Product Data Sheet
PDS-02-04-60-1691-EN Rev. 5
December 2023

Bettis RTS FQ Series

Smart Mechanical Fail-Safe Quarter-Turn Actuator

BETTIS™

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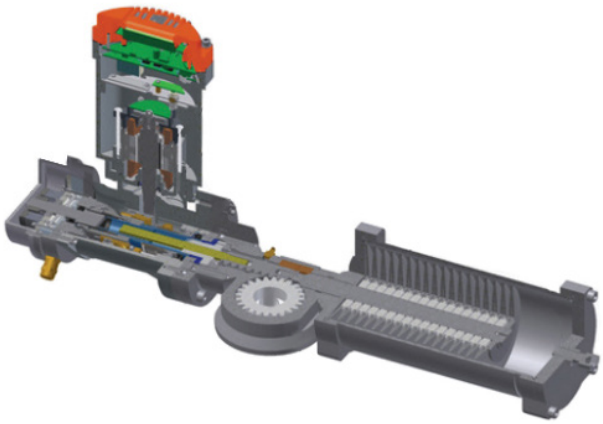
Main Features

- Smart mechanical fail-safe quarter-turn actuator
- Mechanical driven fail-safe operation for reliability and safety
- No battery or super-capacitor dependency for fail-safe action
- Direct coupling of the fail-safe with the valve shaft
- On/Off: S2-15 min. and 30 s/h, IEC 60034 (Class A and B, EN 15714)
- Modulating: S4-1200 s/h and S9-Continuous duty, IEC 60034 (Class C and D, EN 15714)
- Adjustable speed and torque
- Fail-safe triggering selectable in case of drop-off 24 V DC fail-safe signal or main power supply
- Independently adjustable soft starts/stops
- Reliable and high positioning control 0.1% accuracy
- DC, single phase, three phase power supply options
- Weatherproof and explosion proof construction options
- SIL3 capable
- Optional De-clutchable Handwheel
- Local User Interface with wireless Bluetooth® capability for configuration, monitoring and diagnostics of key parameters
- DCMlink software interface available
- Process Control via optional on-board PID Controller
- Multilingual user interface
- Configurable action on loss of control signal

Figure 1. Bettis RTS FQ Series Cut-away

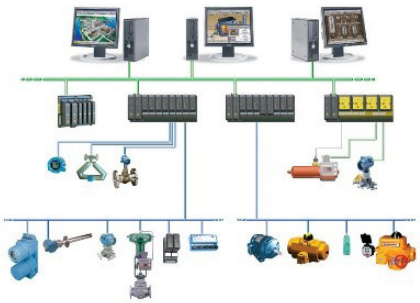


Features

Figure 2. Local Display, Status and Configuration

Rotatable display panel and readout in 90° increments
2 Hall Effect contactless selector switches
(Black) right selector switch for local Open, Close directional commands
Padlockable (Red) left selector switch for Local, Off, Remote control options
Programmable status indicating LED's for visual operation, readiness, warnings, and error message enunciations
Day/night backlit text display in multiple configurable languages
Current position, over torque indication, machine health, operation data logging history

Figure 3. Control and Status Options

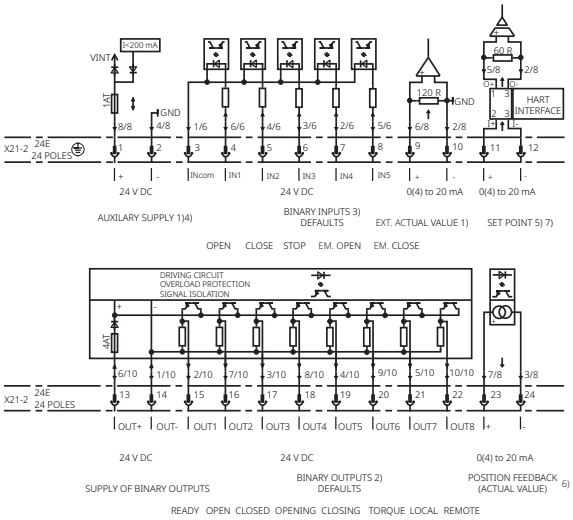


Discrete I/O 2, 3, or 4 wire control options
Multiple status feedback: Actuator ready, open, closed, ESD initialized, PST pass/fail, etc.
Analog 0 to 20 mA or 4 to 20 mA position set-point and position feedback
WirelessHART® capable with Thum: control and status update
Network Protocols: Modbus TCP and RTU, HART®, Profinet, and Profibus DP (optional)
Single loop PID process variable control (optional)

Figure 4. Diagnostics, Monitoring, Control and Configure

Configuration software: DCMlink
Wireless communications via IRLT and Bluetooth
Communication device: MS laptop
DCMlink provides diagnostics, control, configuration uploads, and monitoring of alarms
DCMlink comes as a single laptop app, or a licensed AMS Device Manager Snap-On

Figure 5. Digital Inputs and Outputs



5 Binary Inputs | 8 Configurable Binary Outputs
Digital Inputs and Outputs can be powered by actuator or customer supplied 24 V DC
Optional board available for 115 to 230 DC/AC voltage for discrete inputs and outputs
Common ground of the binary inputs is optically isolated from other internal electronics
All binary outputs are optically isolated when customer supplies control voltage
Different wiring conduits available for weatherproof and explosion proof ratings

Figure 6. Binary Input/Output Current Characteristics

Customer supplied control power: 20 to 30 V DC Maximum current: 500 mA or 120 mA in power-safe
Maximum allowed current for all binary outputs with power supplied by control system: 250 mA
Actuator sourced output voltage: typical 23 V Maximum output current: 200 mA
Maximum allowed current for all binary outputs with power supplied by actuator: 150 mA
Maximum allowed current per binary output: 500 mA
Analog in and out uses the actuator's control unit common ground

Bettis RTS Fail-Safe Quarter-Turn Units

Table 1. Bettis RTS Fail-Safe Quarter-Turn Units

Attribute	FQ-03			FQ-06		
Base Actuator	CM32			CM32		
Power Supply, V[1]	24 V DC ±10%	1Ph 110 to 230 V ±10%	3Ph 380 to 480 V ±10%	24 V DC ±10%	1Ph 110 to 230 V ±10%	3Ph 380 to 480 V ±10%
Nominal Motor Current, A (Conditions)[2]	4.6 (16 Nm/20 RPM/ 24 V DC)	1.47 (16 Nm/72 RPM/ 230 V)	0.46 (16 Nm/72 RPM/ 400 V)	4.6 (16 Nm/20 RPM/ 24 V DC)	1.47 (16 Nm/72 RPM/ 230 V)	0.46 (16 Nm/72 RPM/ 400 V)
Idle Power Consumption, W	12			12		
Power Consumption @ Idle to Hold Spring, W	40			40		
Electric Maximum Torque, S2 (Class A/B), ft-lb / Nm	221 / 300			443 / 600		
Electric Maximum Modulating Torque, S4 (Class C), ft-lb / Nm	111 / 150			221 / 300		
Allowed Modulating Speed, S4 (Class C), RPM	1.0 to 36			1.0 to 36		
Electric Maximum Modulating Torque, S9 (Class D), ft-lb / Nm	74 / 100			148 / 200		
Allowed Modulating Speed, S9 (Class D), RPM	1.0 to 20			1.0 to 20		
Spring Break Torque, ft-lb / Nm	221 / 300			443 / 600		
Spring End Torque, ft-lb / Nm	111 / 150			221 / 300		
Adjustable 90° Electric Operating Time Range, seconds	54 to 1000	15 to 1000		54 to 1000	15 to 1000	
Adjustable Full Stroke Spring Operating Time Range, seconds[3]	1 to 5			1 to 5		
Maximum Travel	90° +/-5°			90° +/-5°		
Maximum Shaft Diameter Acceptance, in. / mm	1.0 / 25			1.57 / 40		
Mounting Base Standard	F07/F10			F10/F12		
Ambient Temperature Range, °F / °C	-40 to +140 / -40 to +60			-40 to +140 / -40 to +60		
Explosion Proof Certifications	NEC-500	NEC-500	-	NEC-500	NEC-500	-
	NEC-505	NEC-505	-	NEC-505	NEC-505	-
	IECex	IECex	IECex	IECex	IECex	IECex
	ATEX	ATEX	ATEX	ATEX	ATEX	ATEX
Water Ingress Protection[4]	IP66 (NEMA 4X), IP67 (NEMA 6), IP68			IP66 (NEMA 4X), IP67 (NEMA 6), IP68		
Approximate Weight, lb / kg	94.8 / 43			116.8 / 53		
Duty Cycle	S2 (Class A/B) Standard, S4/S9 (Class C/D) Optional			S2 (Class A/B) Standard, S4/S9 (Class C/D) Optional		
Coating and Color	High quality two component polyurethane paint system - C2 ISO12944-5/RAL7012 Other options available on request.			High quality two component polyurethane paint system - C2 ISO12944-5/RAL7012 Other options available on request.		

Notes:
1. 24 V DC power supply characteristics are applicable for BLDC version 10.1 and higher.
2. Nominal motor current measured at specified conditions: base unit torque set up/speed/power supply. For detailed current draw and other performance data, please contact a local Emerson sales channel representative.
3. At ambient temperatures below -4 °F / -20 °C, the fail-safe spring operating time will increase.
4. CM32 and CM64 base units IP68 immersion: 5 m / 16 feet, 21 hours. All bolt-on gear boxes (linear drives, QT planetary gears, fail-safe units) are not IP68 rated and need to be rebuilt in case of a flood event.

Table 2. Bettis RTS Fail-Safe Quarter-Turn Units

Attribute	FQ-10			FQ-20		
Base Actuator	CM64			CM64		
Power Supply, V[1]	24 V DC ±10%	1Ph 110 to 230 V ±10%	3Ph 380 to 480 V ±10%	24 V DC ±10%	1Ph 110 to 230 V ±10%	3Ph 380 to 480 V ±10%
Nominal Motor Current, A (Conditions)[2]	Not Available	2.17 (20 Nm/60 RPM/ 230 V)	0.9 (32 Nm/60 RPM/ 400 V)	Not Available	2.17 (20 Nm/60 RPM/ 230 V)	0.9 (32 Nm/60 RPM/ 400 V)
Idle Power Consumption, W		12			12	
Power Consumption @ Idle to Hold Spring, W		40			40	
Electric Maximum Torque, S2 (Class A/B), ft-lb / Nm		738 / 1000			1475 / 2000	
Electric Maximum Modulating Torque, S4 (Class C), ft-lb / Nm		369 / 500			738 / 1000	
Allowed Modulating Speed, S4 (Class C), RPM		1.0 to 30			1.0 to 30	
Electric Maximum Modulating Torque, S9 (Class D), ft-lb / Nm		221 / 300			443 / 600	
Allowed Modulating Speed, S9 (Class D), RPM		1.0 to 20			1.0 to 20	
Spring Break Torque, ft-lb / Nm		738 / 1000			1475 / 2000	
Spring End Torque, ft-lb / Nm		369 / 500			738 / 1000	
Adjustable 90° Electric Operating Time Range, seconds		20 to 500			30 to 650	
Adjustable Full Stroke Spring Operating Time Range, seconds[3]		1 to 5			2 to 10	
Maximum Travel		90° +/-5°			90° +/-5°	
Maximum Shaft Diameter Acceptance, in. / mm		1.93 / 49			2.36 / 60	
Mounting Base Standard		F12/F14			F14/F16	
Ambient Temperature Range, °F / °C		-40 to +140 / -40 to +60			-40 to +140 / -40 to +60	
Explosion Proof Certifications		-	-		-	-
		NEC-505	-		NEC-505	-
		IECex	IECex		IECex	IECex
		ATEX	ATEX		ATEX	ATEX
Water Ingress Protection[4]		IP66 (NEMA 4X), IP67 (NEMA 6), IP68			IP66 (NEMA 4X), IP67 (NEMA 6), IP68	
Approximate Weight, lb / kg		308.6 / 140			440.1 / 200	
Duty Cycle		S2 (Class A/B) Standard, S4/S9 (Class C/D) Optional			S2 (Class A/B) Standard, S4/S9 (Class C/D) Optional	
Coating and Color		High quality two component polyurethane paint system - C2 ISO12944-5/RAL7012 Other options available on request.			High quality two component polyurethane paint system - C2 ISO12944-5/RAL7012 Other options available on request.	

Notes:
1. 24 V DC power supply characteristics are applicable for BLDC version 10.1 and higher.
2. Nominal motor current measured at specified conditions: base unit torque set up/speed/power supply. For detailed current draw and other performance data, please contact a local Emerson sales channel representative.
3. At ambient temperatures below -4 °F / -20 °C, the fail-safe spring operating time will increase.
4. CM32 and CM64 base units IP68 immersion: 5 m / 16 feet, 21 hours. All bolt-on gear boxes (linear drives, QT planetary gears, fail-safe units) are not IP68 rated and need to be rebuilt in case of a flood event.

Table 3. Bettis RTS Fail-Safe Quarter-Turn Units

Attribute	FQ-30			FQ-50		
Base Actuator	CM64			CM64		
Power Supply, V[1]	24 V DC ±10%	1Ph 110 to 230 V ±10%	3Ph 380 to 480 V ±10%	24 V DC ±10%	1Ph 110 to 230 V ±10%	3Ph 380 to 480 V ±10%
Nominal Motor Current, A (Conditions)[2]	Not Available	2.17 (20 Nm/60 RPM/ 230 V)	0.9 (32 Nm/60 RPM/ 400 V)	Not Available	2.17 (20 Nm/60 RPM/ 230 V)	0.9 (32 Nm/60 RPM/ 400 V)
Idle Power Consumption, W		12			12	
Power Consumption @ Idle to Hold Spring, W		40			40	
Electric Maximum Torque, S2 (Class A/B), ft-lb / Nm		2213 / 3000			3688 / 5000	
Electric Maximum Modulating Torque, S4 (Class C), ft-lb / Nm		1106 / 1500			1844 / 2500	
Allowed Modulating Speed, S4 (Class C), RPM		1.0 to 30			1.0 to 30	
Electric Maximum Modulating Torque, S9 (Class D), ft-lb / Nm		664 / 900			1106 / 1500	
Allowed Modulating Speed, S9 (Class D), RPM		1.0 to 20			1.0 to 20	
Spring Break Torque, ft-lb / Nm		2213 / 3000			3688 / 5000	
Spring End Torque, ft-lb / Nm		1106 / 1500			1844 / 2500	
Adjustable 90° Electric Operating Time Range, seconds		30 to 650			44 to 650	
Adjustable Full Stroke Spring Operating Time Range, seconds[3]		3 to 15			5 to 20	
Maximum Travel		90° +/-5°			90° +/-5°	
Maximum Shaft Diameter Acceptance, in. / mm		2.36 / 60			2.95 / 75	
Mounting Base Standard		F14/F16			F16/F25	
Ambient Temperature Range, °F / °C		-40 to +140 / -40 to +60			-40 to +140 / -40 to +60	
Explosion Proof Certifications		-	-		-	-
		NEC-505	-		NEC-505	-
		IECex	IECex		IECex	IECex
		ATEX	ATEX		ATEX	ATEX
Water Ingress Protection[4]		IP66 (NEMA 4X), IP67 (NEMA 6), IP68			IP66 (NEMA 4X), IP67 (NEMA 6), IP68	
Approximate Weight, lb / kg		474 / 215			778.2 / 353	
Duty Cycle		S2 (Class A/B) Standard, S4/S9 (Class C/D) Optional			S2 (Class A/B) Standard, S4/S9 (Class C/D) Optional	
Coating and Color		High quality two component polyurethane paint system - C2 ISO12944-5/RAL7012 Other options available on request.			High quality two component polyurethane paint system - C2 ISO12944-5/RAL7012 Other options available on request.	

Notes:
1. 24 V DC power supply characteristics are applicable for BLDC version 10.1 and higher.
2. Nominal motor current measured at specified conditions: base unit torque set up/speed/power supply. For detailed current draw and other performance data, please contact a local Emerson sales channel representative.
3. At ambient temperatures below -4 °F / -20 °C, the fail-safe spring operating time will increase.
4. CM32 and CM64 base units IP68 immersion: 5 m / 16 feet, 21 hours. All bolt-on gear boxes (linear drives, QT planetary gears, fail-safe units) are not IP68 rated and need to be rebuilt in case of a flood event.

Table 4. Torque Table for Selection of Actuator Construction Size – Fail-Safe Close

Type	Travel	Electric against Spring Maximum Torque (ft-lb / Nm)			Electric with Spring Maximum Torque (ft-lb / Nm)			Spring Maximum Torque (ft-lb / Nm)		
		BTO	RTO[1]	ETO	BTC	RTC[1]	ETC	BTC	RTC[1]	ETC
FQ-03	0 to 90°	339 / 460	284 / 385	229 / 310	433 / 587	378 / 512	322 / 437	221 / 300	166 / 225	111 / 150
FQ-06	0 to 90°	686 / 930	575 / 780	465 / 630	693 / 939	582 / 789	471 / 639	443 / 600	332 / 450	221 / 300
FQ-10	0 to 90°	1099 / 1490	915 / 1240	730 / 990	1105 / 1498	920 / 1248	736 / 998	738 / 1000	553 / 750	369 / 500
FQ-20	0 to 90°	2193 / 2973	1824 / 2473	1455 / 1973	2298 / 3115	1929 / 2615	1560 / 2115	1475 / 2000	1106 / 1500	738 / 1000
FQ-30	0 to 90°	3361 / 4557	2790 / 3783	2237 / 3033	3361 / 4557	2808 / 3807	2255 / 3057	2213 / 3000	1660 / 2250	1106 / 1500
FQ-50	0 to 90°	4609 / 6249	3687 / 4999	2765 / 3749	5301 / 7187	4379 / 5937	3457 / 4687	3688 / 5000	2766 / 3750	1844 / 2500

Table 5. Torque Table for Selection of Actuator Construction Size – Fail-Safe Open

Type	Travel	Electric against Spring Maximum Torque (ft-lb / Nm)			Electric with Spring Maximum Torque (ft-lb / Nm)			Spring Maximum Torque (ft-lb / Nm)		
		BTC	RTC[1]	ETC	BTO	RTO[1]	ETO	BTO	RTO[1]	ETO
FQ-03	90 to 0°	339 / 460	284 / 385	229 / 310	433 / 587	378 / 512	322 / 437	221 / 300	166 / 225	111 / 150
FQ-06	90 to 0°	686 / 930	575 / 780	465 / 630	693 / 939	582 / 789	471 / 639	443 / 600	332 / 450	221 / 300
FQ-10	90 to 0°	1099 / 1490	915 / 1240	730 / 990	1105 / 1498	920 / 1248	736 / 998	738 / 1000	553 / 750	369 / 500
FQ-20	90 to 0°	2193 / 2973	1824 / 2473	1455 / 1973	2298 / 3115	1929 / 2615	1560 / 2115	1475 / 2000	1106 / 1500	738 / 1000
FQ-30	90 to 0°	3361 / 4557	2790 / 3783	2237 / 3033	3361 / 4557	2808 / 3807	2255 / 3057	2213 / 3000	1660 / 2250	1106 / 1500
FQ-50	90 to 0°	4609 / 6249	3687 / 4999	2765 / 3749	5301 / 7187	4379 / 5937	3457 / 4687	3688 / 5000	2766 / 3750	1844 / 2500

Notes:

1. For S4 or S9 operation, please consider for RTO and RTC the maximum modulating torques and speeds from Tables 1 to 3.

- BTO = Break to Open torque
- RTO = Run to Open torque at 45°
- ETO = End to Open torque
- BTC = Break to Close torque
- RTC = Run to Close torque at 45°
- ETC = End to Close torque
- Fail to Close = Actuator turns clockwise (CW) to close valve
- Fail to Open = Actuator turns counter clockwise (CCW) to open valve

Different Versions of Cable Entries

Table 6. Conduit Entries

	Non Fail-Safe	Fail-Safe	Step-down Converter (400 V module)	Bus System Enabled	Bus System TCP
Standard/WP	1xM40, 1xM32, 1xM25	1xM40, 1xM32, 1xM25	1xM40, 1xM32, 1xM25	2xM32, 1xM25 + additional 4xM20 (different connector housing)	1xM40, 1xM32, 1xM25 + 2xM12 connector directly on housing (different actuator housing)
XP	1xM40, 2xM20, 1xM16	1xM40, 2xM20	SDC Module with 1xM40, 2xM20 (1xM40, 2xM20 from actuator housing not usable)	1xM40, 2xM20 + additional ring with 4xM20	1xM40, 2xM20 + additional ring with 4xM20
Additional Ring Added VA001-654-22	4xM20	4xM20	4xM20	N/A	N/A

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