

Chapter 2: Specifications

2.1 Main Specifications

Power Supply Voltage

- Single Phase 100 ~ 230 VAC +/- 10% , 50/60 Hz Auto-Switching

Installation Requirement

- No Vibration should be applied directly to the Controller. Securely mount controllers to a fixed point.

Range of Operation

- Duty cycle below 50% (reference Section 2.2 Duty Cycle Calculation)

Operating Conditions (may be met by incorporating an Air Handling Unit into System)

- Temperature: 0° ~ 50 °C (32° ~ 122 °F)
- Humidity: 20% ~ 90%, no moisture

Storage Conditions

- Temperature: -5° ~ 55 °C (23° ~ 131 °F)
- Humidity: Below 90%, no moisture

Shipping Conditions

- Temperature: -5° ~ 55 °C (23° ~ 131 °F)
- Humidity: Below 90%, no moisture

2.2 Duty Cycle Calculation

Duty Cycle is rated as a percentage of the time the motor is running to the time the motor is idle. This is an important factor in determining overload protection for Servo Amplifiers and motors as it directly relates to the amount of power or heat dissipation of the motor / servo package. The rated duty cycle for the FUSION System is calculated as follows:

$$\frac{\text{Tool Rotation Time}}{\text{Total Cycle Time (Tool Rotation + Tool Waiting)}} \times 100 = \text{Duty Cycle Percentage (\%)}$$

Example: Tool Rotation Time = $\frac{3 \text{ Seconds}}{12 \text{ Seconds}}$ x 100 = 25% Duty Cycle Percentage

Duty cycle ratings vary between tools. As a general rule, however, it should not exceed 50%. IF duty cycles remain above 60% for extended periods, a Servo Amplifier Error / Overload will result (See abnormal CODE 8 -10). Protection for high duty cycle is a standard feature of the Servo Amplifier to prevent servo or motor damage.

2.3 Controller Unit Specifications

Controller Model	HFC-EC-16
Motor Model	RM80, RM50
Controller Supply Voltage	Single Phase 100~ 230 VAC 50/60/Hz +/- 10%
Power Consumption (Running)	95 watt/hour @ 99% Capacity / 50% Duty
Power Consumption (Idle)	37 watt/Hour
Inrush current @ Power on	11A



If the equipment is powered on and off repeatedly, internal circuit protection devices may trip due to high in-rush current overload, and the Controller will not function until it is cleared (powered off). (It may take up to five minutes of “off” time to clear the self-protection circuit.)

- **Controller Processor:** 32-bit RISC (Reduced Instruction Set CPU)
- **Parameter / Firmware Storage:** Flash ROM
- **Fastening Data Storage:** More than 10,000 cycles (stored in flash)
- **Fastening Method:** Torque and Angle, 1 ~ 3 step fastening
- **Torque Rate Calculation:** 3 ranges
- **Data communications:**
 - (1) RS232 – Front Panel - Input/output – Programming and Data collection
 - (1) RS232 – Rear Panel – Output – Printer or data collection device.
 - (1) T/A MON – Front Panel – Output – analog Torque and Angle analysis.
 - (1) Discrete I/O – Rear panel - Control and PLC interface
 - (1) Real Time Clock Connection
 - (1) Optional Ethernet – Output - Data collection
 - (1) Optional Fieldbus – Input/Output – Control and PLC interface

2.4 Capability.

- **Fastening Accuracy (Torque):** From 1/4 to full scale torque: 3 sigma scatter less than 6% of target torque. Accuracy improvements available with application specific set-up.
- **Torque resolution:** Full Scale Torque x 1/1000.
- **Torque Display Resolution:** 4-digit display with floating decimal point.
- **Angle Resolution:** .1 Degree (1024 pulses / motor rev.)
- **Angle Display Resolution:** .1 degree.
Forward Max. count 9999 degree
Reverse Max. count 1999 degree
- **Torque transducer accuracy:** (0 - Full Scale) $\pm 1\%$
- **Linearity of torque transducer:** $\pm 0.5\%$ of Full Scale value (Maximum).

2.4.1 Nutrunner Tool Specification Table.

	TOOL TYPE	SERVO TYPE	CALIBRATION TORQUE					SPEED RPM		Weight (Kg)	Sq. Drive (inch)	Length (mm)
			NM	KGM	KGCM	FTLB	INLB	MAX	MIN			
ANGLE	HFT-015M50-A1	HFC-EC-16	14.7	1.5	150	10.8	130.2	1215	1	1.3	3/8	381
	HFT-025M80-A1	HFC-EC-16	24.5	2.5	250	18.1	217.0	1070	1	1.7	3/8	400
	HFT-040M80-A1	HFC-EC-16	39.2	4.0	400	28.9	347.2	648	1	1.9	3/8	425
	HFT-060M80-A	HFC-EC-16	58.8	6.0	600	43.4	520.8	446	1	1.9	1/2	425
	HFT-080M80-A	HFC-EC-16	78.4	8.0	800	57.9	694.4	330	1	3.8	1/2	507
	HFT-130M80-A	HFC-EC-16	127.5	13.0	1300	94.0	1128.4	203	1	3.8	1/2	516
STRAIGHT	HFT-010M50-S1	HFC-EC-16	9.8	1.0	100	7.2	86.8	1665	1	1.3	3/8	342
	HFT-015M80-S1	HFC-EC-16	14.7	1.5	150	10.8	130.2	1665	1	1.4	3/8	363
	HFT-025M80-S1	HFC-EC-16	24.5	2.5	250	18.1	217.0	900	1	1.4	3/8	363
	HFT-040M80-S	HFC-EC-16	39.2	4.0	400	28.9	347.2	694	1	1.4	3/8	363
	HFT-080M80-S	HFC-EC-16	TBA									
PISTOL	HFT-015M50-P	HFC-EC-16	14.7	1.5	150	10.8	130.2	1000	1	1.4	3/8	230
	HFT-040M80-P	HFC-EC-16	39.2	4.0	400	28.9	346.9	694	1	1.8	3/8	230
	HFT-040M80-T	HFC-EC-16	39.2	4.0	400	28.9	346.9	694	1	1.8	3/8	250

CONVERSION GUIDE: 1 KGM = 100 KGCM = 9.8 NM = 7.2 FTLB = 86.8 INLB

FULL SCALE TORQUE VALUES (WORK 1~16 D-NO 10) IN CONTROLLER ARE BASED UPON LIMIT SET BY Kgm VALUE.

The tool lists located throughout this manual identify the specifications for the standard tools used with the FUSION System. Additional tools are available. If additional capacity, information or special needs are required, please contact FEC INC.

2.4.2 Nutrunner Decimal Point Display Table.

POSITIONS FOR DECIMAL POINT DISPLAY										
TOOL TYPE	TORQUE DECIMAL POINT DISPLAY					TORQUE RATE DECIMAL POINT DISPLAY				
	NM	KGM	KGCM	FTLB	INLB	NM	KGM	KGCM	FTLB	INLB
HFT-010M50-x	2	2	0	2	1	3	3	2	3	2
HFT-015M50-x	2	2	0	2	1	3	3	2	3	2
HFT-015M80-x	2	2	0	2	1	3	3	2	3	2
HFT-025M80-x	2	2	0	2	1	3	3	2	3	2
HFT-040M80-x	2	2	0	2	1	3	3	2	3	2
HFT-060M80-x	1	2	0	2	0	3	3	2	3	2
HFT-080M80-x	1	2	0	2	0	3	3	2	3	2
HFT-130M80-x	1	2	0	2	0	2	3	1	2	1

Example: HFT-025M80-A Torque Display = 25.00 NM (2 positions)
Torque Rate Display = 1.999 NM/degree (3 positions)

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