

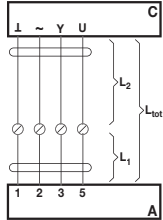
### Electrical Installation

#### Wiring diagram

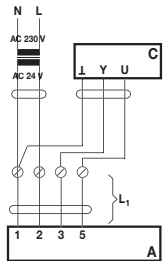
- Note**
- Connect via safety isolation transformer.
  - Parallel connection of other actuators possible.
- Note performance data for supply.



#### Cable lengths



- Note**
- When several actuators are connected in parallel, the maximum cable length must be divided by the number of actuators.



- Note**
- There are no special restrictions on installation if the supply and data cable are routed separately.

- Cable colors:**
- 1 = black
  - 2 = red
  - 3 = white
  - 5 = orange

- A = Actuator  
 C = Control unit  
 L1 = Belimo connecting cable, 1 m (4 x 0.75 mm<sup>2</sup>)  
 L2 = Customer cable  
 Ltot = Maximum cable length

Cross section Lz	Max. cable length Ltot = L1 + L2		Example for DC
	L1 / ~	AC DC	
0.75 mm <sup>2</sup>	≤30 m	≤5 m	1 m (L1) + 4 m (L2)
1.00 mm <sup>2</sup>	≤40 m	≤8 m	1 m (L1) + 7 m (L2)
1.50 mm <sup>2</sup>	≤70 m	≤12 m	1 m (L1) + 11 m (L2)
2.50 mm <sup>2</sup>	≤100 m	≤20 m	1 m (L1) + 19 m (L2)

- A = Actuator  
 C = Control unit  
 L1 = Belimo connecting cable, 1 m (4 x 0.75 mm<sup>2</sup>)

### Wiring Diagrams

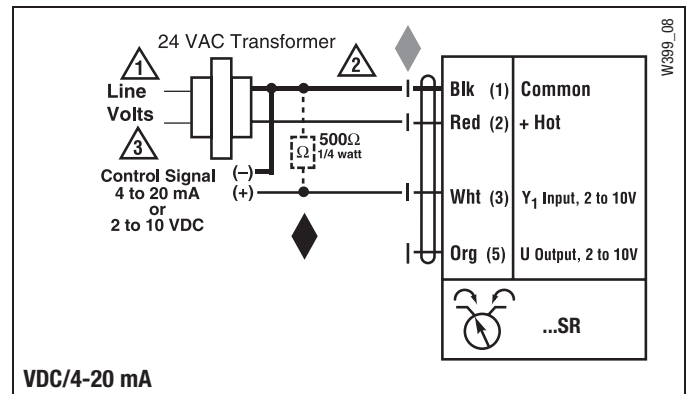
#### INSTALLATION NOTES

- 1 Provide overload protection and disconnect as required.
- 2 **CAUTION Equipment Damage!**  
Actuators may be connected in parallel if not mechanically mounted to the same shaft. Power consumption and input impedance must be observed.
- 3 Actuators may also be powered by 24 VDC.

#### APPLICATION NOTES

- ◆ Meets UL requirements without the need of an electrical ground connection.
- ◆ The ZG-R01 500 Ω resistor may be used.

- WARNING Live Electrical Components!**  
 During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



# GKX24-SR-T N4, GKB24-SR-T N4H

NEMA 4, Proportional Control, Electronic Fail-Safe, Direct Coupled, 24V, for 2 to 10 VDC and 4 to 20 mA



Technical Data	GKX24-SR-T N4, GKB24-SR-T N4H
Power supply	24 VAC $\pm$ 20% 50/60 Hz 24 VDC $\pm$ 10%
Power consumption	12 W (3 W) / heater 21 W
Transformer sizing	21 VA (Class 2 power source) / heater 21 VA
Electrical connection	screw terminal (for 22 to 12 GA wire) $\frac{1}{2}$ " conduit connector
Overload protection	electronic throughout 0 to 95° rotation
Operating range Y	2 to 10 VDC, 4 to 20 mA
Input impedance	100 k $\Omega$ (0.1 mA), 500 $\Omega$
Feedback output U	2 to 10 VDC (max 0.5 mA)
Angle of rotation	max. 95°, adjustable with mechanical stop
Torque	360 in-lb [40 Nm]
Direction of rotation	reversible with  switch
Fail-safe position	adjustable with dial, 0 to 1 in 10° increments
Position indication	dial
Running time	150 seconds
motor (fail-safe)	35 seconds
Humidity	max. 95% RH non-condensing
Ambient temperature	-22°F to 122°F [-30°C to 50°C]
with heater	-40°F to 122°F [-40°C to 50°C]
Storage temperature	-40°F to 176°F [-40°C to 80°C]
Housing	UL Type 4, NEMA 4, IP66
Housing material	polycarbonate
Agency listings†	cULus acc. to UL 60730-1A/-2-14, CAN/CSA E60730-1, CSA C22.2 No. 24-93, CE acc. to 2004/108/EC
Noise level	<45dB(A)
Servicing	maintenance free
Quality standard	ISO 9001
Weight	8.95 lbs [4.05 kg]; 9.45 lbs [4.3 kg] with heater
Initial charge	5 to 20 seconds
Bridge time	2 second delay before fail-safe activates

†Rated Impulse Voltage 800V, Type of action 1, Control Pollution Degree 3.

Torque min. 360 in-lb for control of damper surfaces up to 90 sq ft.

## Application

For proportional modulation of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications. The actuator is mounted directly to a damper shaft up to 1.05" in diameter by means of its universal clamp. The actuator operates in response to a 2 to 10 VDC, with the addition of a 500 $\Omega$  resistor, a 4 to 20 mA control input from an electronic controller or positioner. A 2 to 10 VDC feedback signal is provided for position indication. Not to be used for a master-slave application.

## Operation

The GK..24-SR-T N4 actuator provides 95° of rotation and a visual indicator shows the position of the actuator. When reaching the damper or actuator end position, the actuator automatically stops. The gears can be manually disengaged by pressing the button located on the actuator cover. The GK..24-SR-T N4 actuator uses a sensorless brushless DC motor, which is controlled by an Application Specific Integrated Circuit (ASIC). The ASIC monitors and controls the actuator's rotation and provides a digital rotation sensing (DRS) function to prevent damage to the actuator in a stall condition. Power consumption is reduced in a holding mode. The actuator is electronically protected against overload. The anti-rotation strap supplied with the actuator will prevent lateral movement. Add-on auxiliary switches or feedback potentiometers are easily fastened directly onto the actuator body for signaling and switching functions.

## Fail-Safe Indication

Green LED status indicator light sequence:

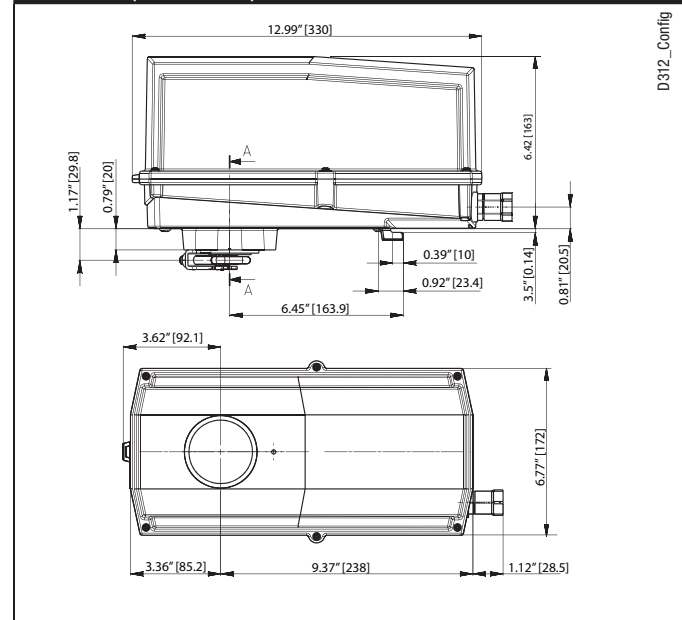
On: operation ok, no faults

Blinking: fail-safe mechanism is active

Off: fault is detected or not in operation / capacitors charging

Installation Note: Use suitable flexible metallic conduit or its equivalent with the conduit fitting. Not suitable for plenum applications.

## Dimensions (inches [mm])



D312\_Config

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Accessories	
S1A, S2A	Auxiliary Switch(es)
P...A	Feedback Potentiometers
SGA24	Min positioners for surface mounting
SGF24	Min positioners for flush panel mounting
IRM-100	Input Rescaling Module
ZG-R01	Resistor for 4 to 20 mA Conversion
ZG-X40	Transformer
43442-00001	Gland (needed for additional wires)
11097-00001	Gasket for Gland

**Note:** When using GKX(B)24-SR-T N4(H) actuators, only use accessories listed on this page.

**Typical Specification**

Proportional control damper actuators shall be electronic direct-coupled type, which require no crank arm and linkage and be capable of direct mounting to a shaft up to 1.05" diameter. Actuators must provide proportional damper control in response to a 2 to 10 VDC or, with the addition of a 500 Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. Actuators shall have brushless DC motor technology and be protected from overload at all angles of rotation. Actuators shall have reversing switch and manual override on the cover. Run time shall be constant and independent of torque. A 2 to 10 VDC feedback signal shall be provided for position indication. Actuators shall be cULus listed, have a 5-year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

**Wiring Diagrams**

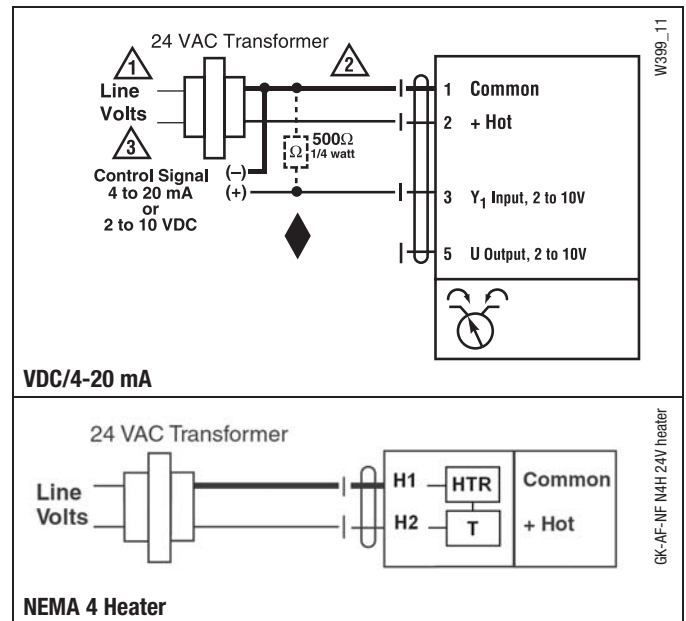
**✂ INSTALLATION NOTES**

- 1 Provide overload protection and disconnect as required.
- 2 **CAUTION Equipment Damage!**  
Actuators may be connected in parallel. Power consumption and input impedance must be observed.
- 3 Actuators may also be powered by 24 VDC.
- 5 Only connect common to neg. (-) leg of control circuits

**📄 APPLICATION NOTES**

◆ The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

⚠ **WARNING Live Electrical Components!**  
 During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



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**MFT**  
MULTI-FUNCTION TECHNOLOGY®



**5**  
YEAR  
WARRANTY



Technical Data	GKX24-MFT
Power supply	24VAC ±20% 50/60Hz 24VDC ±10%
Power consumption	12W (3W)
Transformer sizing	21VA (class 2 power source)
Electrical connection	18 GA plenum rated cable ½" conduit connector protected NEMA 2 (IP54) 3 ft [1m] 10 ft [3m] 16 ft [5m]
Overload protection	electronic throughout 0 to 95 rotation
Operation range Y	2 to 10 VDC, 4 to 20mA (default) variable (VDC,PWM, floating point, on/off)
Input impedance	100kΩ (0.1 mA), 500Ω 1500Ω (PWM, floating point, on/off)
Feedback output U	2 to 10VDC, 0.5mA max, VDC variable
Angle of rotation	max. 95°, adjustable with mechanical stop electronically variable
Torque	360 in-lb [40 Nm]
Direction of rotation	reversible with  switch
Fail-safe position	adjustable with dial or tool 0 to 100% in 10% increments
Position indication	reflective visual indicator (snap-on)
Manual override	external push button
Running time	
normal operation	150 seconds (default), variable 90 to 150 seconds
fail-safe	35 seconds
Humidity	5 to 95% RH non-condensing (EN 60730-1)
Ambient temperature	-22°F to +122°F [-30°C to +50°C]
Storage temperature	-40°F to +176°F [-40°C to +80°C]
Housing	NEMA2, IP54, UL enclosure type 2
Housing material	UL94-5VA
Agency list	cULus acc. to UL 60730-1A/-2-14 CAN/CSA E60730-1:02 CE acc. to 2004/108/EC and 2006/95/EC
Noise level	< 45dB(A)
Servicing	maintenance free
Quality standard	ISO 9001
Weight	3.85 lbs [1.75 kg]
Initial charge	5 to 26 seconds
Bridge time	programmable 0 to 10 second (2 seconds default) delay before fail-safe activates

**Torque min. 360 in-lb for control damper surfaces up to 90 sq ft.**

### Application

For fail-safe, proportional control of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications. A feedback signal is provided for position indication or master-slave applications.

### Default/Configuration

Default parameters for 2 to 10 VDC applications of the GK.-MFT actuator are assigned during manufacturing. If required, custom versions of the actuator can be ordered. The parameters noted in the Technical Data table are variable. These parameters can be changed by three means:

- Pre-set or custom configurations from Belimo.
- Configurations set by the customer using the most current MFT PC tool software application.
- Handheld ZTH-GEN.

### Operation

The GK..24-MFT provides 95° of rotation and a visual indicator shows the position of the actuator. When reaching the damper or actuator end position the actuator automatically stops. The gear can be manually disengaged by pressing the button located on the actuator cover. The GK..24-MFT actuator uses a brushless DC motor, which is controlled by an Application Specific Integrated Circuit (ASIC). The ASIC monitors and controls the actuators rotation and provides a digital rotation sensing (DRS) function to prevent damage to the actuator in a stall condition. Power consumption is reduced in a holding mode. The actuator is electronically protected against overload. The anti-rotation strap supplied with the actuator will prevent lateral movement. Add-on auxiliary switches or feedback potentiometers are easily fastened directly onto the actuator body for signaling and switching functions.

### Fail-Safe Indication

LED status indicator lights sequence:

Yellow off / Green on: operation ok, no faults

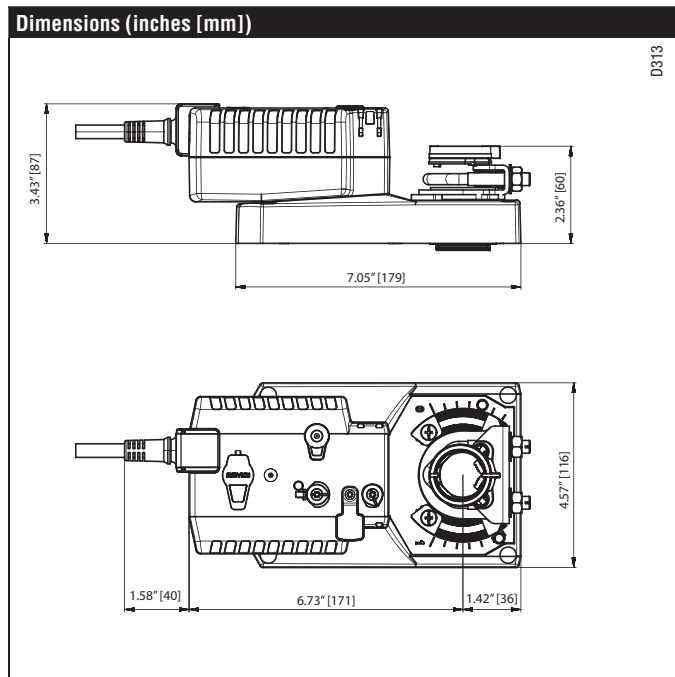
Yellow off / Green blinking: fail-safe mechanism is active

Yellow on / Green off: fault is detected

Yellow off / Green off: not in operation / capacitors charging

Yellow on / Green on: adaption running

Yellow blinking / Green on: communication with programming tool



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#### Accessories

K-GM20	3/4" [20mm] Shaft Clamp
ZG-102	Multiple Actuator Mounting Bracket
ZG-GMA	Crank arm Adaptor Kit
ZG-JSA (-1,2,3)	Jackshaft Adaptors for Hollow Jackshafts
ZS-100	Weather Shield - Steel
ZS-150	Weather Shield - Polycarbonate
ZS-260	Explosion Proof Housing
ZS-300 (-1) (-5)	NEMA 4X Housing
Tool-07	13 mm Wrench
PS-100	Actuator Power Supply Simulator
S1A, S2A	Auxiliary Switch(es)
P370	Shaft Mount Auxiliary Switch
P...A	Feedback Potentiometers
SGA24	Min positioners in NEMA 4 Housing
SGF24	Min positioners for flush panel mounting
ZG-R01	Resistor for 4 to 20 mA Conversion
ZG-X40	Transformer

Note: When using GKX24-MFT actuators, only use accessories listed on this page.

#### Typical Specification

Proportional control damper actuators shall be electronic direct-coupled type, which require no crank arm and linkage and be capable of direct mounting to shaft up to 1.05" diameter. Actuators must provide proportional damper control response to a 2 to 10 VDC or, with the addition of a 500 Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. Actuators shall have Brushless DC motor technology and be protected from overload at all angles of rotation. Actuators shall have reversing switch and manual override on the cover. Run time shall be constant and independent of torque. Actuators shall be cULus listed, have a 5-year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

#### Wiring Diagrams

#### INSTALLATION NOTES

- 1 Provide overload protection and disconnect as required.
- 2 **CAUTION Equipment Damage!** Actuators may be connected in parallel if not mechanically mounted to the same shaft. Power consumption and input impedance must be observed.
- 3 Actuators may also be powered by 24 VDC.
- 4 Position feedback cannot be used with Triac sink controller. The actuator internal common reference is not compatible.
- 5 Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.
- 8 Contact closures A & B also can be triacs. A & B should both be closed for triac source and open for triac sink.
- 9 For triac sink the common connection from the actuator must be connected to the hot connection of the controller.

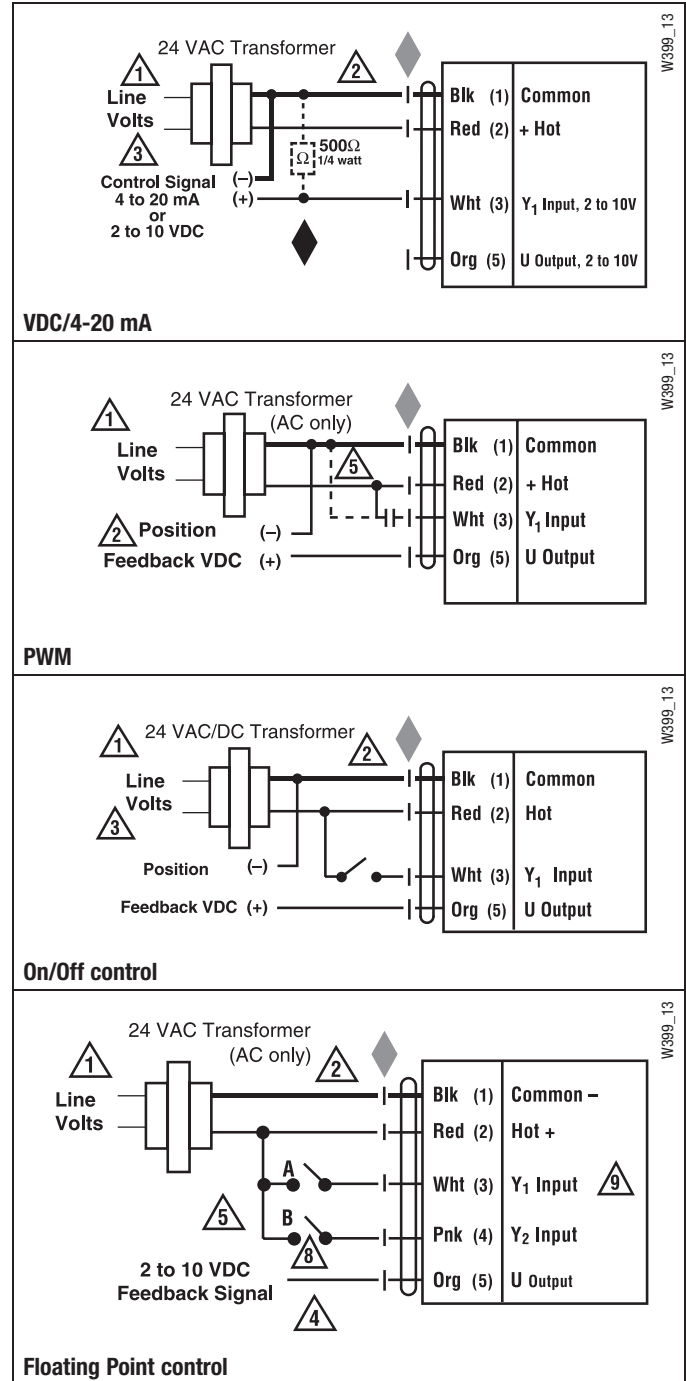
#### APPLICATION NOTES

- ◆ Meets UL requirements without the need of an electrical ground connection.
- ◆ The ZG-R01 500 Ω resistor may be used.



#### WARNING Live Electrical Components!

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# GKX24-MFT-T N4, GKB24-MFT-T N4H

NEMA 4, Proportional Control, Electronic Fail-Safe, Direct Coupled, 24V, Multi-Function Technology®



**MFT**  
MULTI-FUNCTION TECHNOLOGY®



Technical Data	GKX24-MFT-T N4, GKB24-MFT-T N4H
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	12 W (3 W) / heater 21 W
Transformer sizing	21 VA (class 2 power source) / heater 21 VA
Electrical connection	screw terminal (for 22 to 12 GA wire) ½" conduit connector
Overload protection	electronic throughout 0 to 95° rotation
Operating range Y	2 to 10 VDC, 4 to 20 mA (default) variable (VDC, PWM, floating point, on/off)
Input impedance	100 kΩ (0.1 mA), 500 Ω, 1500 Ω (PWM, floating point, on/off)
Feedback output U	2 to 10 VDC, 0.5 mA max, VDC variable
Angle of rotation	max. 95°, adjustable with mechanical stop electronically variable
Torque	360 in-lb [40 Nm]
Direction of rotation	reversible with  switch
Fail-safe position	adjustable with dial or tool 0 to 100% in 10% increments
Position indication	dial
Running time	150 seconds (default) variable (90 to 150 seconds)
motor (fail-safe)	35 seconds
Humidity	max. 95% RH non-condensing
Ambient temperature	-22°F to 122°F [-30°C to 50°C]
with heater	-40°F to 122°F [-40°C to 50°C]
Storage temperature	-40°F to 176°F [-40°C to 80°C]
Housing	UL Type 4, NEMA 4, IP66
Housing material	polycarbonate
Agency listings†	cULus acc. to UL 60730-1A/-2-14, CAN/CSA E60730-1, CSA C22.2 No. 24-93, CE acc. to 2004/108/EC
Noise level	<45dB(A)
Servicing	maintenance free
Quality standard	ISO 9001
Weight	8.95 lbs [4.05 kg]; 9.42 lbs [4.3 kg] with heater
Initial charge	5 to 26 seconds
Bridge time	programmable 0 to 10 seconds (2 seconds default)

†Rated Impulse Voltage 800V, Type of action 1, Control Pollution Degree 3.

Torque min. 360 in-lb for control of damper surfaces up to 90 sq ft.

## Application

For fail-safe, proportional control of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications. A feedback signal is provided for position indication or master-slave applications.

## Default/Configuration

Default parameters for 2 to 10 VDC applications of the GK.-MFT actuator are assigned during manufacturing. If required, custom versions of the actuator can be ordered. The parameters noted in the Technical Data table are variable. These parameters can be changed by three means:

- Pre-set or custom configurations from Belimo.
- Configurations set by the customer using the most current MFT PC tool software application.
- Handheld ZTH-GEN.

## Operation

The GK..24-MFT-T N4 provides 95° of rotation and a visual indicator shows the position of the actuator. When reaching the damper or actuator end position, the actuator automatically stops. The gears can be manually disengaged by pressing the button located on the actuator cover. The GK..24-MFT-T N4 actuator uses a sensorless brushless DC motor, which is controlled by an Application Specific Integrated Circuit (ASIC). The ASIC monitors and controls the actuator's rotation and provides a digital rotation sensing (DRS) function to prevent damage to the actuator in a stall condition. Power consumption is reduced in a holding mode. The actuator is electronically protected against overload. The anti-rotation strap supplied with the actuator will prevent lateral movement. Add-on auxiliary switches or feedback potentiometers are easily fastened directly onto the actuator body for signaling and switching functions.

## Fail-Safe Indication

LED status indicator lights sequence:

Yellow off / Green on: operation ok, no faults

Yellow off / Green blinking: fail-safe mechanism is active

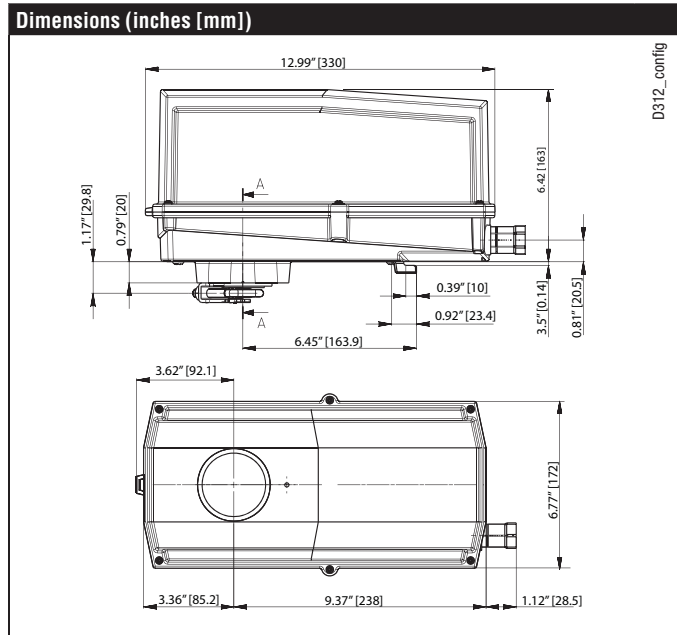
Yellow on / Green off: fault is detected

Yellow off / Green off: not in operation / capacitors charging

Yellow on / Green on: adaption running

Yellow blinking / Green on: communication with programming tool

Installation Note: Use suitable flexible metallic conduit or its equivalent with the conduit fitting. Not suitable for plenum applications.



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**Accessories**

ZS-100	Weather Shield - Steel
S1A, S2A	Auxiliary Switch(es)
P...A	Feedback Potentiometers
SGA24	Min positioners for surface mounting
SGF24	Min positioners for flush panel mounting
ZG-R01	Resistor for 4 to 20 mA Conversion
ZG-X40	Transformer
43442-00001	Gland (needed for additional wires)
11097-00001	Gasket for Gland

**Note:** When using GKX24-MFT-T N4, GKB24-MFT-T N4H actuators, only use accessories listed on this page.

**Typical Specification**

Proportional control damper actuators shall be electronic direct-coupled type, which require no crank arm and linkage and be capable of direct mounting to a shaft up to 1.05" diameter. Actuators must provide proportional damper control in response to a 2 to 10 VDC or, with the addition of a 500 Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. Actuators shall have brushless DC motor technology and be protected from overload at all angles of rotation. Actuators shall have reversing switch and manual override on the cover. Run time shall be constant and independent of torque. Actuators shall be cULus listed, have a 5-year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

**Wiring Diagrams**

**INSTALLATION NOTES**

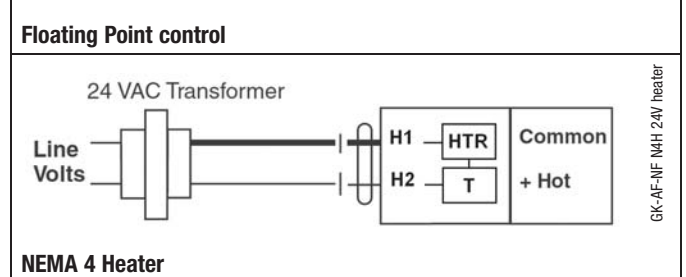
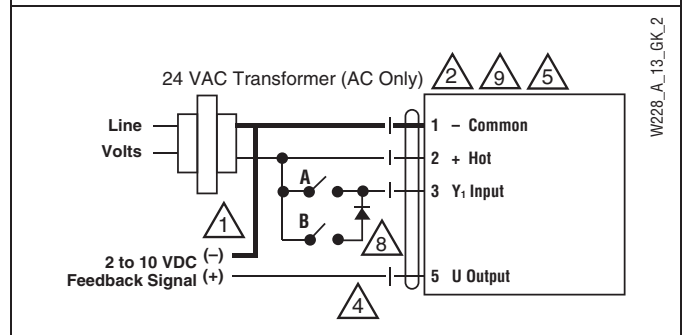
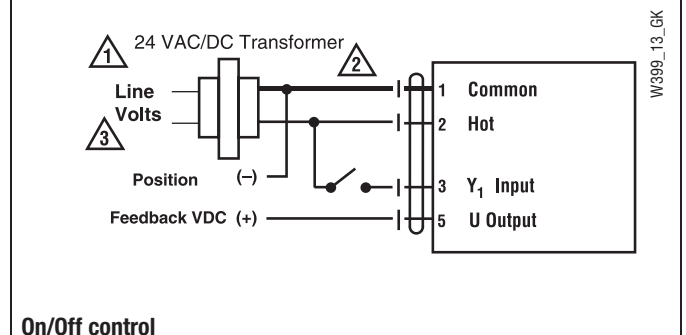
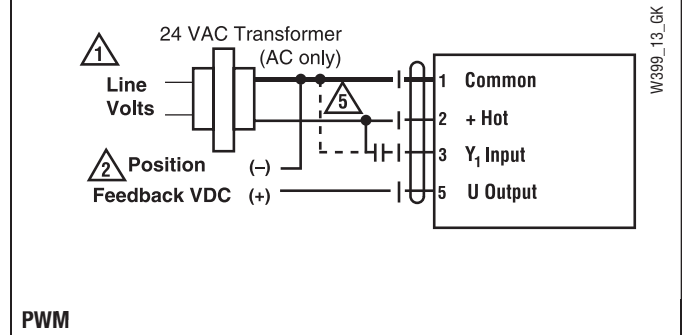
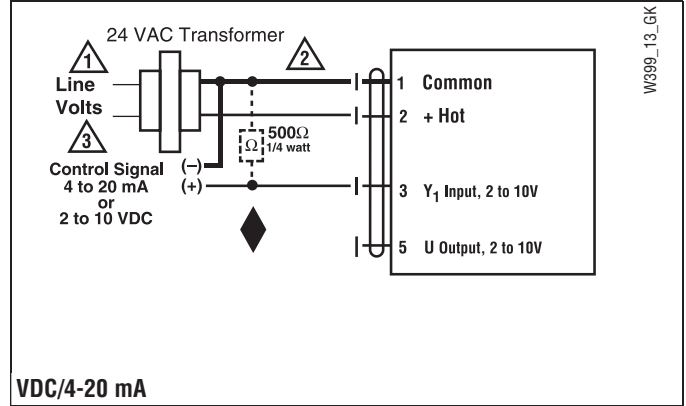
- 1 Provide overload protection and disconnect as required.
- 2 **CAUTION Equipment Damage!**  
Actuators may be connected in parallel if not mechanically mounted to the same shaft. Power consumption and input impedance must be observed.
- 3 Actuators may also be powered by 24 VDC.
- 4 Position feedback cannot be used with Triac sink controller. The actuator internal common reference is not compatible.
- 5 Control signal may be pulsed from either the Hot (source) or the Common (sink) 24 VAC line.
- 8 Contact closures A & B also can be triacs. A & B should both be closed for triac source and open for triac sink.
- 9 For triac sink the common connection from the actuator must be connected to the hot connection of the controller.

**APPLICATION NOTES**

The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

**WARNING Live Electrical Components!**  
 During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

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GK-AF-NF-M4H 24V heater