

ELECTRONICS AND DIAGNOSTICS

[1] SPECIFICATION (CONTROLLER AND MOTORS)

(1) TRACTION CONTROL SYSTEM

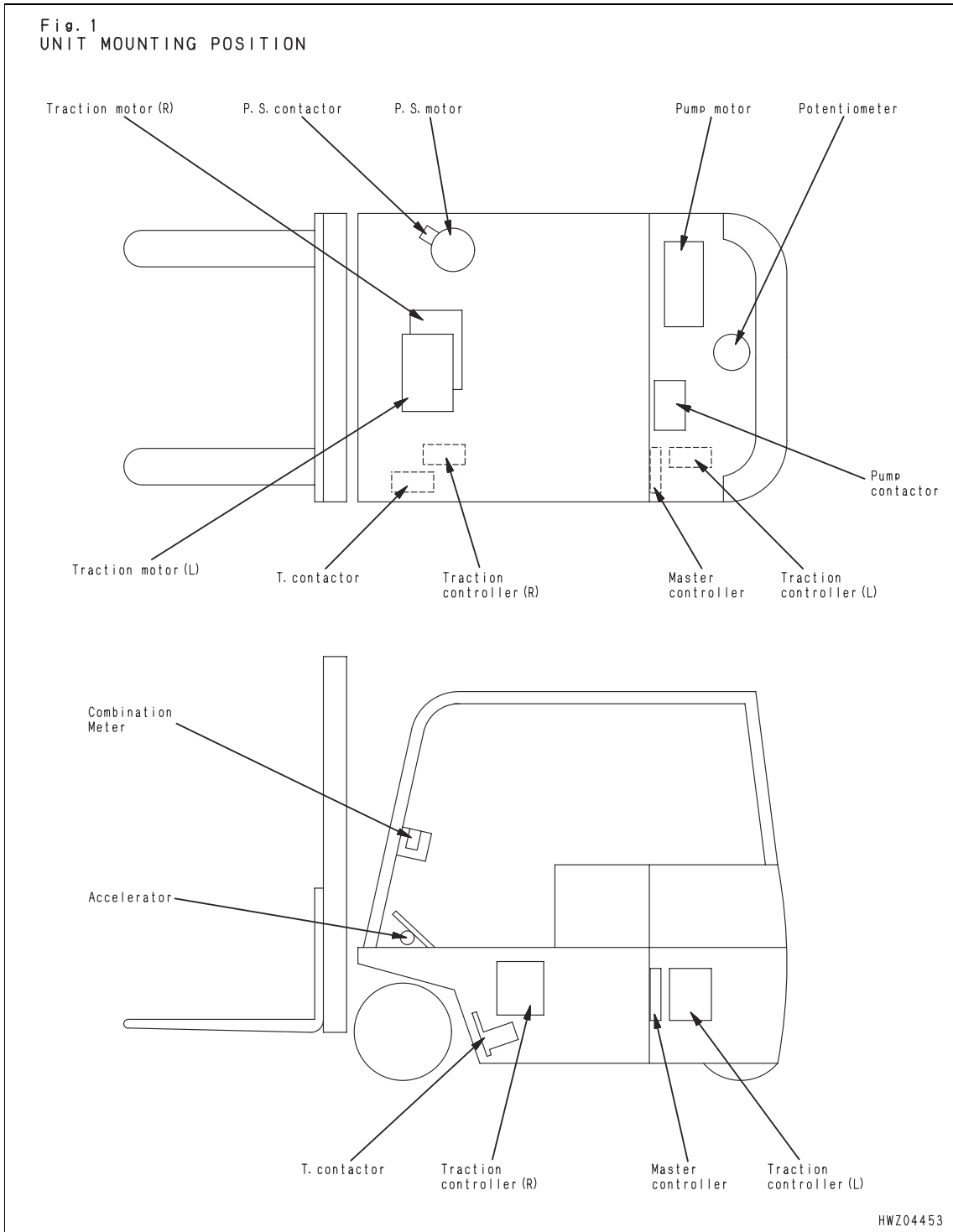
Item	Unit	FB15M/18M/18MG/20M
Motor type.	–	3-phase induction motor with squirrel cage rotor
No. of quadrants.	–	4 quadrant control.
Braking	–	Regenerative
Modulation	–	PWM (Pulse Width Modulation)
Switching frequency	kHz	8
Operating stator current frequency	Hz	0-150
Control mode.	–	Speed or torque control
Operating Voltage	V	34-62
Motor Stall Current	Arms	285 (one phase/AC)
Battery Stall Current (36Vdc/48Vdc)	A	165 / 120

(2) MAIN SPECIFICATIONS OF MOTORS AND SERVICE DATA

Item	Unit	Traction motor	Pump motor (same as 15SH)		Power steering motor (same as 15SH)
		FB15M/18M/18MG/20M	FB15M/18M/18MG/20M	FB15M/18M/18MG/20M	FB15M/18M/18MG/20M
Rated voltage	V	23/AC	36 volts	48 volts	48
Number of poles	–	4	4		4
Rated output	kw	4.8	4.85	6.34	0.45
Rated time	min.	60	60		60
Excitation method	–	3 phases induction	Series winding		Permanent magnet
Type insulation	–	F	H		F
Casing type	–	Open self-ventilating	Open self-ventilating		Close
Weight	kg	34	37		14
Dimension	mm	∅ 204 × L284	∅ 170 × L395		∅ 122 × L255
Initial brush dimension Thickness×width×height	mm (in.)	---	15.9 × 24.6 × 38.1 (0.626 × 0.967 × 1.50)		7.0 × 22.3 × 20.3 (0.28 × 22.3 × 20.3)
Wear limit height of brush	mm (in.)	---	16 (0.62)		12 (0.47)
Standard outside diameter of commutator	mm (in.)	---	74.2 (2.92)		51 (2.0)
Wear limit of outside diameter of commutator	mm (in.)	---	69.9 (2.75)		46 (1.8)
Tightening torque for M8 or M10 terminal bolts	Nm (in.-lb)	M8 16.6~20.6 (147~182)	M10 16.6~20.6 (120~140) Top bolt only; bottom bolt torque N/A		---
Motor temperature sensor set temperature (optional)	°F (°C)		ON: 302°F ± 41°F (150°C ± 5°C) OFF: 284°F ± 41°F (140°C ± 5°C)		

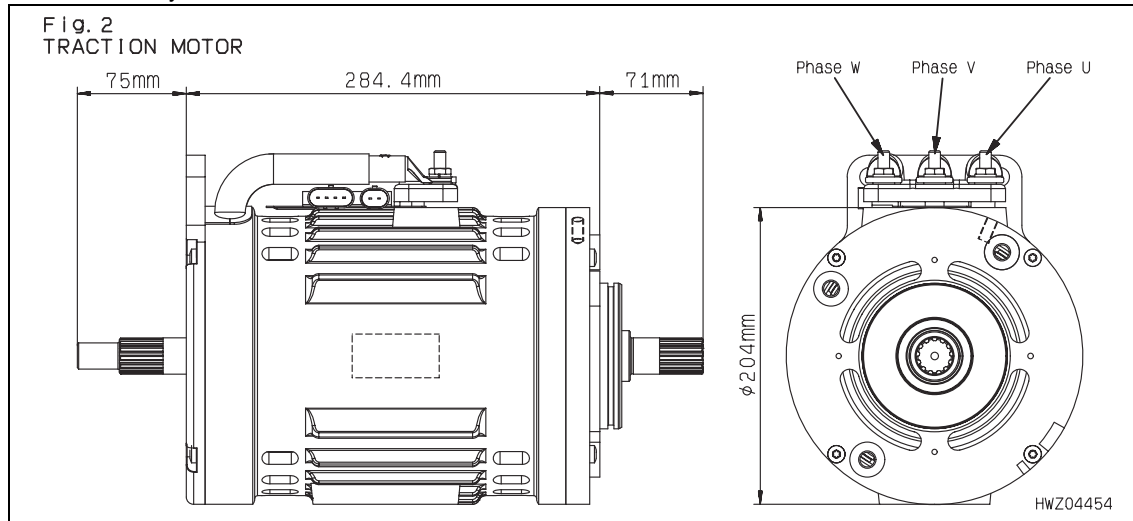
[2] OUTLINE OF ELECTRICAL PARTS

(1) ELECTRICAL PARTS LOCATION



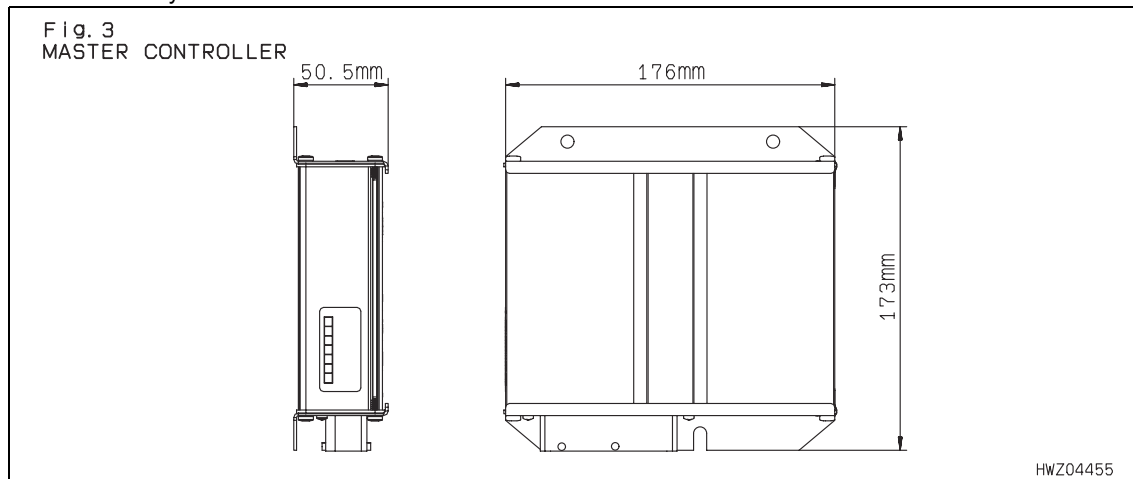
(2) TRACTION MOTOR

Manufactured by API-Elmo



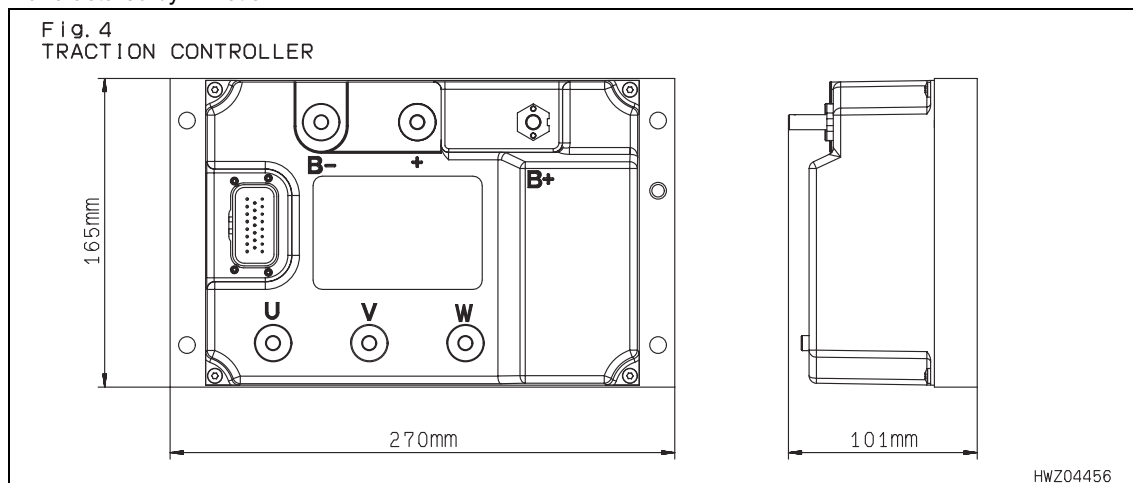
(3) MASTER CONTROLLER(CANION)

Manufactured by Inmotion



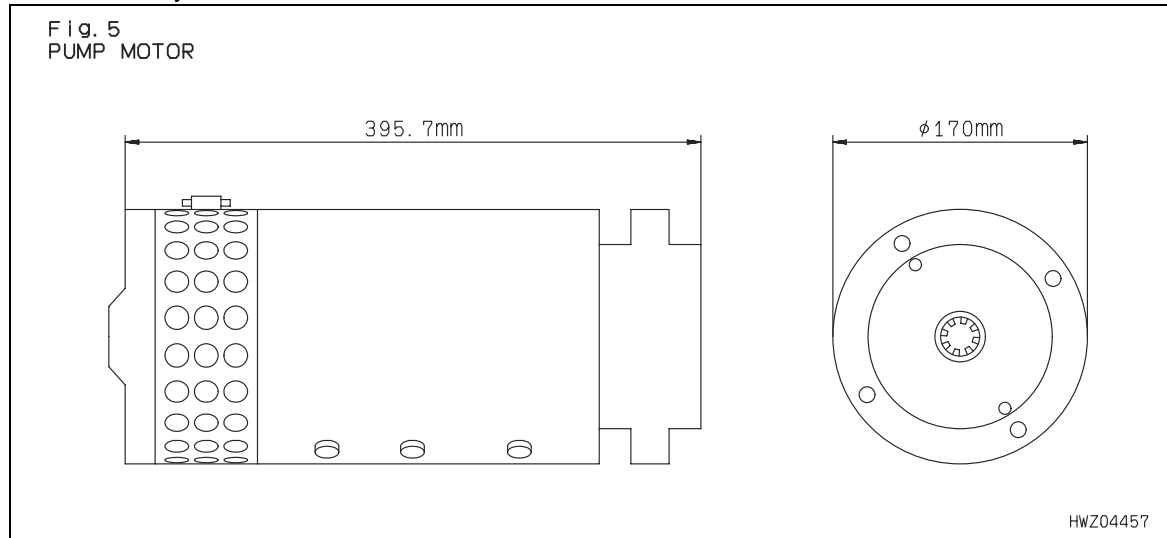
(4) TRACTION CONTROLLER(ACS)

Manufactured by Inmotion



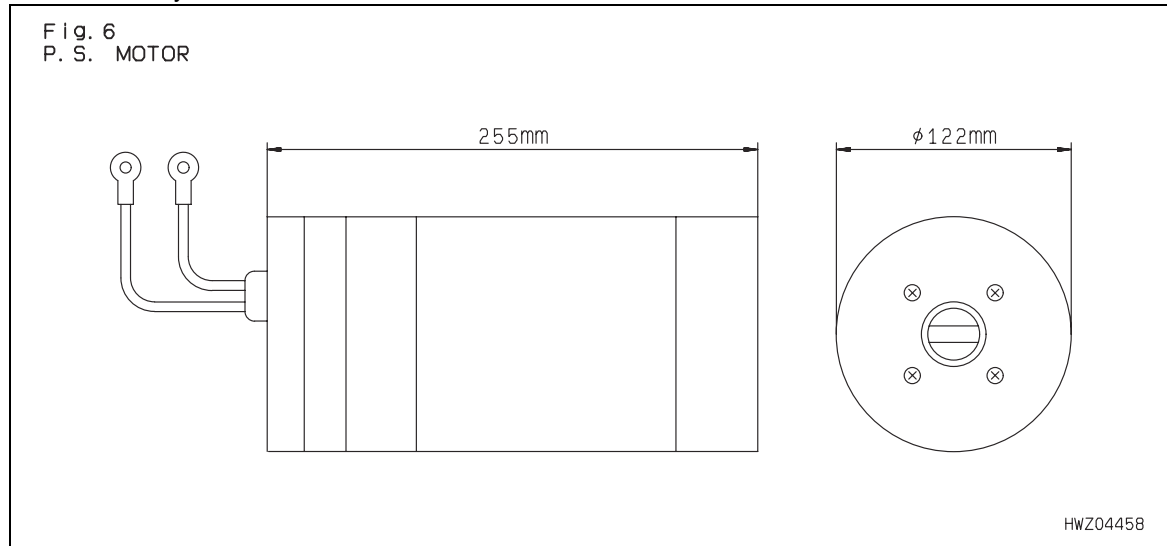
(5) PUMP MOTOR

Manufactured by Advanced D.C. Motor Inc.



(6) PS MOTOR

Manufactured by Ohio Electric Motor Inc.



ELECTRONICS AND DIAGNOSTICS

[3] BASIC OF AC DRIVE SYSTEM

(Remark) Note that the following parts may be called by different names in this manual.

- Traction controller ----- ACS controller or ACS
- Master controller ----- Canion controller or canion
- Traction contactor ----- Main contactor

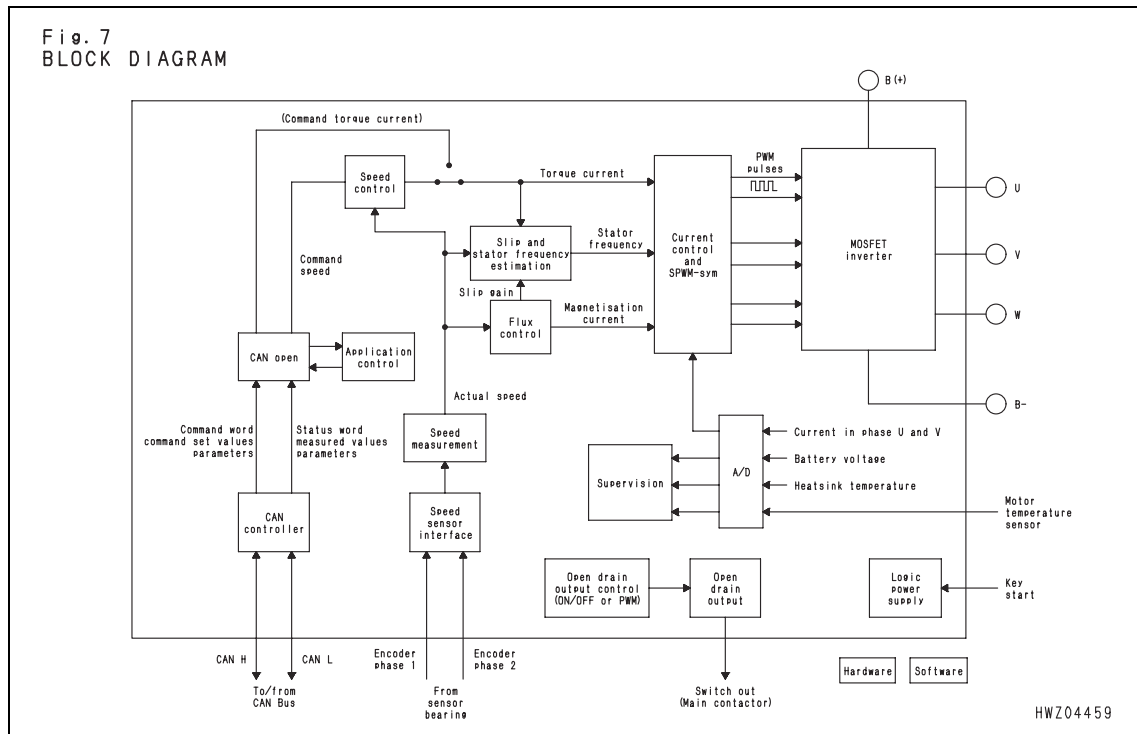
(1) FUNCTIONAL DESCRIPTION

• BLOCK DIAGRAM

Figure 7 shows a functional block diagram to expound the AC drive system.

It shows united system of ACS and master controller, the communication between two controllers is not shown in the figure.

The following paragraphs provide additional details on each functional block.



• SPEED REGULATOR

The speed regulator accepts speed setpoints as input and produces torque commands as output. It can function as a closed loop proportional or proportional plus integral speed controller with feedback provided by the sensor bearing. It includes provisions for limiting torque. The speed regulator is implemented in software, with operating characteristics set by program parameters.

• VECTOR GENERATOR

Utilizing a mathematical model of the induction motor and parameters for the specific motor under control, the vector generator computes the current amplitudes and frequency required to produce the commanded motor torque. Its outputs are two vector reference current commands.

• CURRENT REGULATOR

Utilizing feedback from current sensors in the power conversion section, and reference current commands from the vector generator, the current regulator develops PWM(Pulse width modulated) drive signals for the Power conversion section. With current feedback, the current regulator is able to compensate for temperature and frequency related changes in motor winding impedance as well as variations in DC Supply voltage, thereby providing precise control of motor flux over a wide range of operating conditions.