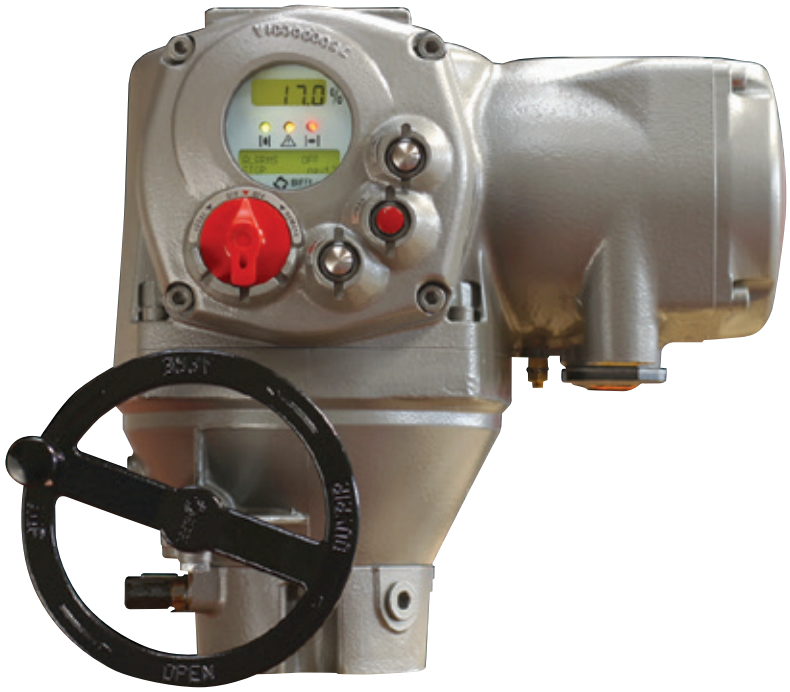
BIFFI F01 ELECTRIC ACTUATORS

Light weight, compact, intelligent electric quarter turn actuator with torques ranging from 150 to 600 Nm and speeds from 5 to 60 seconds



FEATURES

- Constant torque controlled in both directions
- Cut metal teeth gearing runs in oil for high efficiency and low power consumption
- All rotating parts supported by roller bearings
- Mechanical adjustment by stops connected directly to the actuator housing
- Anodized aluminum enclosures with epoxy-polyurethane coating
- Easy set-up and commissioning
- Position indication if power fails
- Local push buttons for full actuator access
- Password protection to avoid unauthorized access
- Diagnostics displayed in a choice of languages

GENERAL APPLICATION

The F01 is ideal for smaller ball, plug, butterfly valves or dampers in heavy-duty applications in the oil and gas, petrochemical, power and water industries.

ENVIRONMENT PROTECTION

- Waterproof only
  IP66/68 (EN60529)

- Standard explosionproof degree
  Ex d IIB T4 (Gas)
  Ex tD A21 T135°C Db (Dust)

TECHNICAL DATA

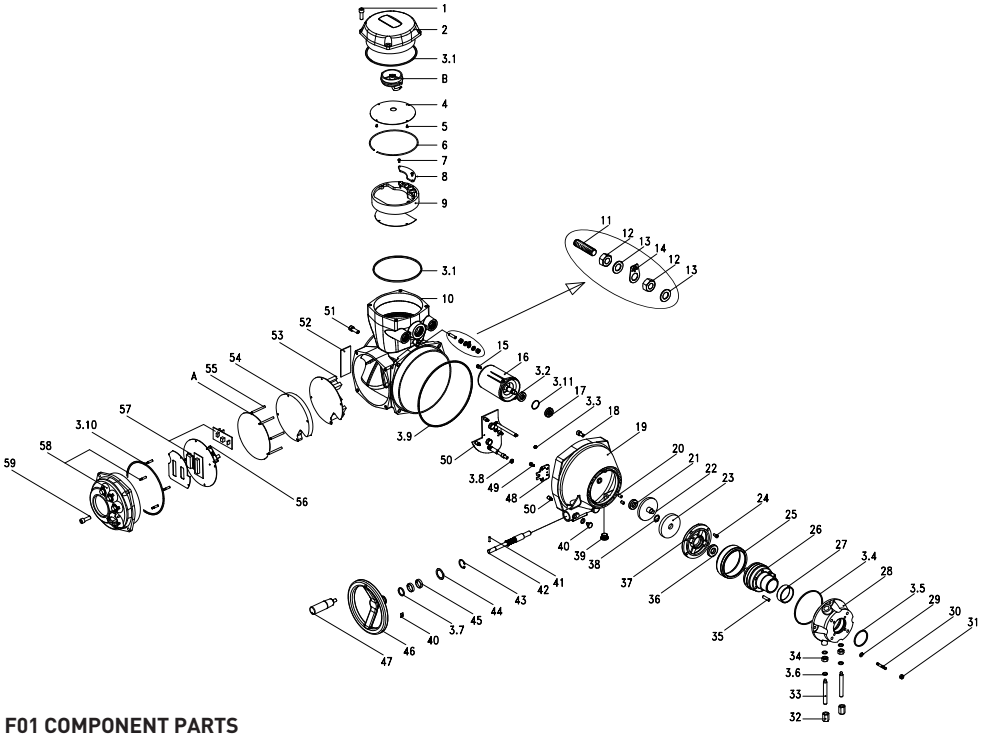
Voltages:
3-phase from 208 V to 690 V at 50/60 Hz
1-phase from 110 V to 240 V at 50/60 Hz
DC (Direct current) from 24 V to 110 V

Torques:	up to 600 Nm
Time/90° stroke:	from 5 up to 60 sec.
Temperature:	-20°C to +85°C Extended temperature ranges available

© 2012 Pentair plc. All Rights Reserved.

BIFFI F01 ELECTRIC ACTUATORS

COMPONENT PARTS



F01 COMPONENT PARTS

Item	Qty	Description	Material	Item	Qty	Description	Material
1	4	Screw	Stainless steel	27	1	Guide bush	Bronze
2	1	Terminal board cover	Aluminum	28	1	Thrust block	Cast iron
3*	1	Seal kit	-	29	4	Washer	Carbon steel
3.1*	2	O-ring	NBR	30	4	Stud bolt	Carbon steel
3.2*	1	Seal ring	NBR	31	4	Nut	Carbon steel
3.3*	1	O-ring	NBR	32	2	Mechanical stop nuts	Carbon steel
3.4*	1	O-ring	NBR	33	2	Mechanical stops	Carbon steel
3.5*	1	O-ring	NBR	34	2	Nut	Carbon steel
3.6*	1	Seal washer	NBR	35	2	Pin	Carbon steel
3.7*	1	O-ring	NBR	36	1	Bearing	Carbon steel
3.8*	1	O-ring	NBR	37	1	Support flange	Aluminum
3.9*	1	O-ring	NBR	38	1	Circlip	Carbon steel
3.10*	1	O-ring	NBR	39	2	Oil plug	-
4	1	Terminals label	Plastic	40	1	Handwheel stop screw	Carbon steel
5	4	Screw	Stainless steel	41	1	Pin	Carbon steel
6	1	Circlip	Stainless steel	42	1	Worm gear assembly	-
7	2	Screw	Stainless steel	43	1	Circlip	Carbon steel
8	1	Power terminals cover	Nylon	44	1	Handwheel ring	Nylon
9	1	Terminal board	-	45	2	Handwheel slide ring	Nylon
10	1	Cover housing	Aluminum	46	1	Handwheel	Aluminum
11	1	Earth stud	Brass	47	1	Hand grip	Plastic
12	2	Earth stud nut	Brass	48	1	Torque plate	Stainless steel
13	2	Washer	Stainless steel	49	2	Screw	Stainless steel
14	1	Earth stud indicator plate	Aluminum	50	1	Torque/position assembly	-
15	2	Screw	Stainless steel	51	4	Screw	Stainless steel
16*	1	Electric motor	-	52	1	Data plate	Stainless steel
17	1	Bearing	Carbon steel	53*	1	Power card	-
18	1	Screw	Stainless steel	54	1	Power card cover	Nylon
19	1	Housing	Aluminum	55	4	Column	Stainless steel
20	1	Pin	Carbon steel	56	1	Potentiometer card	-
21	1	Bearing	Carbon steel	57*	1	Processor card	-
22	1	Double wheel 1st stage	Carbon steel	58*	1	Local interface assembly	-
23	1	Wheel 2nd stage	Carbon steel	59	4	Screw	Stainless steel
24	3	Screw	Carbon steel				
25	1	Worm wheel	Alloy steel	A*	1	Bus card	-
26	1	Planicentric assembly	-	B	1	Battery	-

* Recommended spare parts

NON-HAZARDOUS AND HAZARDOUS AREA CERTIFICATIONS

NON-HAZARDOUS / WEATHERPROOF AREAS

			Temperature range		
			3-ph		1-ph and DC
Standards	Enclosure marking	Version	Up to 60 st/hr	> 60 st/hr	
IEC EN 60529	IP66 / IP68	Standard temperature	-20°C/+85°C	-20°C/+65°C	-20°C/+65°C
		Low temperature	-40°C/+85°C	-40°C/+65°C	-40°C/+65°C
		Extra low temperature	-60°C/+65°C	-60°C/+65°C	-60°C/+65°C

EUROPEAN STANDARDS HAZARDOUS AREAS (ATEX)

				Temperature range		
	Enclosure marking			3-ph		1-ph and DC
Standards	Gas	Dust	Version	Up to 60 st/hr	> 60 st/hr	
ATEX (60079)§	c Ex d IIB T4 Gb*	c Ex d IIIC T135°C Db	Standard temperature	-20°C/+85°C	-20°C/+85°C	-20°C/+85°C
			Low temperature	-40°C/+85°C	-40°C/+85°C	-40°C/+85°C
			Extra low temperature	-50°C/+85°C	-50°C/+85°C	-50°C/+85°C
ATEX (60079)§	c Ex d e IIB T4*	Ex tD A21 T135°C Db	Standard temperature	-20°C/+60°C	-20°C/+60°C	-20°C/+60°C

INTERNATIONAL STANDARDS HAZARDOUS AREAS (IECEX)

				Temperature range		
	Enclosure marking			3-ph		1-ph and DC
Standards	Gas	Dust	Version	Up to 60 st/hr	> 60 st/hr	
IECEx	Ex d IIB T4 Gb*	Ex d IIIC T135°C Db	Standard temperature	-20°C/+85°C	-20°C/+85°C	-20°C/+85°C
			Low temperature	-40°C/+85°C	-40°C/+85°C	-40°C/+85°C
			Extra low temperature	-50°C/+85°C	-50°C/+85°C	-50°C/+85°C

BRAZILIAN STANDARDS HAZARDOUS AREAS (INMETRO)

				Temperature range		
	Enclosure marking			3-ph		1-ph and DC
Standards	Gas	Dust	Version	Up to 60 st/hr	> 60 st/hr	
INMETRO§	c Ex d IIB T4 Gb*	c Ex d IIIC T135°C Db	Standard temperature	-20°C/+85°C	-20°C/+85°C	-20°C/+85°C
			Low temperature	-40°C/+85°C	-40°C/+85°C	-40°C/+85°C
			Extra low temperature	-50°C/+85°C	-50°C/+85°C	-50°C/+85°C

RUSSIAN STANDARDS HAZARDOUS AREAS (EAC CoC)

				Temperature range		
	Enclosure marking			3-ph		1-ph and DC
Standards	Gas	Dust	Version	Up to 60 st/hr	> 60 st/hr	
EAC CoC§	c Ex d IIB T4 Gb*	c Ex d IIIC T135°C Db	Standard temperature	-20°C/+85°C	-20°C/+85°C	-20°C/+85°C
			Low temperature	-40°C/+85°C	-40°C/+85°C	-40°C/+85°C
			Extra low temperature	-50°C/+85°C	-50°C/+85°C	-50°C/+85°C

* with battery: add ia
§ Certified also with the 5th cable entry (optional)

CONTROL PACKAGE STANDARD FEATURES

- Torque/position end-of-travel limits
- Position display
- Three push buttons (open-stop-close)
- Two bi-colored LEDs (open/opening; close/closing)
- Selector switch (local-off-remote)
- Remote control via dry contacts
- Reversing contactor
- Control transformer (fused primary and secondary)
- Local selector switch status
- Auto-phase correction
- Single phase protection
- Monitor relay
- Speed control (timer)
- Remote control via 24 volt thru 125 volt AC or DC signal
- Motor running indication
- Alarm bi-colored LED
- Emergency shutdown (ESD)
- Non-intrusive torque and position limit settings
- Configuration parameters are set locally or remotely
- 3½ digits LCD display for position
- 2 x 16-character lines alphanumeric display for configuration, diagnostics and visualization
- Jammed valve protection
- Instantaneous reversal protection
- Programmable torque/position end of travel
- Maximum torque alarm
- Electronic temperature alarm
- Programmable clockwise or counterclockwise valve rotation
- Electronic nameplate
- Data log (storage of main events)
- Alarm diagnostics
- Programmable in five languages

OPTIONAL MODULES

- 4-20 mA input and output
- 4-20 mA output (selectable position or torque)
- Network options:
  - ProfiBus DP
  - FieldBus foundation
  - LonWorks
  - ModBus
  - DeviceNet
- High/low internal temperature alarm
- Auxiliary battery (remote position transmission)
- Auxiliary heater

BIFFI F01 ELECTRIC ACTUATORS

PERFORMANCE - NOMINAL TORQUE

DEFINITIONS

- Actuator duty according to IEC 60034-1: On-Off: S2-30 minutes; Inching: S4-25%, max 200 starts/hour; Modulating S4-50% 1200 starts/ hour
- Nominal torque = the output torque given by the actuator when the torque device is set and trips at max settable value of its scale
- Stall torque = from 1.4 to 2 times the nominal torque
- Time for 90° rotation = the actuator nominal operating time when the running torque is yielded
- Running torque = 0.4 times the nominal torque
- Hand-wheel torque factor = multiply the required output torque by this factor to obtain the hand-wheel torque
- Bold-faced values represent the performances of Standard models with 3-ph motors
- Identification code: Model/Nominal torque-time at 50 or 60 Hz
  e.g.: F01.150-052/150-12

PERFORMANCES

	Nominal torque (Nm) and time (sec) for 90 degrees of rotation at 50 Hz/60 Hz						Handwheel	
Model	**6/5**	**12/10**	**15/12**	**30/25**	**45/37**	**60/50**	**Torque factor**	**Turns/90°**
F01.150-052			150				$48x10^{-3}$	21
F01.150-054				150			$48x10^{-3}$	21
F01.150-056					150		$48x10^{-3}$	21
F01.150-058						150	$48x10^{-3}$	21
F01.150-052	150						$48x10^{-3}$	21
F01.150-054		150					$48x10^{-3}$	21
F01.300-052			300				$48x10^{-3}$	21
F01.300-054				300			$48x10^{-3}$	21
F01.300-056					300		$48x10^{-3}$	21
F01.300-058						300	$48x10^{-3}$	21
F01.300-102	300						$48x10^{-3}$	21
F01.300-104		300					$48x10^{-3}$	21
F01.600-102			600				$48x10^{-3}$	21
F01.600-104				600			$48x10^{-3}$	21
F01.600-106					600		$48x10^{-3}$	21
F01.600-108						600	$48x10^{-3}$	21
Ratio	1036:1	1036:1	2759:1	2759:1	2759:1	2759:1	$48x10^{-3}$	21

The above characteristics are referred to the actuators with 3-phase or 1-phase asynchronous motors

BIFFI F01 ELECTRIC ACTUATORS

PERFORMANCE THREE PHASE SUPPLY 380 V / 50 HZ ; 415 V / 50 HZ ; 480 V / 60 HZ

DEFINITIONS

- **KW** = motor nominal power
- **RPM** = motor nominal speed in round per minute
- **In** = nominal current of the motor, according to IEC 60034-1, which approximately corresponds to 40% of the actuator nominal torque
- **Is** = current which approximately corresponds to the actuator nominal torque (torque set 100%); we recommend the selection of cables and protections based on the above values
- **Icc** = locked rotor current
- **PF** = power factor
- **Eff** = motor efficiency

Motor insulation class H
Motors duty according to IEC 60034-1

Tolerances
Nominal Voltage Tolerance:
±10% continuous
+10%; -15% intermittent
Nominal Frequency Tolerance: ±2%
Other tolerances according to IEC 60034-1

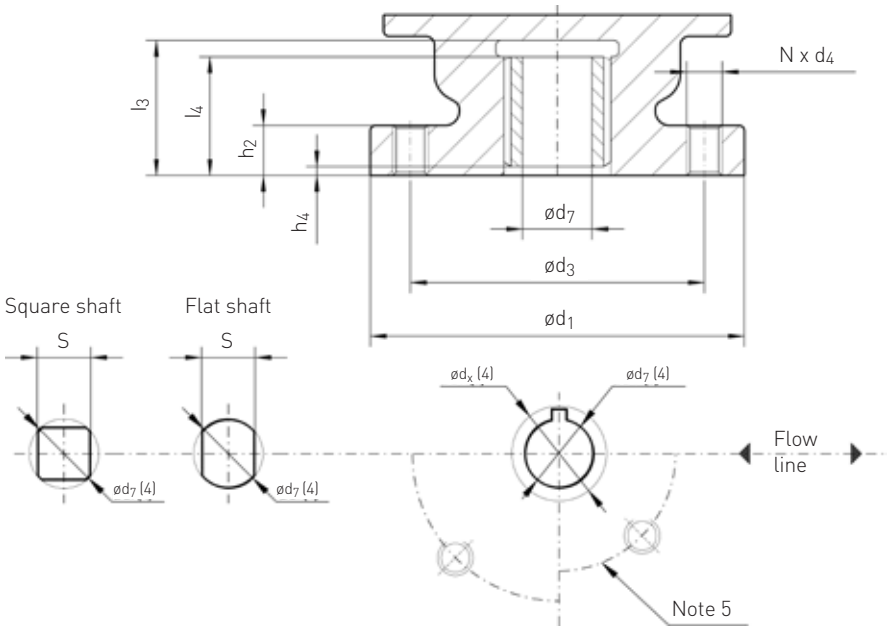
ELECTRICAL DETAILS 3-PHASE SUPPLY

	380 V - 50 Hz - 3-phase							415 V - 50 Hz - 3-phase							480 V - 60 Hz - 3-phase						
Model	**KW**	**RPM**	**In(A)**	**Is(A)**	**Icc(A)**	**PF**	**Eff**	**KW**	**RPM**	**In(A)**	**Is(A)**	**Icc(A)**	**PF**	**Eff**	**KW**	**RPM**	**In(A)**	**Is(A)**	**Icc(A)**	**PF**	**Eff**
F01.150-052	0.040	2820	0.25	0.40	1.00	0.47	0.52	0.040	2820	0.22	0.40	1.00	0.47	0.54	0.048	3380	0.25	0.40	1.00	0.47	0.49
F01.150-054	0.020	1400	0.16	0.20	0.40	0.42	0.46	0.020	1400	0.15	0.20	0.40	0.42	0.44	0.024	1680	0.16	0.20	0.40	0.42	0.43
F01.150-056	0.014	930	0.14	0.20	0.40	0.38	0.40	0.014	930	0.12	0.20	0.40	0.38	0.43	0.017	1120	0.14	0.20	0.40	0.38	0.38
F01.150-058	0.010	700	0.12	0.20	0.50	0.36	0.35	0.010	700	0.10	0.20	0.50	0.36	0.39	0.012	840	0.12	0.20	0.50	0.36	0.34
F01.300-052	0.040	2820	0.25	0.40	1.00	0.47	0.52	0.040	2820	0.22	0.40	1.00	0.47	0.54	0.048	3380	0.25	0.40	1.00	0.47	0.49
F01.300-054	0.020	1400	0.16	0.20	0.40	0.42	0.46	0.020	1400	0.15	0.20	0.40	0.42	0.44	0.024	1680	0.16	0.20	0.40	0.42	0.43
F01.300-056	0.014	930	0.14	0.20	0.40	0.38	0.40	0.014	930	0.12	0.20	0.40	0.38	0.43	0.017	1120	0.14	0.20	0.40	0.38	0.38
F01.300-058	0.010	700	0.12	0.20	0.50	0.36	0.35	0.010	700	0.10	0.20	0.50	0.36	0.39	0.012	840	0.12	0.20	0.50	0.36	0.34
F01.300-102	0.080	2850	0.40	0.50	1.50	0.56	0.54	0.080	2850	0.35	0.50	1.50	0.56	0.57	0.096	3420	0.40	0.50	1.50	0.56	0.52
F01.300-104	0.040	1420	0.30	0.40	1.00	0.42	0.48	0.040	1420	0.30	0.40	1.00	0.42	0.44	0.048	1700	0.30	0.40	1.00	0.42	0.46
F01.600-102	0.080	2850	0.40	0.50	1.50	0.56	0.54	0.080	2850	0.35	0.50	1.50	0.56	0.57	0.096	3420	0.40	0.50	1.50	0.56	0.52
F01.600-104	0.040	1420	0.30	0.40	1.00	0.42	0.48	0.040	1420	0.30	0.40	1.00	0.42	0.44	0.048	1700	0.30	0.40	1.00	0.42	0.46
F01.600-106	0.030	940	0.25	0.40	0.80	0.40	0.46	0.030	940	0.22	0.40	0.80	0.40	0.47	0.036	1130	0.25	0.40	0.80	0.40	0.44
F01.600-108	0.020	720	0.20	0.30	0.60	0.38	0.40	0.020	720	0.20	0.30	0.60	0.38	0.37	0.024	860	0.20	0.30	0.60	0.38	0.38

The current values shown on the table are referred to motors with Star connection; when the phases are Delta-connected multiply the current figures by factor 1.73

BIFFI F01 ELECTRIC ACTUATORS

OUTPUT DRIVE DIMENSIONS



COUPLING DIMENSIONS

										Max stem acceptance				Mass
Actuator size	**ISO 5211**	**Ø d_1**	**Ø d_3**	**Ø d_4**	**N**	**l_3**	**l_4**	**h_2**	**h_4**	**Ø d_7**	**S**	**Ø d_x**	**FL**	**Kg**
F01-150	F10	125	102	M10	4	50	48	16	1	28	22	36	F07	32
F01-300	F10	125	102	M10	4	50	48	16	1	28	22	36	F07	32
F01-600	F12	150	125	M12	4	60	58	18	1	36	30	45	F10	34

NOTES

1. Insert bush supplied by Biffi with unmachined bore; larger bores can be supplied with solid piece bush
2. Fixing bolts or rods supplied by Biffi only on request, minimum material required ISO class 8.8
3. d_x = the maximum accepted diameter described by the key
4. Position of the shaft with closed valve
5. Additional ISO PCD is provided as shown in column FL

BIFFI F01 ELECTRIC ACTUATORS

PERFORMANCE SINGLE PHASE SUPPLY 50 HZ / 60 HZ

1-PHASE SUPPLY AT 50 Hz

	110 V - 50 Hz - 1-phase								230 V - 50 Hz - 1-phase							
Model	**KW**	**RPM**	**In(A)**	**Is(A)**	**Icc(A)**	**PF**	**Eff**	**Cap**	**KW**	**RPM**	**In(A)**	**Is(A)**	**Icc(A)**	**PF**	**Eff**	**Cap**
F01.150-052	0.040	2820	1.40	2.50	4.50	0.92	0.28	25.0	0.040	2820	0.70	1.25	2.30	0.92	0.28	6.3
F01.150-054	0.020	1400	0.80	1.50	2.50	0.94	0.24	16.0	0.020	1400	0.40	0.80	1.30	0.94	0.24	4.0
F01.150-056	0.014	930	0.60	1.20	2.00	0.97	0.22	12.5	0.014	930	0.30	0.60	1.00	0.97	0.22	3.5
F01.150-058	0.010	700	0.50	0.80	1.50	0.96	0.19	8.0	0.010	700	0.25	0.40	0.80	0.96	0.19	2.0
F01.300-052	0.040	2820	1.40	2.50	4.50	0.92	0.28	25.0	0.040	2820	0.70	1.25	2.30	0.92	0.28	6.3
F01.300-054	0.020	1400	0.80	1.50	2.50	0.94	0.24	16.0	0.020	1400	0.40	0.80	1.30	0.94	0.24	4.0
F01.300-056	0.014	930	0.60	1.20	2.00	0.97	0.22	12.5	0.014	930	0.30	0.60	1.00	0.97	0.22	3.5
F01.300-058	0.010	700	0.50	0.80	1.50	0.96	0.19	8.0	0.010	700	0.25	0.40	0.80	0.96	0.19	2.0
F01.300-102	0.080	2850	2.10	3.00	5.50	0.90	0.38	50.0	0.080	2850	1.00	1.50	3.00	0.90	0.40	12.5
F01.300-104	0.040	1420	1.40	2.50	4.50	0.92	0.28	25.0	0.040	1420	0.70	1.30	2.30	0.92	0.28	6.3
F01.600-102	0.080	2850	2.10	3.00	5.50	0.90	0.38	50.0	0.080	2850	1.00	1.50	3.00	0.90	0.40	12.5
F01.600-104	0.040	1420	1.40	2.50	4.50	0.92	0.28	25.0	0.040	1420	0.70	1.30	2.30	0.92	0.28	6.3
F01.600-106	0.030	940	1.20	2.00	3.50	0.94	0.24	20.0	0.030	940	0.60	1.00	1.80	0.94	0.24	5.0
F01.600-108	0.020	720	0.80	1.50	2.50	0.94	0.24	16.0	0.020	720	0.40	0.80	1.30	0.94	0.24	4.0

1-PHASE SUPPLY AT 60 Hz

	115 V - 60 Hz - 1-phase								240 V - 60 Hz - 1-phase							
Model	**KW**	**RPM**	**In(A)**	**Is(A)**	**Icc(A)**	**PF**	**Eff**	**Cap**	**KW**	**RPM**	**In(A)**	**Is(A)**	**Icc(A)**	**PF**	**Eff**	**Cap**
F01.150-052	0.048	3380	1.40	2.50	4.50	0.92	0.32	20.0	0.048	3380	0.70	1.25	2.30	0.92	0.31	6.3
F01.150-054	0.024	1680	0.80	1.50	2.50	0.94	0.28	12.5	0.024	1680	0.40	0.80	1.30	0.94	0.27	4.0
F01.150-056	0.017	1120	0.60	1.20	2.00	0.97	0.25	10.0	0.017	1120	0.30	0.60	1.00	0.97	0.24	3.5
F01.150-058	0.012	840	0.50	0.80	1.50	0.96	0.22	6.3	0.012	840	0.25	0.40	0.80	0.96	0.20	2.0
F01.300-052	0.048	3380	1.40	2.50	4.50	0.92	0.32	20.0	0.048	3380	0.70	1.25	2.30	0.92	0.31	6.3
F01.300-054	0.024	1680	0.80	1.50	2.50	0.94	0.28	12.5	0.024	1680	0.40	0.80	1.30	0.94	0.27	4.0
F01.300-056	0.017	1120	0.60	1.20	2.00	0.97	0.25	10.0	0.017	1120	0.30	0.60	1.00	0.97	0.24	3.5
F01.300-058	0.012	840	0.50	0.80	1.50	0.96	0.22	6.3	0.012	840	0.25	0.40	0.80	0.96	0.20	2.0
F01.300-102	0.096	3420	2.10	3.00	5.50	0.90	0.44	40.0	0.096	3420	1.00	1.50	3.00	0.90	0.44	12.5
F01.300-104	0.048	1700	1.40	2.50	4.50	0.92	0.32	20.0	0.048	1700	0.70	1.30	2.30	0.92	0.31	6.3
F01.600-102	0.096	3420	2.10	3.00	5.50	0.90	0.44	40.0	0.096	3420	1.00	1.50	3.00	0.90	0.44	12.5
F01.600-104	0.048	1700	1.40	2.50	4.50	0.92	0.32	20.0	0.048	1700	0.70	1.30	2.30	0.92	0.31	6.3
F01.600-106	0.036	1130	1.20	2.00	3.50	0.94	0.28	16.0	0.036	1130	0.60	1.00	1.80	0.94	0.27	5.0
F01.600-108	0.024	860	0.80	1.50	2.50	0.94	0.28	12.5	0.024	860	0.40	0.80	1.30	0.94	0.27	4.0

DEFINITIONS

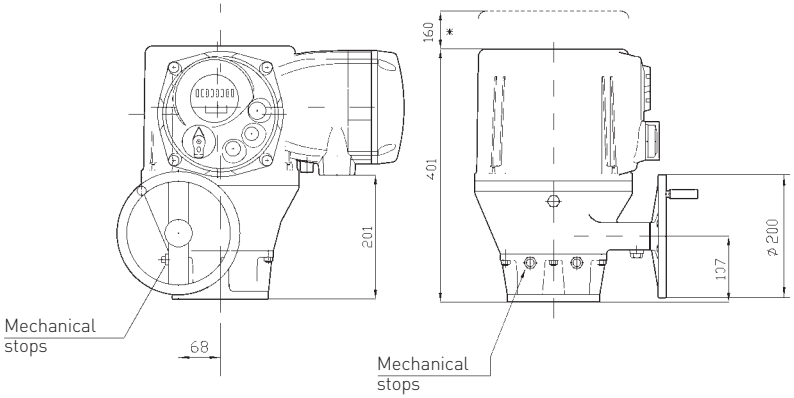
- **KW** = motor nominal power
- **RPM** = motor nominal speed in round per minute
- **In** = nominal current of the motor, according to IEC 60034-1, which approximately corresponds to 40% of the actuator nominal torque
- **Is** = current which approximately corresponds to the actuator nominal torque (torque set 100%); we recommend the selection of cables and protections based on the above values
- **Icc** = locked rotor current
- **PF** = power factor
- **Eff** = motor efficiency
- **Cap** = capacitors value measured in microFarad

Motor insulation class H
Motors duty according to IEC 60034-1

Tolerances
Nominal Voltage Tolerance:
±10% continuous
+10%; -15% intermittent
Nominal Frequency Tolerance: ±2%
Other tolerances according to IEC 60034-1

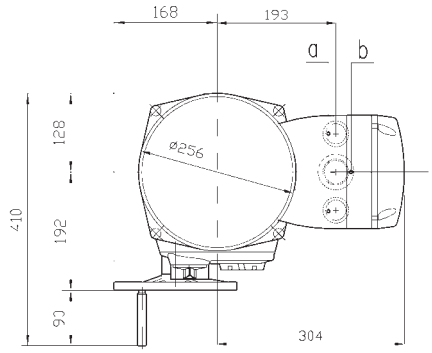
BIFFI F01 ELECTRIC ACTUATORS
OVERALL DIMENSIONS

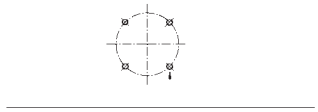
MODEL F01-600



OVERALL DIMENSIONS

Cables entries	a	b	c
NPT	1"	1½"	1"



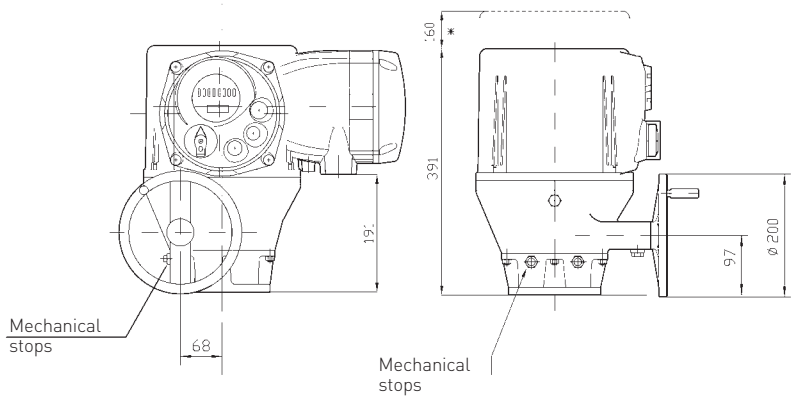


Coupling flange according
to ISO 5211 ISOF10/ISOF12

MASS 32 KG

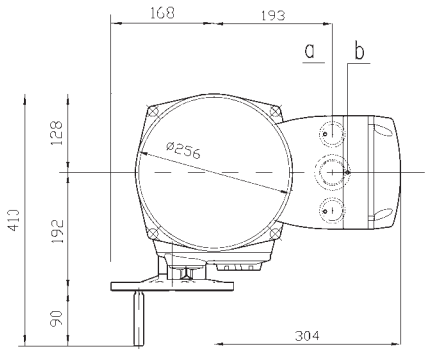
*Space for cover removal

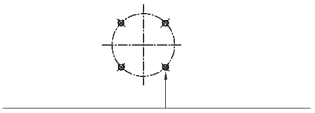
MODELS F01-150 AND 300



OVERALL DIMENSIONS

Cables entries	a	b	c
NPT	1"	1½"	1"



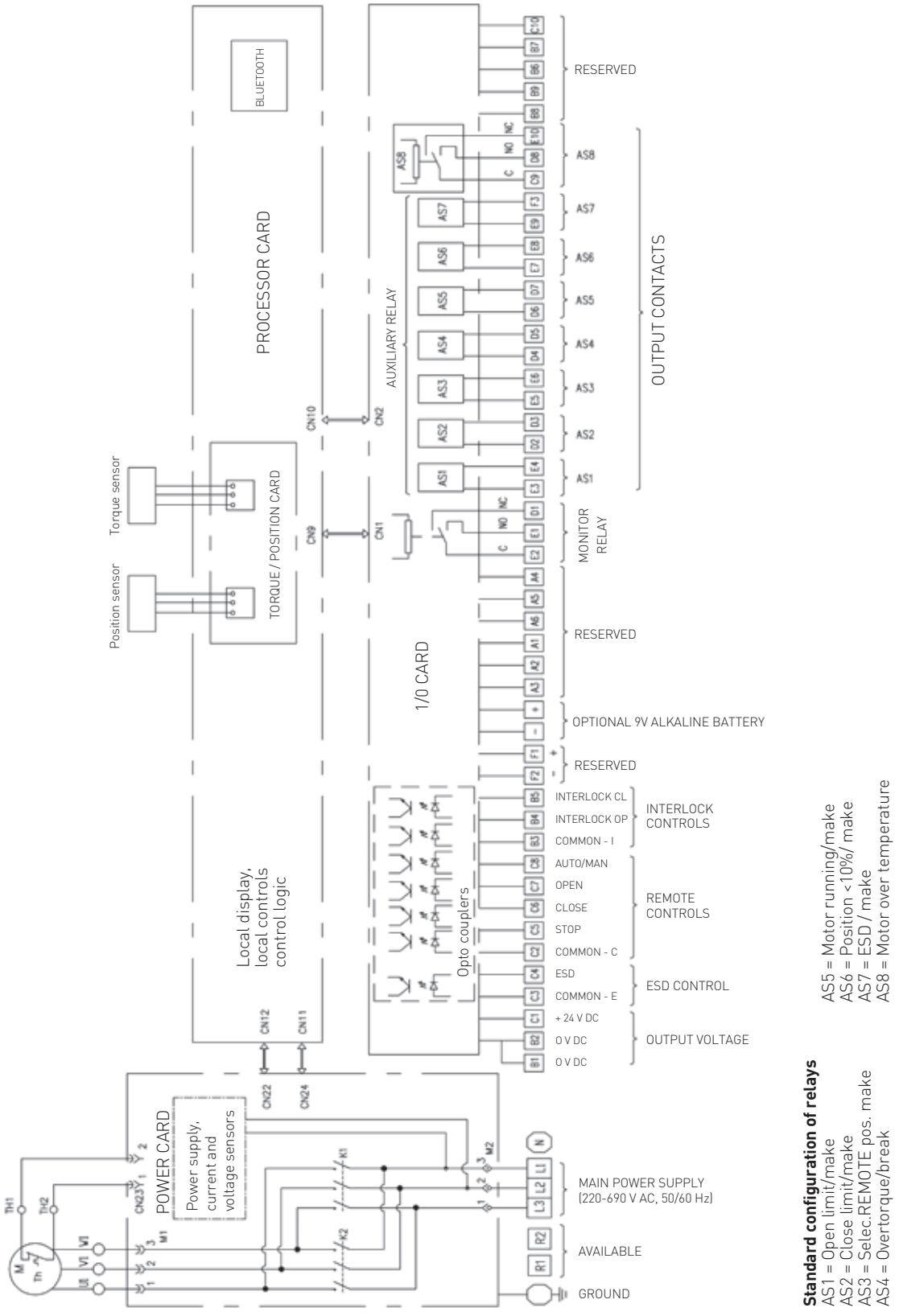


Coupling flange according
to ISO 5211 ISOF07/ISOF10

MASS 31 KG

*Space for cover removal

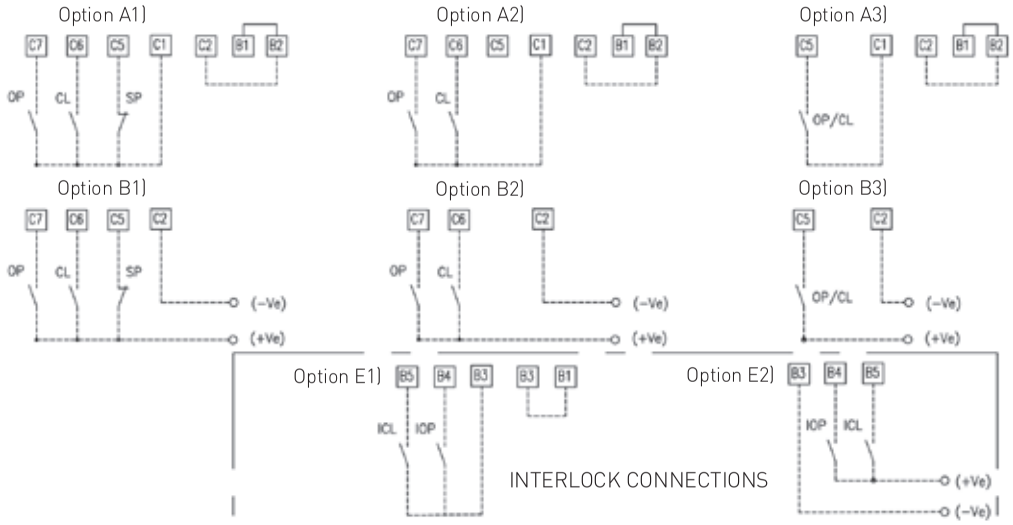
GENERAL CONFIGURATION



Standard configuration of relays
AS1 = Open limit/make
AS2 = Close limit/make
AS3 = Selec.REMOTE pos. make
AS4 = Overtorque/break
AS5 = Motor running/make
AS6 = Position <10%/ make
AS7 = ESD / make
AS8 = Motor over temperature

NOTES

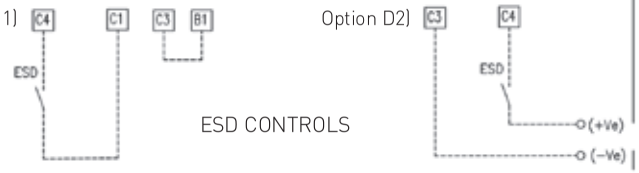
1) B1-B2: Internally linked
2) C1: +24 V DC not regulated, max. 4 W
3) Control signal levels:
   Minimum "ON" >20 V DC or 20 V AC (50/60 Hz)
   Maximum "ON" <125 V DC or 120 V AC (50/60 Hz)
   Maximum "OFF" <3 V DC or AC
   Mimimum signal duration > 300 ms
   Total current drawn for remote controls <25 mA
   Total current drawn for ESD controls <15 mA
4) Monitor relay: Voltage-free, change-over contact
   Max. voltage 250 V AC or 30 V DC - max. current 5 A / min. voltage 5 V DC - min. current 10 mA
   See instruction manual to view or configure the switching conditions of relay
   - E2/D1 contact is closed when the configured condition occurs
5) AS1, AS2, AS3, AS4, AS5, AS6, AS7: Voltage-free contact
   Max. voltage 250 V AC or 30 V DC - max. current 5 A / min. voltage 5 V DC - min. current 10 mA
   Contact can be configured to make or break on condition
   See Instruction manual to view or configure switching conditions of relays
6) AS8 : Voltage-free, change-over contact
   Max. voltage 250 V AC or 30 V DC - max. current 5 A / min. voltage 5 V DC - min. current 10 mA
   See instruction manual to view or configure the switching conditions of relay
   - C9/D8 contact is closed when the configured condition occurs
7) A1, A2, A3: Internal supply 24 V DC
8) B1, B2, B3: External supply 20-125 V DC or 20-120 V AC (50/60 Hz)
9) Controls mode:
   Option A1/B1 : 4 wires latched (SP configuration = BREAK)
   Option A2/B2 : 3 wires push to run
   : 3 wires latched with instant reserve
   Option A3/B3 : 2 wires open contact opens
   : 2 wires open contact closes



See instruction handbook to configure options A1, A2, A3, B1, B2, B3.
For 4-20 mA connections see MAN 618/5, optional modules PSM1 and APTM1.

Remote STOP control SP can be configured to perform the STOP action when the contact is open (break) or closed (make).

Option E1: Internal supply 24 V DC INTERLOCK active with closed or open contact (to be configured)
Option E2: External supply 20-125 V DC or 20-120 V AC (50/60 Hz) INTERLOCK active with closed or open contact (to be configured)
See Instruction handbook to configure INTERLOCK signal type



Option D1: Internal supply 24 V DC ESD active with closed or open contact (to be configured)
Option E1: External supply 20-125 V DC or 20-120 V AC (50/60 Hz) ESD active with closed or open contact (to be configured)
See instruction manual to configure ESD signal type, ESD action and priority.
If customers wish to have the thermostat by-passed during ESD operation, it should be noted that any certification for actuator enclosure in hazardous area will be invalidated.

LEGENDA
M = Three-phase motor
Th = Motor thermostat
OP = OPEN control
CL = CLOSE control
SP = STOP control
K1 = Opening/Closing contactor
K2 = Opening/Closing contactor

PENTAIR VALVES & CONTROLS
www.pentair.com/valves

All Pentair trademarks and logos are owned by Pentair plc. All other brand or product names are trademarks or registered marks of their respective owners. Because we are continuously improving our products and services, Pentair reserves the right to change product designs and specifications without notice. Pentair is an equal opportunity employer. © 2015 Pentair plc. All rights reserved.