SPECIFICATIONS FOR

Varispeed-626MTII®

B Series Drives

AC ADJUSTABLE SPEED DRIVES FOR MACHINE TOOL SPINDLES

YASKAWA ELECTRIC

INTRODUCTION

These specifications cover the machine tool spindle drive system, Varispeed-626MTII B series (VS-626MTII). Before initial operation with a VS-626MTII, these specifications must be thoroughly read, and retained for future reference.

The maximum speed obtained with a VS-626MTII is substantially higher than those with conventional DC motor speed control systems. To prevent accidents resulting from these high speeds, care should be taken in operating machines with your VS-626MTII. When you intend to use your VS-626MTII in configurations not described in this manual, contact our service department.

Spindle Motor
Flange-Mounted
Type EEVA-5IKM   385-52

Controller VS-626MTII
Type CIMR-MTII-7.5KB   685-319

Spindle Motor
Foot-Mounted
Type EEA-IKM   385-48

CONTENTS

1. SPINDLE AC MOTOR

1.1 OUTLINE

The VS-626MTⅡ spindle AC motor is an induction motor exclusively designed to drive machine tool spindles. It is available in two versions; a flange- and a foot-mounted type. The features of these spindle AC motors are as follows.

- 1500 to 6000 RPM(A Ratio of 1:4) at Constant Output Range
  The exceptionally rigid motor structure and precision manufactured bearings permit 6000 rpm.
      Thorough analysis of application requirements plus drive motor structure and characteristics establish the most ideal motor-controller combination. This provides optimum drive performance for a wide constant output range at speeds from 1500 to 6000 rpm maximum(1500 to 4500 rpm maximum for 26/22 kW motor).

- Exclusively-designed Motor for Spindle Drive
  Totally-enclosed, external fan-cooled, squirrel-cage motors are specifically designed for operation where oil mist, iron particles, machining chips, etc. exist. To meet space requirements for machine tools, the motors are available in slender, flange-mounted types and convetional foot-mounted types: both are compact and light weight.

- Unique Motor Cooling System
  Flange-mounted motors employ a unique cooling system. A small integrated fan circulates air inside the enclosure, and the outside fan induces fresh cooling air through openings on the drive end and exhausts the air from to the opposite. Thus the heat generated by the drive motor is not transmitted to the driven machine; the machine is entirely free from the influence of the heat.
      If the cooling air flows from opposite the drive end to the drive end, contact your Yaskawa representative.

- Accessories
  Output shaft key
  Control signal connectors (i.e. housing, pins) are installed in the terminal box.

- High Reliability
  Totally-enclosed, multipole brushless resolver for speed detection providé maximum performance dependability in concert with that of the AC motor.

1. 2 SPECIFICATIONS AND CHARACTERISTICS

Table 1.1 Specifications of AC Spindle Motors

Mounting		Flange-Mounted Type for Machining Center							Foot-Mounted Type for Lathe						
Motor Type		EEVA-5IKM							EEA-IKM						
Frame		17TX	17TX	22TX	22TX	25TX	25TX	25TX	EE-112 MTB	EE-132 STB	EE-132 MTB	EE-160 MTB	EE-160 MTF	EE-160 LTF	EE-160 TX
Applicable VS-626MTII	Type CIMR-MTII-☐	5 5KB	7 5KB	11KB	15KB	18 5KB	22KB	26KB	5.5KB	7 5KB	11KB	15KB	18 5KB	22KB	26KB
Rated Output kW (HP)	30-minute rating (50% ED)	5 5 (7 5)	7 5 (10)	11 (15)	15 (20)	18 5 (25)	22 (30)	26 (35)	5 5 (7 5)	7 5 (10)	11 (15)	15 (20)	18 5 (25)	22 (30)	26 (35)
	Continuous rating	3 7 (5)	5 5 (7.5)	7 5 (10)	11 (15)	15 (20)	18 5 (25)	22 (30)	3.5 (5)	5 5 (7 5)	7 5 (10)	11 (15)	15 (20)	18.5 (25)	22 (30)
Rated Current (A)	30-minute rating (50% ED)	34	43	74	97	95	105	112	40	53	74	90	95	105	112
	Continuous rating	25	35	55	75	80	92	98	29	42	55	69	80	92	98
Rated Speed (rpm)	Base speed	1500 (40 to 1500rpm constant torque)						4500 (1500 to 4500rpm constant output)	1500 (40 to 1500rpm· constant torque)						4500 (1500 to 4500rpm constant output)
	Maximum speed	6000 (1500 to 6000rpm. constant output)							6000 (1500 to 6000rpm· constant output)						
Output Torque at Base Speed kg m (Continuous Rated Output) (lb·ft)		2 40 (17 4)	3 57 (25 8)	4 86 (35.2)	7 14 (51 7)	9 73 (70 4)	12 00 (86 8)	14 28 (103 5)	2 40 (17 4)	3 57 (25 8)	4 86 (35.2)	7 14 (51 7)	9 73 (70.4)	12 00 (86.8)	14 28 (103.5)
Rotor GD² kg m² (lb·ft²)		0 074 (1.75)	0 098 (2 32)	0 20 (4 74)	0 25 (5 93)	0 39 (9 24)	0 46 (10 9)	0 54 (12 8)	0 066 (1 56)	0 13 (3 08)	0 16 (3 74)	0.27 (6 40)	0 39 (9 24)	0.46 (10 9)	0.54 (12 8)
Overload Capacity		120 %, 60 sec of 30-minute rating							120 %, 60 sec of 30-minute rating						
Cooling Method		Totally-enclosed externally fan-cooled type							Totally-enclosed externally fan-cooled type						
Power Supply for Cooling Fan Motor		Single-phase 200 VAC, 50 or 60 Hz, 220 VAC, 50 or 60 Hz, 230 VAC, 60 Hz	Three-phase 200 VAC, 50 or 60 Hz, 220 VAC, 50 or 60 Hz, 230 VAC, 60 Hz						Three-phase 200 VAC, 50 or 60 Hz; 220 VAC, 50 or 60 Hz; 230 VAC, 60 Hz						
Insulation		Class F							Class E				Class F		
Operating Temperature of Thermal Protector (Normally closed type)		155 ±7°C (298 4–323 6°F)							120 ±5°C (239–257°F)				155 ±7°C (298 4–323 6°F)		
Ambient Temperature, Humidity		−10 to +40°C (14 to 104°F), 95% RH or below (non−condensing)							−10 to +40°C (14 to 104°F), 95% RH or below (non−condensing)						
Vibration†		V-10 or below							V-10 or below						
Noise (A) Level		78 dB or below				80 dB or below			76 dB or below				80 dB or below		
Finish in Munsell Notation		N 1 5							2.5 PB 5/2						
Speed Detector		Multipole resolver (TDIA-72B)							Multipole resolver (TDIA-72 B)						
Standards		Comply with JIS*, JEM†, JEC‡													

* Japanese Industrial Standard
† The standard of Japan Electrical Manufacturers' Association
‡ Standard of Japanese Electrical Committee

1. 2 SPECIFICATIONS AND CHARACTERISTICS (Cont'd)

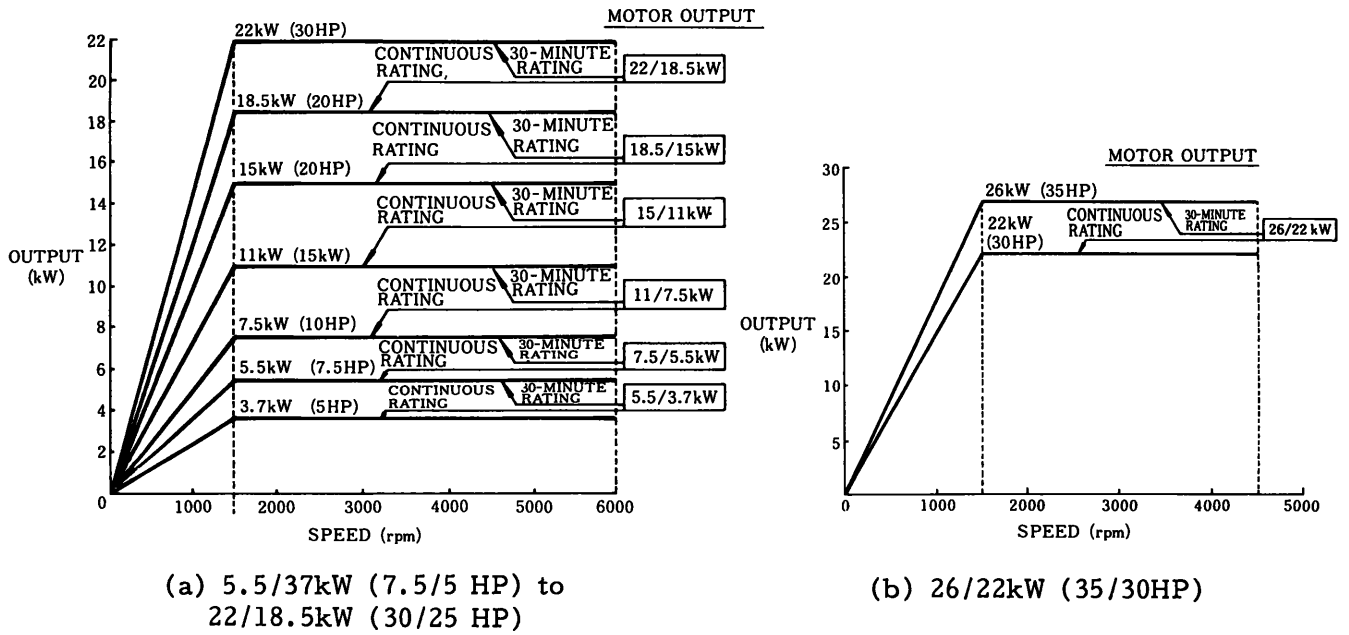**(a) 5.5/37kW (7.5/5 HP) to 22/18.5kW (30/25 HP)**

(b) 26/22kW (35/30HP)

Fig. 1.1 Output-Speed Characteristics

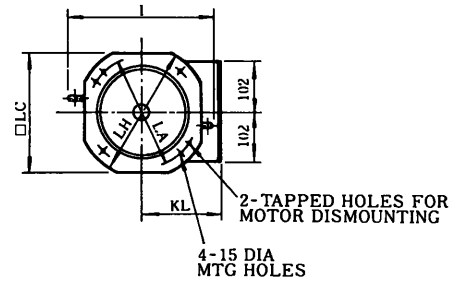**(a) 5.5/3.7 (7.5/5 HP) to 22/18.5 (30/25 HP)**
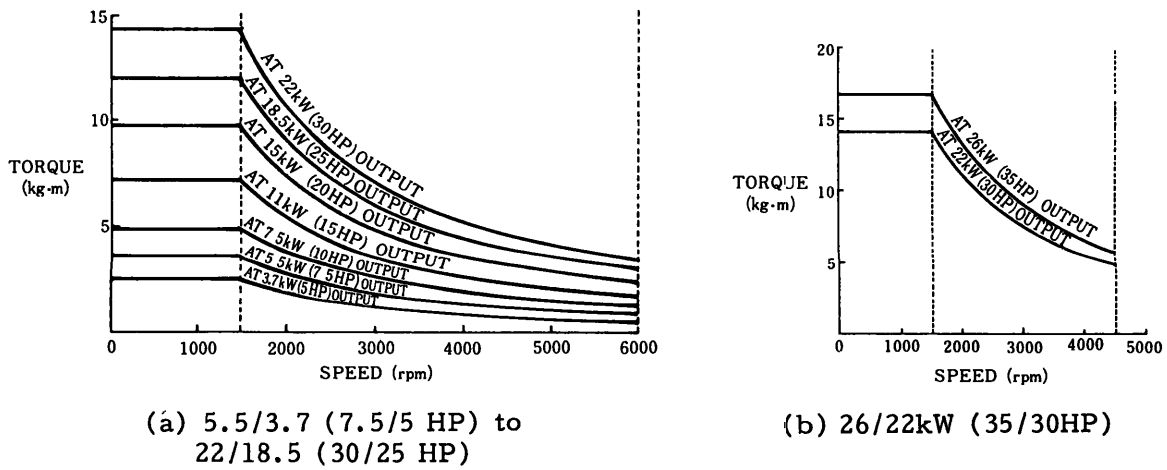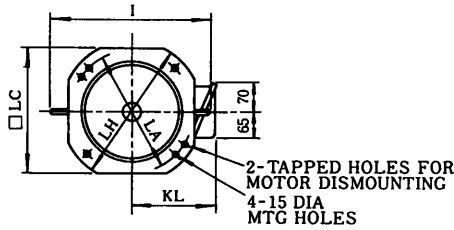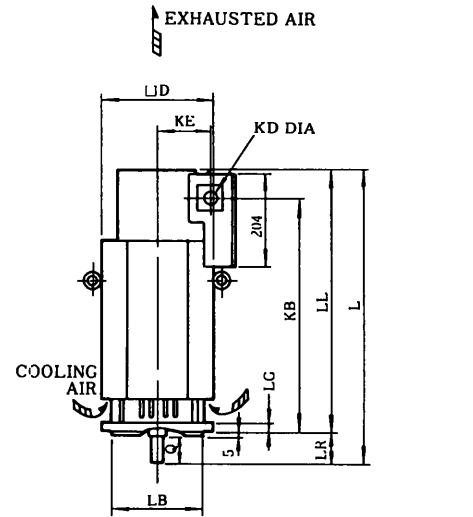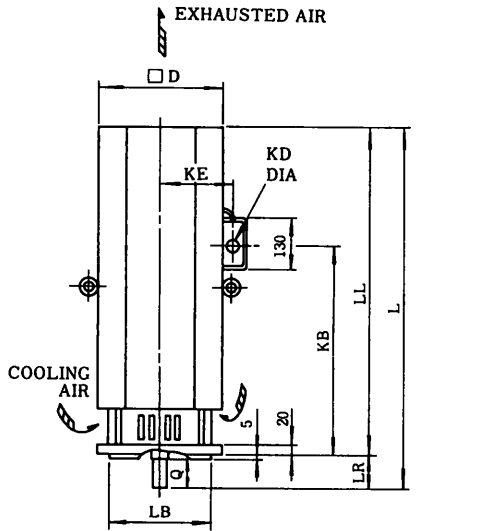
(b) 26/22kW (35/30HP)

Fig. 1.2 Torque-Speed Characteristics

1.3 DIMENSIONS in mm

FLANGE-MOUNTED TYPE

- 5.5/3.7kW-15/11kW(7.5/5-20.15HP)
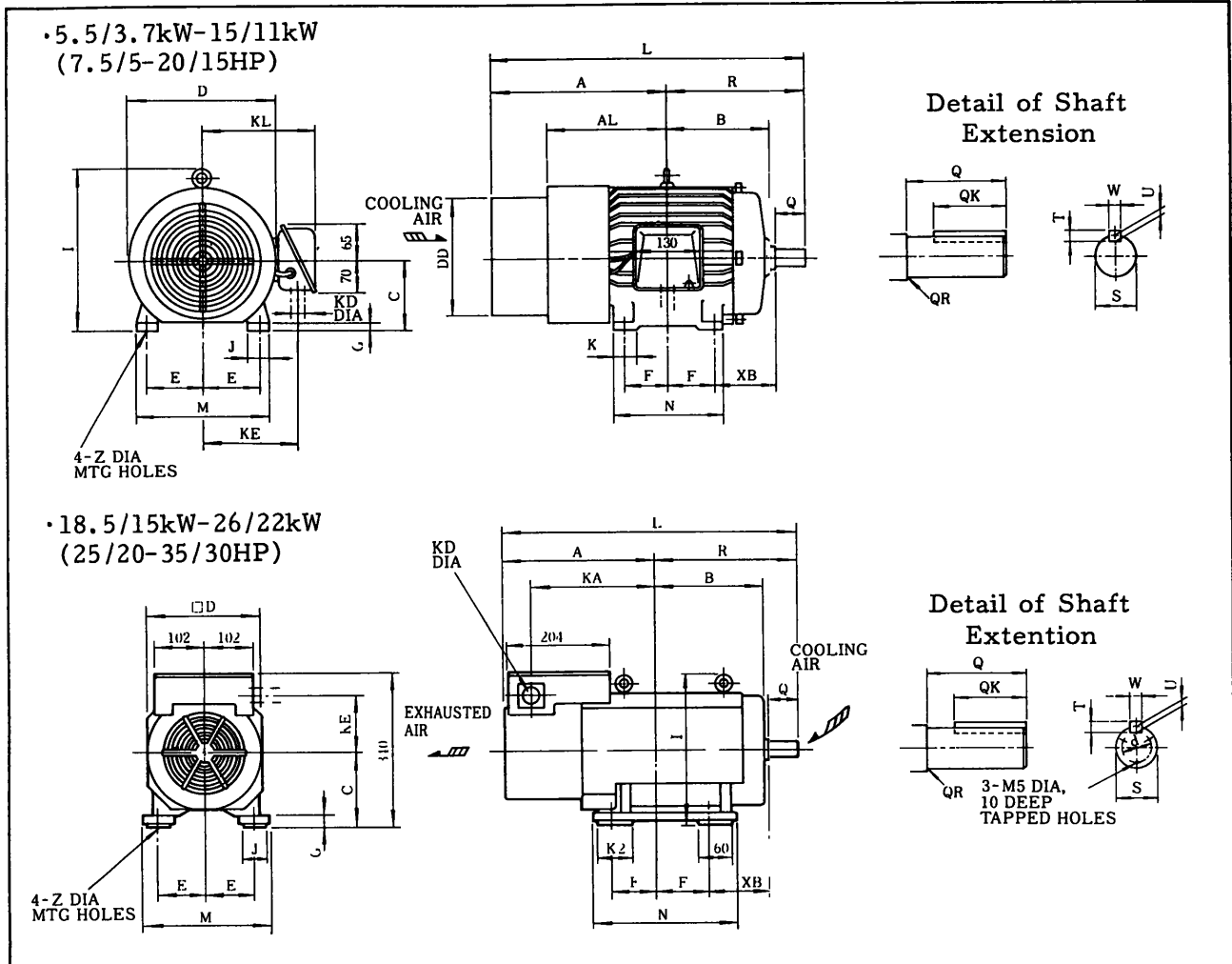- 18.5/15kW-26/22kW(25/20-35/30HP)

NOTE: The cooling fan type for 5.5/3.7kW (7.5/5HP) to 7.5/5.5kW (10/7.5HP) motors is PFA-610-A; and PFA-680-A for 11/7.5kW (15/11HP) motors or above.
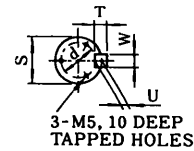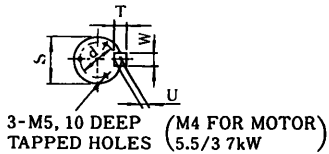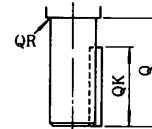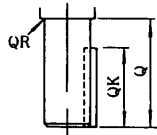
Rated Output kW (Hp)		L	LA	LB h7	LC	LG	LH	LL	LR	D	I	KB	KD	KE	KL	Shaft Extension								Bearing No		Approx Weight kg (lbs)
30-minute Rating	Continuous Rating															Q	QK	QR	S	T	U	W	d	Drive End	Opp Drive End	
5.5 (7.5)	3.7 (5)	630	215	$180_{-0.040}^{0}$	204	—	250	570	60	205	280	335	33	128	158	60	45	1	$28_{-0.016}^{0}$	7	4	8	22	6308M2C3P6	6307C3P6	73 (161.3)
7.5 (10)	5.5 (7.5)	710	215	$180_{-0.040}^{0}$	204	—	250	630	80	205	280	395	33	128	158	80	70	1	$32_{-0.016}^{0}$	8	5	10	22	6308M2C3P6	6307C3P6	85 (187.8)
11 (15)	7.5 (10)	715	265	$230_{-0.046}^{0}$	250	—	300	605	110	260	365	360	33	165	195	110	90	1	$48_{-0.016}^{0}$	9	5.5	14	40	6310M2C3P6	6307C3P6	113 (249.7)
15 (20)	11 (15)	765	265	$230_{-0.046}^{0}$	250	—	300	655	110	260	365	410	33	165	195	110	90	1	$48_{-0.016}^{0}$	9	5.5	14	40	6310M2C3P6	6307C3P6	132 (291.7)
18.5 (25)	15 (20)	620	265	$230_{-0.046}^{0}$	250	18	300	510	110	260	335	460	42.5	130	180	110	90	1	$48_{-0.016}^{0}$	9	5.5	14	40	6310M2ZZC3P6	6210M2ZZC3P6	135 (298.3)
22 (30)	18.5 (25)	668	265	$230_{-0.046}^{0}$	250	20	300	558	110	260	335	508	42.5	130	180	110	90	0	$55_{+0.011}^{+0.030}$	10	6	16	45	6311M2ZZC3P6	6210M2ZZC3P6	165 (364.6)
26 (35)	22 (30)	709	265	$230_{-0.046}^{0}$	250	20	300	599	110	260	335	549	42.5	130	180	110	90	0	$55_{+0.011}^{+0.030}$	10	6	16	45	6311M2ZZC3P6	6210M2ZZC3P6	185 (408.8)

5

1.3 DIMENSIONS in mm (Cont'd)

FOOT-MOUNTED TYPE

- **5.5/3.7kW-15/11kW (7.5/5-20/15HP)**

Detail of Shaft Extension

- **18.5/15kW-26/22kW (25/20-35/30HP)**

Detail of Shaft Extention

Rated Output kW (Hp)		A	AL	B	C $_{-0.5}^{0}$	D	DD	E	F	G	I	J	K	K2	KA	KD	KE	KL	L
30-minute Rating	Continuous Rating																		
5 5 (7 5)	3 7 (5)	305	—	135	112	245	—	95	70	15	275	35	35	—	—	33	155	185	505
7 5 (10)	5 5 (7 5)	338	228	151	132	275	216	108	70	15	330	45	40	—	—	33	175	210	577
11 (15)	7 5 (10)	358	248	171	132	275	216	108	89	15	330	45	40	—	—	33	175	210	616
15 (20)	11 (15)	380	—	205	160	320	—	127	105	18	390	50	45	—	—	33	195	230	703
18 5 (25)	15 (20)	298	—	211	160	260	—	127	105	16	330	50	—	60	248	42 5	130	—	621
22 (30)	18 5 (25)	312	—	233	160	260	—	127	127	16	330	50	—	70	262	42 5	130	—	657
26 (35)	22 (30)	327 5	—	258 5	160	260	—	139 5	152 5	16	330	65	—	75	277 5	42 5	130	—	698

Rated Output kW (Hp)		M	N	R	XB	Z	Shaft Extension								Bearing No		Approx Weight kg (lbs)
30-minute Rating	Continuous Rating						Q	QK	QR	S	T	U	W	d	Drive End	Opp Drive End	
5 5 (7 5)	3 7 (5)	225	170	200	70	12	60	45	1	28 $_{-0.016}^{0}$	7	4	8	—	6306ZZ	6305ZZ	55 (121 5)
7 5 (10)	5 5 (7 5)	260	170	239	89	12	80	60	3	32 $_{-0.016}^{0}$	8	5	10	—	6308M2C3P6	6306ZZC3	70 (154 7)
11 (15)	7 5 (10)	260	210	258	89	12	80	60	3	32 $_{-0.016}^{0}$	8	5	10	—	6308M2C3P6	6306ZZC3	80 (176 8)
15 (20)	11 (15)	300	250	323	108	15	110	90	1	42 $_{-0.016}^{0}$	8	5	12	—	6309M2C3P6	6307C3P6	115 (254 1)
18 5 (25)	15 (20)	290	278	323	108	15	110	90	1	48 $_{-0.016}^{0}$	9	5 5	14	40	6310M2ZZC3P6	6210M2ZZC3P6	135 (298 3)
22 (30)	18 5 (25)	290	320	345	108	15	110	90	0	55 $_{+0.011}^{+0.030}$	10	6	16	45	6311M2ZZC3P6	6210M2ZZC3P6	165 (364 6)
26 (35)	22 (30)	320	375	370 5	108	15	110	90	0	55 $_{+0.011}^{+0.030}$	10	6	16	45	6311M2ZZC3P6	6210M2ZZC3P6	185 (408 8)

NOTE: The cooling fan type is PFA-680-B for 5.5/3.7kW(7.5/5HP) motors;
and 300P54H-3 for 15/11kW(20/15HP) motors; and PFA-680-A for
18.5/15kW (25/20HP) motors and above.

1.4 INSTALLATION

1.4.1 Installing Spindle AC Motor

Location

- See that air flow through the cooling fan is completely free from obstruction.
- See that the motor is free from direct splashing of cutting oil from the machine tool.
- Mounting base, bed or frame must be solid and rigid enough to sustain the motor or its dynamic load during operation so as to minimise vibration.

Mounting

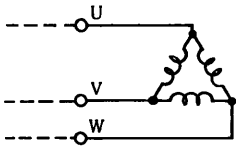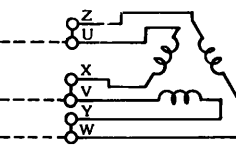- The spindle motor permits mountings at any angle from horizontal to drive-end-down.

Connection with machine

- For V-belt drive, the shafts of the motor and driven machine are parallel to each other, and align the sheaves.
- For a gear drive, install the motor with the shaft paralleled with the machine spindle, and the gear meshing centrally.
- The high speed of the spindle AC motor may induce vibration if the driven members are even slightly out of balance. Take this carefully into consideration when designing the driven machine members such as gears and pulleys.

1.5 WIRING

Make interconnections of the spindle motor and cooling fan with wires as follows.

Table 1.2 Terminals of Spindle Motor and Cooling Motor

Spindle Motor Output kW (Hp)		Spindle Motor		Cooling Fan Motor		
		Connection	Terminal screw	Motor type	Terminal	Terminal screws
5.5/3.7 (7.5/5)	Flange-mounted		M5	PFA-610-A	u, v	M4
	Foot-mounted		M8	PFA-680-B	u, v, w	
7 5/5.5 (10/7.5)	Flange-mounted		M8	PFA-610-A	u, v	
	Foot-mounted			PFA-680-B	u, v, w	
11/7.5 (15/10)	Flange-mounted			PFA-680-A		
	Foot-mounted			PFA-680-B		
15/11 (20/15)	Flange-mounted		M10	PFA-680-A		
	Foot-mounted			300P54H-3		
18.5/15 (25/20)			M8	PFA-680-A	u, v, w	
22/18.5 (30/25)						
26/22 (35/30)						

1.5 WIRING (Cont'd)

For selection of protective relay, refer to Table 1.3.

Table 1.3 Specifications of Cooling Fan

Cooling Fan Motor Type	Phase	Power Supply	Input (kW)	Current (A)	
				With rated	With locked
PFA-610-A	Single	200 VAC, 50 Hz, 200 VAC, 60 Hz, 220 VAC, 60 Hz	65/85/95	0 35/0 45/0 45	0.5/0.53/0 58
PFA-680-A	Three		85/120/130	0.32/0 40/0.45	0 72/0 68/0.74
PFA-680-B					
300P54H-3			60/70/80	0 4/0 35/0 4	1 2/1.1/1 2

NOTE: If the cooling fan motor power is supplied by the controller, connect terminals u, v, w to terminals u, v, w of the controller, respectively.

(3) Wiring of control signal lead

Connect resolver signal lead and detecting relay for motor overload according to Table 1.4.

Table 1.4 Connection of Control Signal Lead

Pin No.	Signal		Connection in AC Spindle Motor	Connector for AC Spindle Motor	Lead	Connector of Controller	
						Type	Pin No.
1	Resolver detection Signal	THETA 1		Made by Nippon pressure terminal Co , Ltd Connector receptacle Type MLP-09 5 5/3 7 to 15/11kW	Vinyl cable with braided copper shield 0 3mm² twisted-pair 4P	MR-20LF made by Honda Tsushin Kogyo K.K	5
2		THETA 2					6
3	Resolver excitation signal	ALPHA					1
4		0V					2, 3
5		BETA					4
6	Ground terminal			Type LP-09 18 5/15 to 26/22kW	SHIELD		—
7	0V						20
8	Motor overheat detection (OH)						7
9	0V						8

Note: Pin 6 of connector on motor is not used. Leave it open.

2. VS-626MTII CONTROLLER

2.1 OUTLINE

The VS-626MTII controller is vector-controlled, high-performance transistor inverter to control a machine tool spindle AC motor, with the following features.

(1) Compact size

With the use of integrated elements, the complete system has been built compact and light.

(2) Efficient control

With the adoption of a regenerative braking system, the braking efficiency is high, and with the use of the special circuitry, commutation failure during a power failure is eliminated.

(3) High reliability and ease of maintenance

Through the adoption of LSIs, high reliability has been achieved by miniaturizing parts and reducing their number. With the adoption of function modules, maintenance is simplified.

(4) Easy application for totally-enclosed control panels

Several special heat-dissipation designs suitable for incorporation in totally-enclosed control panels are available in semi-standard series.

2.2 SYSTEM CONFIGURATION

VS-626MTII drive is composed of a spindle AC motor and Controller VS-626MTII.
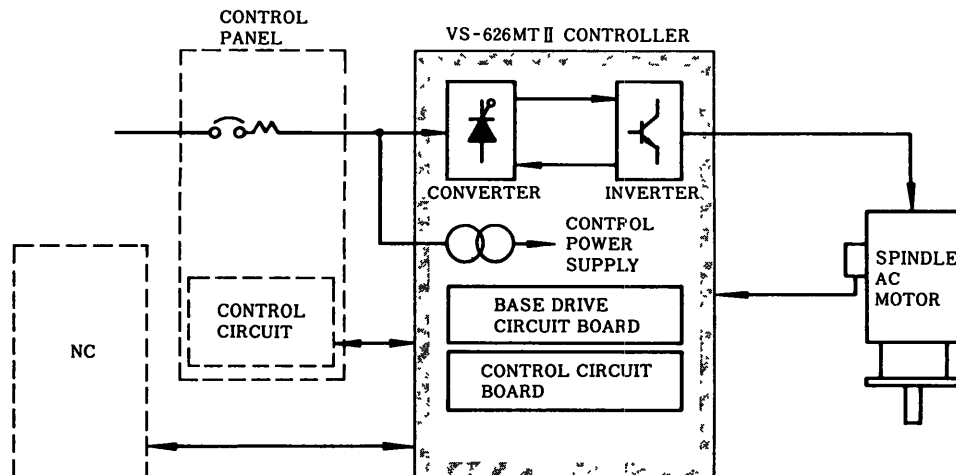
Fig. 2.1 VS-626MTII System Configuration

2. 3 SPECIFICATIONS AND FUNCTIONS

2.3.1 Specifications

- Table 2.1 Specifications

VS-626MTⅡ Controller Type CIMR-MTⅡ-◌	5 5KB	7 5KB	11KB	15KB	18 5KB	22KB	26KB
Power Supply	Three-phase, 200 V, 50 or 60 Hz, 220 V, 50 or 60 Hz, 230 V, 60 Hz $\left(\begin{array}{l}\text{Voltage fluctuation} \\ + 10 \text{ to} - 15\%\end{array}\right)$						
Rated Output Current A (30-minute/Continuous Rating)	5 5/3 7	7 5/5 5	11/7 5	15/11	18 5/15	22/18.5	26/22
Maximum Required Power Supply at 30-Minute Rating kVA	9	12	19	24	30	35	40
Dissipated Power W (Continuous Rating/30-Minute Rating)	320/400	400/520	530/750	780/1030	900/1080	1120/1320	1230/1400
Circuitry	PWM transistor inverter control						
Control Method	Vector control with automatic field-weakening control						
Braking Method	Regenerative braking						
Adjustable Speed Range	40—6000 rpm (1 150)						
Speed Regulation	0 2 % or below of max speed (load variation 10—100 %)						
Overload Capacity	120 %, 60 sec of 30-minute rating						
Speed Command Voltage	± 10 VDC or + 10 VDC (forward and reverse signals)						
Operating Temperature	0 to + 55°C						
Storage Temperature	− 10 to + 60°C						
Humidity	10 to 95 % RH Non-condensing						
Allowable Vibration	0 5 G or below						
Finish in Munsell Notation	5Y7/1						
Installation	Free from dirt, dust, liquid, harmful gases, etc						
Standard	JIS*, JEM †, JEC ‡						

*Japanese Industrial Standard
†The Standard of Japan Electrical Manufacturers' Association
‡Standard of Japanese Electrotechnical Committee

2.3.2 Functions

The VS-626MTⅡ controller is designed basically to control the operation of the VS-626MTⅡ spindle AC motor, driving it at commanded speeds at the rated output.

The VS-626MTⅡ is further provided with a protection and monitoring functions to protect, and insure full display of performance of, the spindle drive motor, its electrical circuits and the driven machine.

Tables 2.2 and 2.3 show the protection and monitoring functions respectively.

Table 2.2 Protection Functions

Alarm			Situation
No.	Item	Symbol	
1	DC Fuse blown	FU	DC circuit fuse blown
2	Overcurrent Protection	OC	Detection of main transistor instantanuous overcurrent
3	MCCB* tripped	MCCB	Detection of main circuit input overcurrent
4	Overvoltage Protection	OV	Detection of DC bus overvoltage
5	Overspeed Protection	OS	Detection of motor overspeed.
6	Undervoltage Protection	UV	Detection of Input power supply undervoltage.
7	Overload Protection	OL	Detection of motor overload current
	Overheat †	OH FAN C	Motor or controller thermostat activates
Trouble Signal			• When one of the protective functions above activates, a closed contact signal (1C) will be sent • Optional status is activated at all times to indicate either normal or trouble condition
Function Hold			• When one of the protective functions above activates this function holds in the respective circuit • To reset the function, depress the reset button in the VS-626 MTII or make an external signal.

*Molded-case circuit breaker
†If OH or FAN C activates, OH or FAN C lamp blinks every 1 second and the closed contact signal (1A) is output. 4 minutes after activation of OH or FAN C, the alarm signal is output and alarm 7 is displayed. Then, the transistor base is blocked and the motor current is interrupted. OH or FAN C signal is used for stopping the spindle before these protective actions occur. However, it is a normal condition for the OH lamp to be ON during acceleration or deceleration.
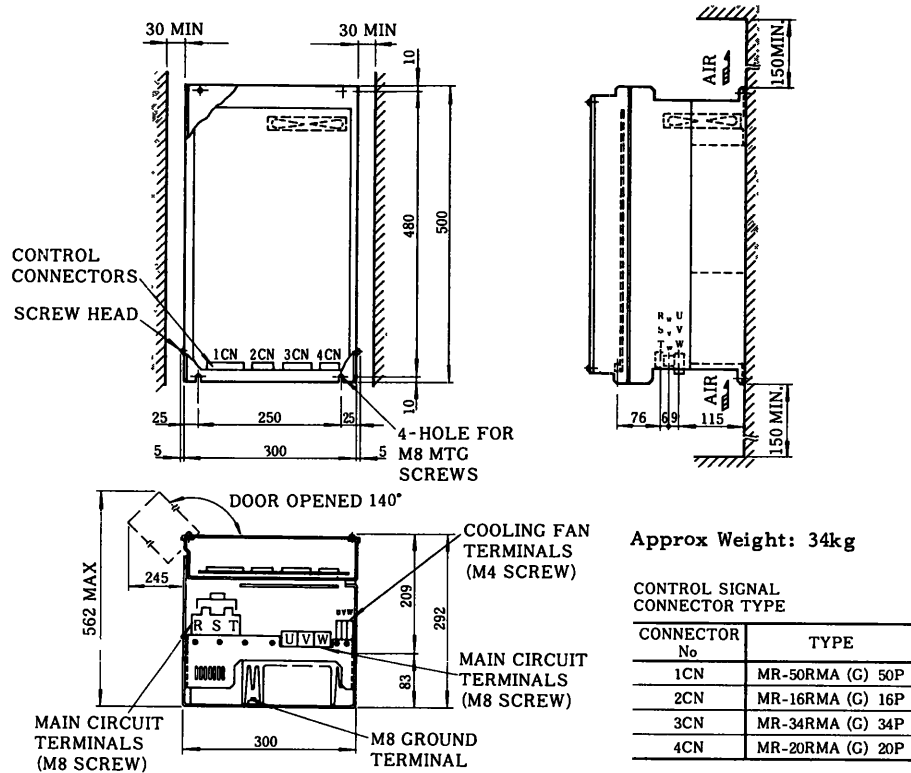
Table 2.3 Status Monitoring Function

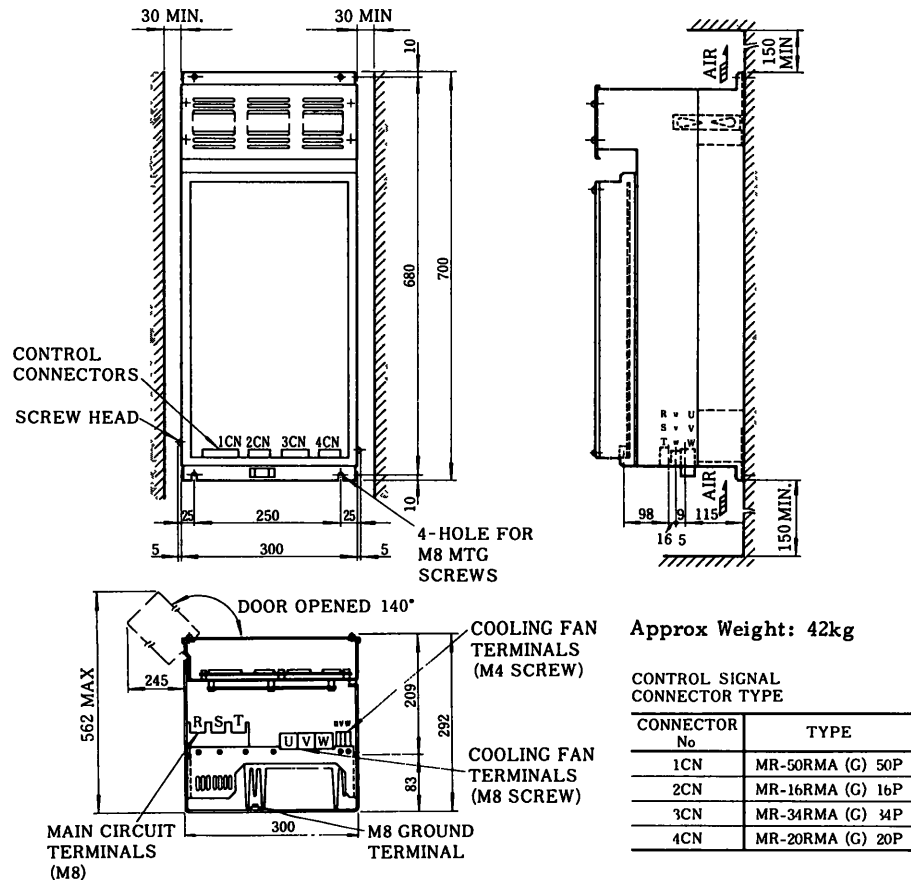| Name	Code	Description
Zero-speed Signal	Z-SPD	Indication of motor stop (below 30 rpm)
Speed Coincidence Signal	AGREE	Indication of motor speed reaching within ± 15 % of command speed
Speed Detecting Signal	N DET	Indication of motor speed reaching the set speed or below
Excessive Speed Deviation Signal	DEV	Indication of actual speed 50 % or more deviating to command speed
Torque Detecting Signal	T DET	Indication of torque, reaching the set level or above
Speedometer Signal	SM-A SM-V	External display of motor speed
Load Meter Signal	LM-A LM-V	External display of load factor with respect to 30-minute rated output

2.4 VS-626MTⅡ DIMENSIONS in mm
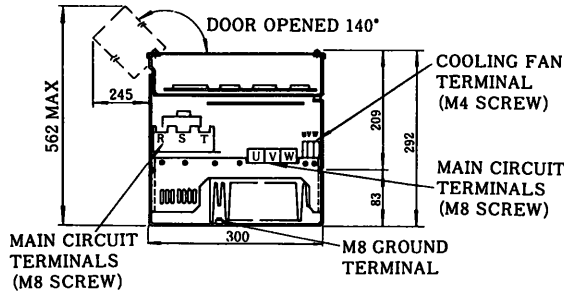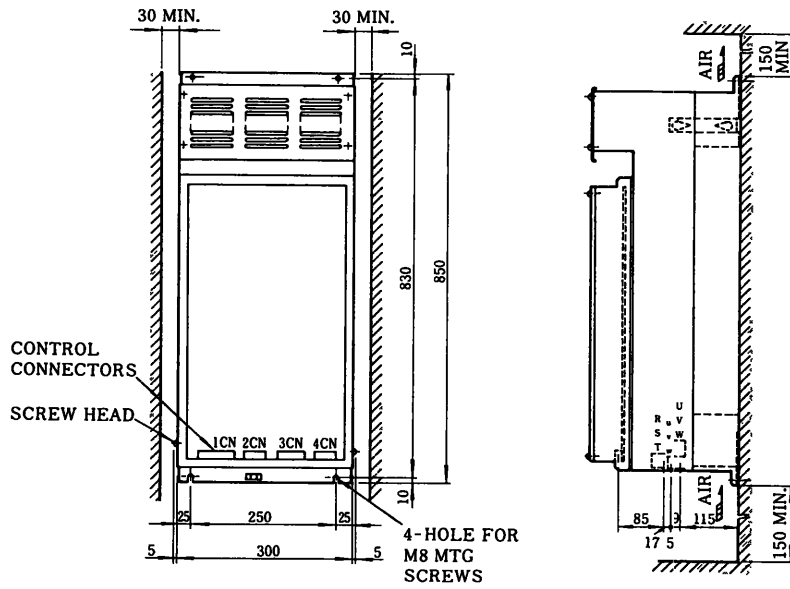
2.4.1 Panel-installed Type

For Types CIMR-MTⅡ-5.5kB and -7.5kB (5.5/3.7 and 7.5/5.5kW)

Approx Weight: 34kg

CONTROL SIGNAL
CONNECTOR TYPE

CONNECTOR No	TYPE
1CN	MR-50RMA (G) 50P
2CN	MR-16RMA (G) 16P
3CN	MR-34RMA (G) 34P
4CN	MR-20RMA (G) 20P

For Type CIMR-MTⅡ-11kB (11/7.5kW)

Approx Weight: 42kg

CONTROL SIGNAL
CONNECTOR TYPE

CONNECTOR No	TYPE
1CN	MR-50RMA (G) 50P
2CN	MR-16RMA (G) 16P
3CN	MR-34RMA (G) 34P
4CN	MR-20RMA (G) 20P

12

For CIMR-MTII-15kB to -22kB(15/11 to 22/18.5kW)

CONTROL SIGNAL
CONNECTOR TYPE

CONNECTOR No	TYPE
CN	MR-50RMA (G) 50P
2CN	MR-16RMA (G) 16P
3CN	MR-34RMA (G) 34P
4CN	MR-20RMA (G) 20P

CIMR-MTII-	15KB	18 5KB	22KB
Approx Weight kg	52	55	59

For CIMR-MTII-26kB(26/22kW)
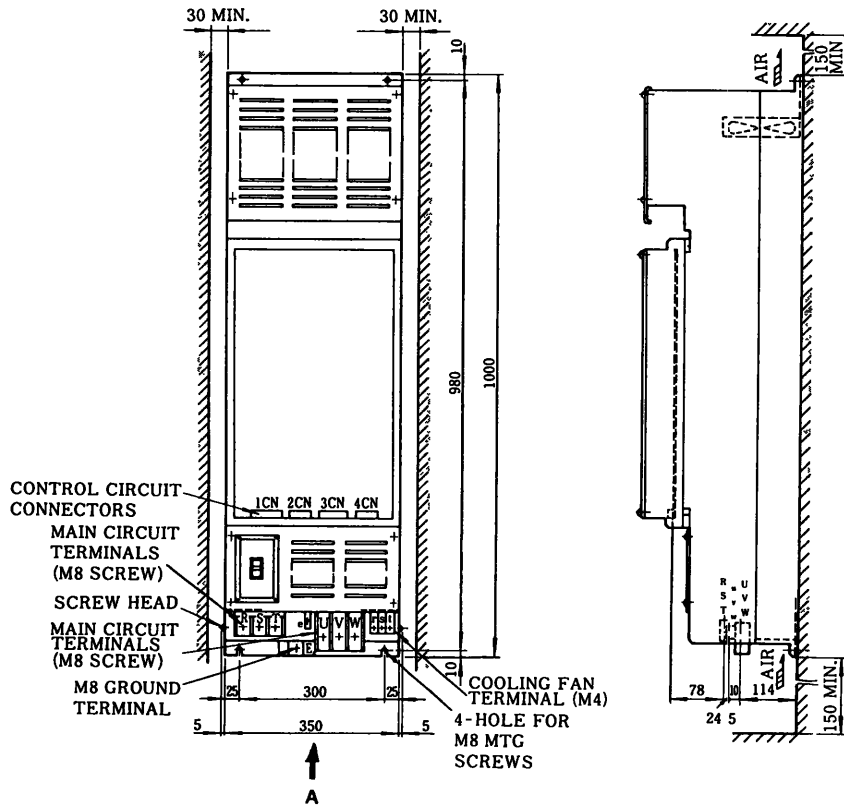
Approx Weight: 72kg

CONTROL SIGNAL
CONNECTOR TYPE

CONNECTOR No	TYPE
1CN	MR-50RMA (G) 50P
2CN	MR-16RMA (G) 16P
3CN	MR-34RMA (G) 34P
4CN	MR-20RMA (G) 20P

VIEW A
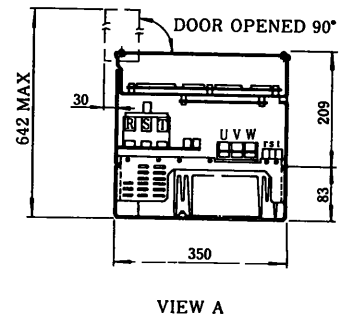
2.4.2 Totally-enclosed Type

For CIMR-MTⅡ-5.5kB and -7.5kB (5.5/3.7 and 7.5/5.5kW)*

Approx Weight: 30kg

CONTROL SIGNAL CONNECTOR TYPE

CONNECTOR No	TYPE
1CN	MR-50RMA (G) 50P
2CN	MR-16RMA (G) 16P
3CN	MR-34RMA (G) 34P
4CN	MR-20RMA (G) 20P

For CIMR-MTⅡ-11kB (11/7.5kW)*

Approx Weight: 36kg

CONTROL SIGNAL CONNECTOR TYPE

CONNECTOR No	TYPE
1CN	MR-50RMA (G) 50P
2CN	MR-16RMA (G) 16P
3CN	MR-34RMA (G) 34P
4CN	MR-20RMA (G) 20P
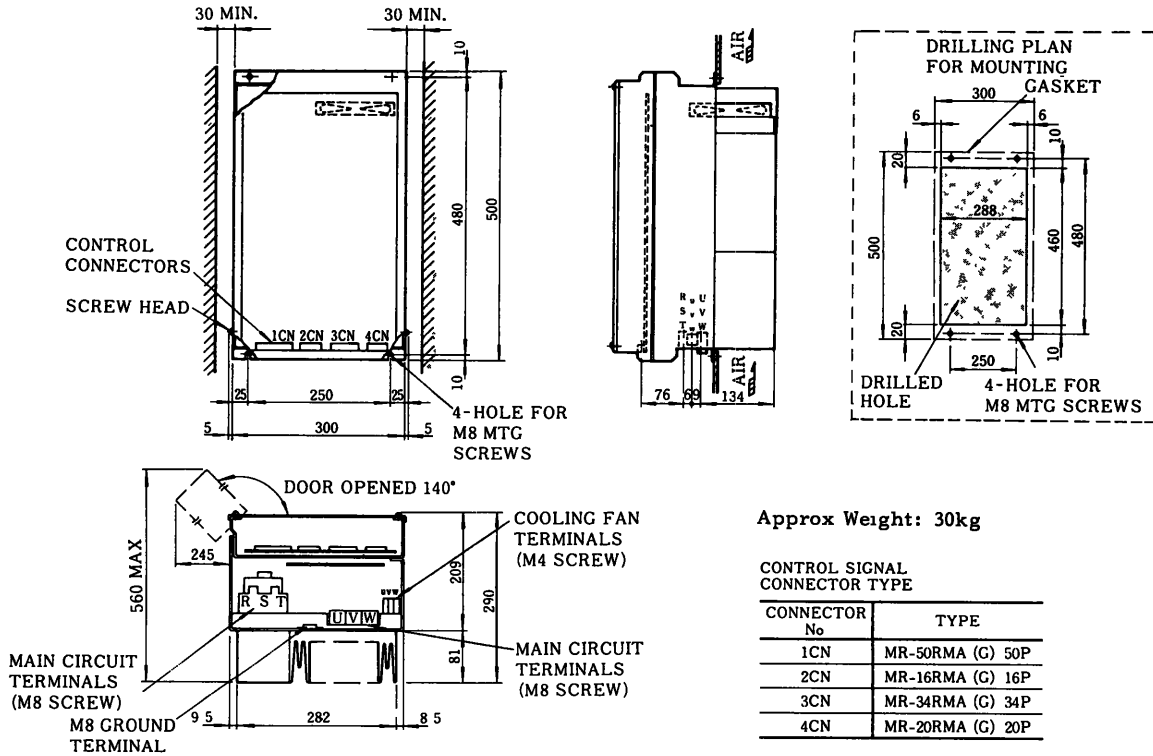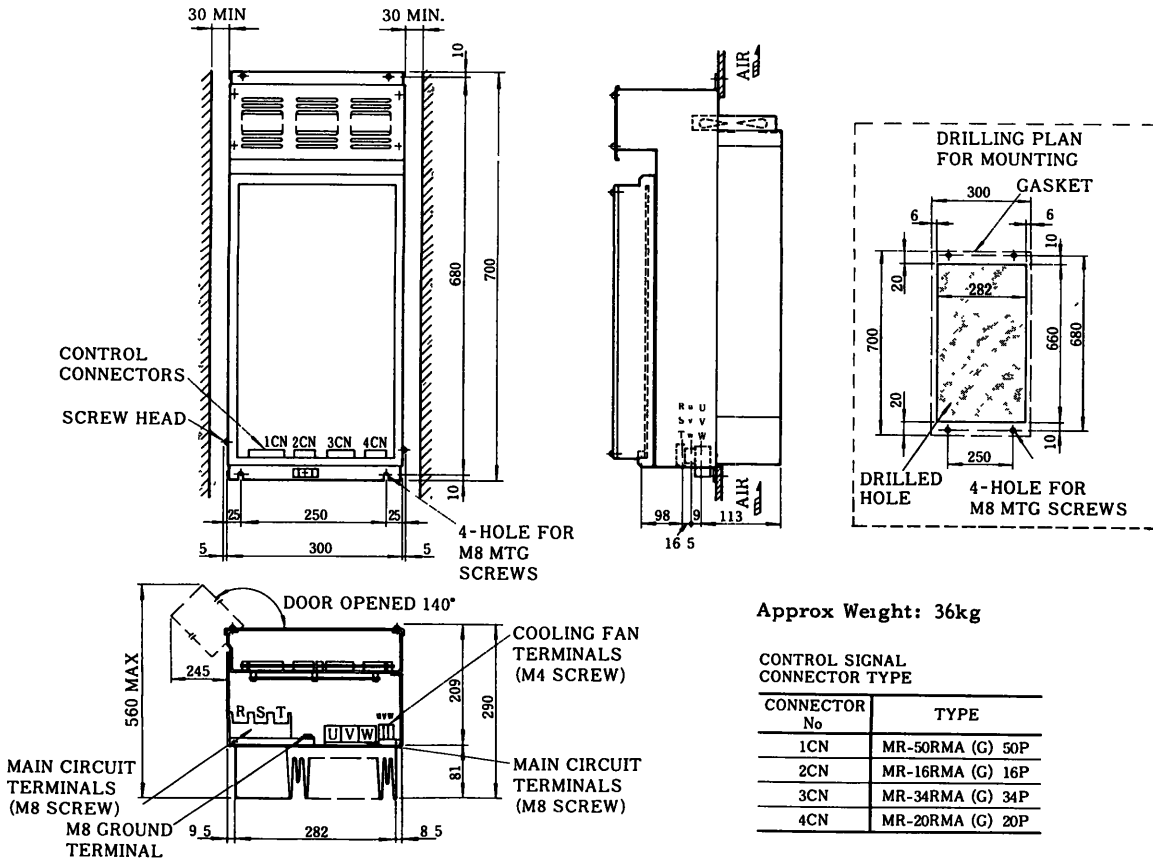
*CONTACT YASKAWA REPRESENTATIVE WHEN ORDERING

14

For CIMR-MTⅡ-15kB to -22kB (15/11 to 22/18.5kW)*

CONTROL CONNECTOR TYPE

CONNECTOR No	TYPE
1CN	MR-50RMA (G) 50P
2CN	MR-16RMA (G) 16P
3CN	MR-34RMA (G) 34P
4CN	MR-20RMA (G) 20P

CIMR-MTⅡ-	15KB	18 5KB	22KB
Approx Weight kg	45	48	52

For CIMR-MTⅡ-26kB (26/22kW)*

CONTROL CONNECTOR TYPE

CONNECTOR No	TYPE
1CN	MR-50RMA (G) 50P
2CN	MR-16RMA (G) 16P
3CN	MR-34RMA (G) 34P
4CN	MR-20RMA (G) 20P

Approx Weight: 70kg

* CONTACT YASKAWA REPRESENTAIVE WHEN ORDERING

VIEW A

15

2.5 INSTALLATION

2.5.1 Installing Controller

To install the VS-626MTⅡ controller in a power control panel or the like, take the following into consideration.

(1) Heat dissipation

• Incorporate heat dissipating features into the design, in due consideration of the heat generating rate.

• For the heat generation rates of the different types, refer to Table 2.1. STANDARD SPECIFICATIONS.

• Maintain the operating temperature of the controller between 0 to +55°C.

• To maintain the cooling performance of the controllers, maintain 150 mm space both above (discharge side) and below (suction side) the controller, as far as possible. Be sure to secure at least 100 mm and 50 mm spaces above and below the controller respectively.

(2) Maintenance

• In designing the panel housing, take the convenience of maintenance work into consideration.

• For mounting and replacing the controller, secure at least 30 mm space on both the right and left sides between controller and the side walls.

• The front panel of the controller is hinged to open 140° (90° for type CIMR-MTⅡ-26kB). Be sure to allow sufficient space to fully open the front panel.

• The I/O terminals and the control signal connectors are located at the lowermost part of the controller.

• Be sure to allow space below the controller so that cables can be easily connected to the terminals and connectors.

• Fig. 2.2 shows the mounting space.
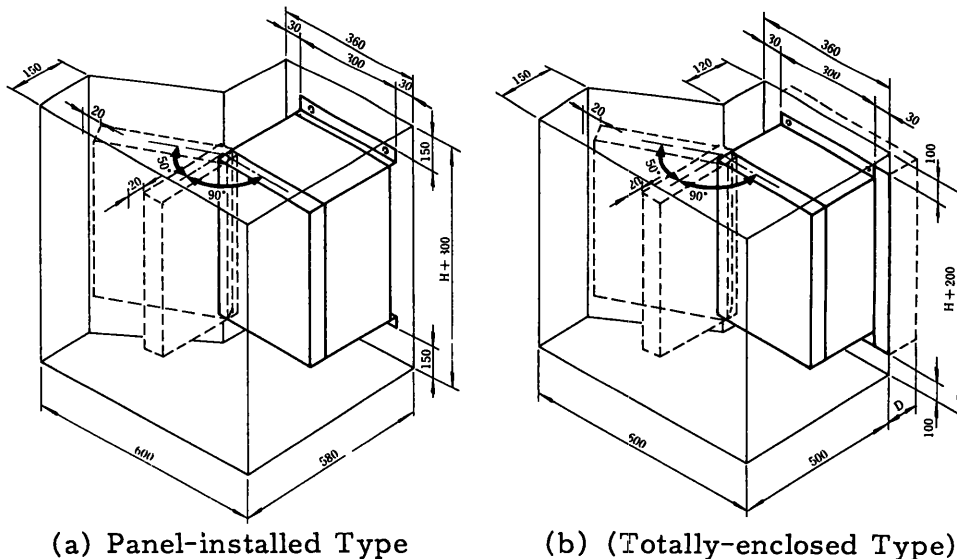
(a) Panel-installed Type   (b) (Totally-enclosed Type)

Totally-enclosed type

• Be sure to provide the rear panel of the controller with a cooling air flow space. Secure 85 to 90 mm for dimension D in Fig. 2.2(b).

• The cooling air velocity must be 3m/min in air duct.

• Insert packings under the units when installing them, to avoid clearance.

Fig. 2.2 Controller Mounting Space

2.5.2 Wiring

In installing the power lines, the motor cooling fan power lines and control signal lines, take the following into consideration.

(1) Power line and terminal

Table 2.4 shows the type and size of the leads to be used, and the terminals sizes.

Table 2.4 Lead Specifications

CIMR-MTII -[]	Input					Output			
	Lead		VS-626MTII Controller			Lead		Motor	
	Type	Size mm²	Terminal	Terminal Screw	Terminal	Type	Size mm²	Terminal	Terminal Screw
5.5KB	600 V Cabtyre cable	5.5	R, S, T, E	M8 (Flange-mounted type) M5 (Foot-mounted type)	U, V, W, E	600 V Cabtyre cable	5 5	U, V, W, E	*
7 5KB		8					8		M8
11KB		14					14		
15KB		22					22		M10
18 5KB		30					30	U, V, W, X, Y, Z, E	M8
22KB		38					38		
26KB		38					38		

*Hexagonal socket grub screws for the controller terminals.

(2) Cooling fan motor power lead

Table 2.5   Lead Specifications

Application	Lead		Screw terminal	
	Type	Size	Terminal	Size
Cooling fan power lead	600 V vinyl-insulated lead	2 mm²	u, v, w, e	M4

NOTE: Since type EEVA-51KM flange-mounted motors (5.5/3.7kW, 7.5/5.5kW) are provided with a single-phase fan motor, only terminals u and v are furnished.

2. 5 INSTALLATION (Cont'd)

(3) Control signal lead

Table 2.6 shows the specifications for the connectors and cables for the control signals

Table 2.6 Connector and Lead Specifications

Connector No	Application	Connector		Lead	
		Type MR-	Maker	Type	Size
1CN	I/O interface (1)	50LF	Honda Tsushin Kogyo K K	*Vinyl cable with braided copper shield	0 3 mm² coaxial 50-core
2CN	Meter signal	16LF			0 3 mm² twisted 4-pair
3CN	I/O interface (2)	34LF			0 3 mm² coaxial 20-core
4CN	Motor interface	20LF			0 3 mm² twisted 4-pair

*Except for lines for analog signals, signal lines 1CN and 2CN may also be in conventional vinyl lead (0.5 mm²) for electric appliances, provided the following are observed.

· To minimize adverse effects of noise, the signal lead and the power lead should be separately run through as short a passage as possible.

· The outer diameter of the cable bundle must be smaller than the size of the connector outlet opening given below.

Connector type MR-50LF:	16 mm diameter
Connector type MR-16LF:	9 mm diameter
Connector type MR-34LF:	15 mm diameter
Connector type MR-20LF:	11 mm diameter

2. 6 WIRING DIAGRAM

Fig. 2.3 shows the connection between the controller and the motor, and the input and output signals. The connector connections for the input and output signals are shown in Table 2.7 through 2.10. Refer to the diagram and tables when designing interfaces to NC and power sequencers.
Fig. 2.4 shows the block diagram for VS-626MTⅡ controller.

Table 2.7 1CN Signal List

Pin No	Signal	Pin No	Signal	Pin No	Signal
1	+15 V			33	Malfunction (ALARM)
2				34	
3	0 V	19	Soft start cancel (S SCAN)	35	
4		20	M gear selection (M GEAR)	36	Orientation completion (GREND)
5	−15V	21	L gear selection (L GEAR)	37	
6		22	Orientation (ORICM)	38	Overheat signal (THALM)
7	−	23	Zero speed (Z SPD)	39	
8	0 V	24		40	Torque limit signal (H) (TLIML)
9	Analog speed command (N COM)	25	Speed detecting (N DET)	41	0 V
10	0 V	26		42	
11	Malfunction reset (RESET)	27	Speed coincidence (AGREE)	43	
12	Ready signal (RUN SB)	28		44	
13	Emergency stop (EM STP)	29	Torque detecting (T DET)	45	
14	Override cancel (ORCAN)	30		46	
15	0 V	31	Excessive speed deviation (DEV)	47	
16	Forward run (FORRN)	32		48	
17	Reverse run (REVRN)			49	
18	Torque limit signal (H) (T LIMH)			50	

18

Table 2.8 2CN Signal List

Pin No	Signal	Pin No	Signal	Pin No	Signal
1	Speed meter (SM-A)			11	Speed meter (SM-V)
2	0 V	7	0 V	12	Load meter (LM-V)
3	Load meter (LM-A)	8	—	13	—
4	Override (OVER RIDE)	9	—	14	—
5		10	—	15	—
6				16	0 V

Table 2.9 3CN Signal List

Pin No	Signal	Pin No	Signal	Pin No	Signal
1	—			23	—
2	—	13	—	24	—
3	—	14	—	25	—
4	—	15	AC 4	26	AC 2
5	—	16	AC 1	27	COM
6	—	17	—	28	—
7	—	18	—	29	D 6
8	—	19	D 7	30	D 8
9	0 V	20	D 9	31	D 10
10	0 V	21	D 11	22	D 0
11	D 4	22	D 3	33	D 1
12	D 5			34	D 2

Table 2.10 4CN Signal List

Pin No	Signal	Pin No	Signal	Pin No	Signal
1	Resolver exciting (ALPHA)	8	0V	14	0 V
2	0 V	9	—	15	—
3		10	—	16	—
4	Resolver exciting (BETA)	11	—	17	—
5	Resolver detection signal (THETA 1)	12	—	18	—
6	Resolver detection signal (THETA 2)	13	—	19	—
7	Motor overheat detection signal (OH)			20	0 V

2.6 WIRING DIAGRAM (Cont'd)
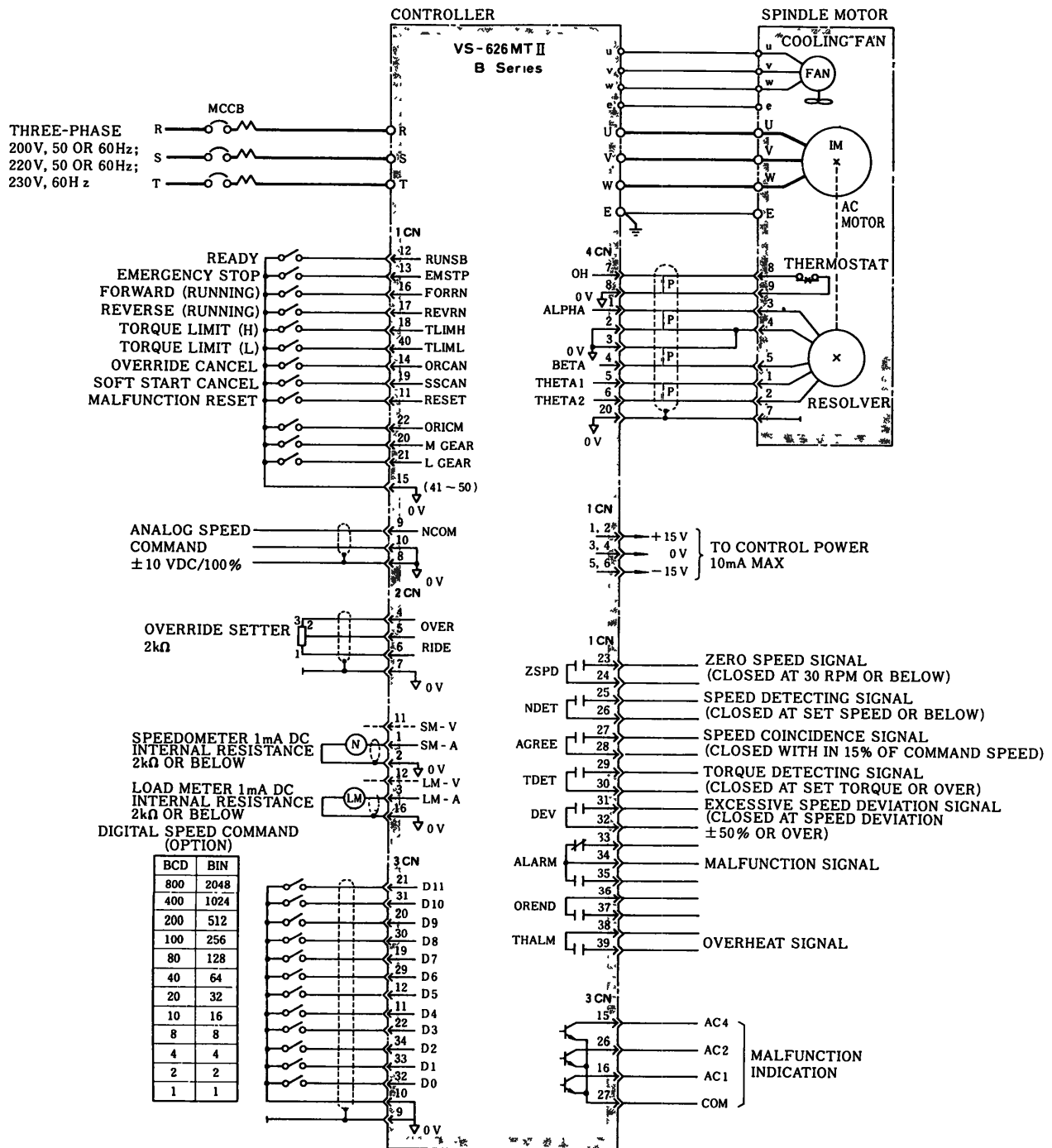
Fig. 2.3 Wiring Diagram
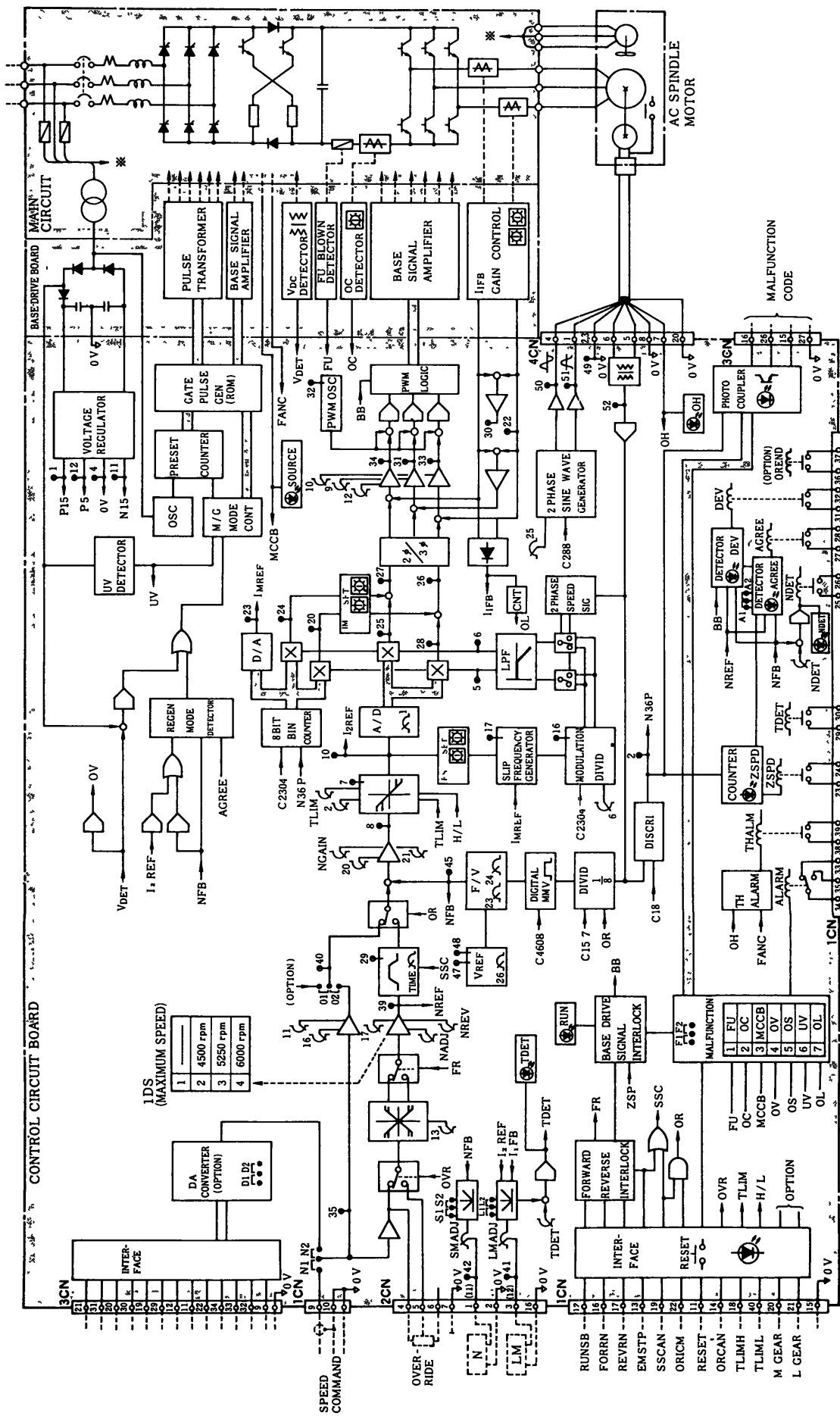
Fig. 2.4 VS-626MTII Controller Block Diagram

21

2.7 CONTROL SIGNAL

2.7.1 Contact Input Signal

When designing input signals, take the following conditions into consideration.

· When relay contacts, etc. are used, the contact capacity must be 30 V or above (15 mA or above).

· The filter in the level shifter circuit in the input section causes approximately 5 msec delay in the signals.

· Since a pull-up resistor is incorporated in the circuit, contactless signals can also be inputted. In this case, input signals 20 V or above for the HIGH level, and 2 V or below for LOW level.

· Fig. 2.5 shows the input circuit, and Table 2.11 gives the signal functions.
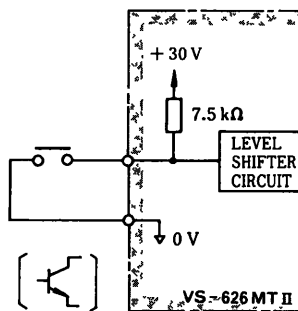
Fig. 2.5   Input Circuit

Table 2.11 (a)   Functions of Contact Input Signals

Signal	Connector No.	Pin No.	On Signal	Function
Ready RUNSB	1CN	12	CLOSE	· After power is applied, and [RUNSB] closes, 2LED-12 (green) LED lights. · When [RUNSB] is opened during run, base is blocked instantly, and the motor current is interrupted. · Where [RUNSB] is not used, connect pin ⑫ to 0 V.

Note: 0 V is pin ⑮, pins ㊶ - ㊿ of 1CN.

Table 2.11 (b)   Function of Input Signals
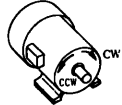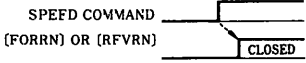
Signal	Connector No.	Pin No.	On Signal	Function
Forward Run [FORRN]	1CB	16	CLOSE	· With [RUNSB] closed (2LED-12 ON), and the speed command positive, when [FORRN] is closed, 2LED-16 lights and the motor runs CCW as viewed from drive end; and when [REVRN] is closed, the motor runs CW.
Reverse Run [REVRN]		17	CLOSE	Therefore, when speed commands and run signals are combined, the motor runs in the directions shown below.

Speed command		+	−
Run Signal	[FORRN]	CCW	CW
	[REVRN]	CW	CCW

· When the signal is opened during run, teh motor is stopped by the regenerative braking, and then, the motor current is interrupted by base blocking.

· The RUN LED (green) is on during run, and off during halt.

· The acceleration and deceleration time is set with the potentiometer TIME.
The time between halt and 100% rated speed can be set between 0.5 and 6 seconds. However, for some load GD^{2}values, the set accel/decel time may be exceeded.

· When both [FORN] and [REVRN] are closed, the motor stops. In this case, if whichever of them becomes open, the motor resumes running, so that care must be taken to avoid accident.

· When [FORN] or [REVRN] is closed, the motor runs at the speed specified by a speed command. Be sure to first command a speed when running the motor.

SPEED COMMAND ___⌐‾‾‾‾‾
[FORRN] OR [REVRN] ___⌐‾‾‾
| CLOSED |

· When a trouble occurs during run, base is blocked immediately to interrupt the motor current, and the RUN LED is extinguished.

Signal	Connector No.	Pin No.	On Signal	Function
Emergency stop [EMSTP]	1CN	13	OPEN	· When [EMSTP] is opened during run, the motor is quickly stopped by regenerative braking, and then, the current is interrupted.

· When [EMSTP] is closed again, the motor becomes ready to run again, so that if a speed command is sent, and [FORRN] or [REVRN] is closed, the motor is restarted.
Therefore, be sure to open [FORRN] or [REVRN] before closing [EMSTP].
If EMSTP is closed, 2LED-13 lights.
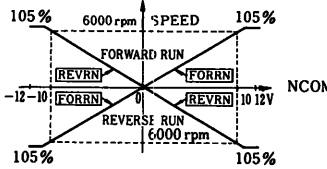
· When [EMSTP] is not to be used, connect pin ⑬ to 0V.

Table 2.11 (c) Functions of Input Signals

Signal	Connector No.	Pin No.	On Signal	Function
Torque Limit [T LIM H] [TLIML]	1CN	18	CLOSE	· This signal is for temporarily limiting the motor torque with a mechanically oriented spindle or gear shift.
		40	CLOSE	· When [TLIM H] or [TLIML] is closed, the torque is limited.
				· If [TLIMH] is closed, 3LED-18 lights; 3LED-40 for [TLIML].
				· Even if [TLIMH] and [TLIML] are simultaneously closed, TLIML will close before TLIMH.
				· The torque limit level is preset by a potentiometer (T LIM) in the controller between 15 and 120%. · When [TLIMH] or [TLIML] is not be used, leave pin ⑱ open.
Over-ride Cancel [ORCAN]		14	OPEN	· This signal is for selectively applying an over-ride to an external spindle speed command to change the cutting condition.
				· When [ORCAN] is opened, the override is cancelled. When [ORCAN] is closed, 3LED-14 lights.
				· For the adjustment of the override value, refer to Table 2.12.
Soft-start Cancel [SSCAN]		19	CLOSE	· This signal is for cancelling the soft start function so that speed reference is changed by speed command without delay, for inching or other special control modes. (Speed reference N_{REF}: controller CH29)
				· When [SSCAN] is closed, 2LED-14 lights and the accel/decel set time is neglected, and the motor is accelerated or decelerated in short time by the current limit accel/decel function.
				· When [SSCAN] is not to be used, leave pin ⑲ open.
Mal-function Reset [RESET]	1CN	11	OPEN ⬇ CLOSE or CLOSE ⬇ OPEN	· This signal is for restoring the run ready state after eliminating the cause of the tripping of the protective circuit, as the result of overload.
				· [RESET] is effective only after the tripping of a protecting circuit.
				· While [FORRN] or [REVRN] is closed, resetting is not possible.
				· The [RESET] switch incorporated in the controller is equivalent to this signal in function.
				· Resetting is effected at the edge of [RESET]. Therefore, close [RESET] if open, and open it if closed. If [RESET] is closed, 3LED-11 lights.

Table 2.11 (c)   Functions of Input Singnals (Cont'd)

Signal	Connector No.	Pin No.	On Signal	Function
Mal-function Reset [RESET]	1CN	11	OPEN ↓ CLOSE or CLOSE ↓ OPEN	· In the protective circuit sequence, resetting has priority. An example of the timing chart for resetting is given below. T1: Reset pulse width (>0.7 sec) T2: Malfunction signal delay time (approx. 50 msec)
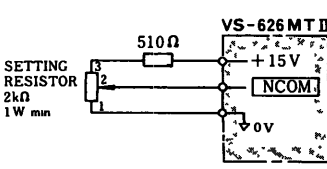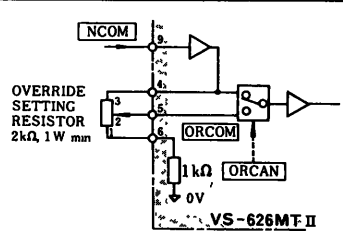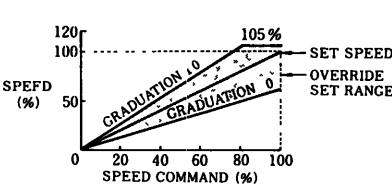
Table 2.11 (d)   Functions of Contact Input Signal

Signal	Connector No.	Pin No.	On Signal	Function
Motor Overheat Detection [OH]	4CN	7	OPEN	· This signal is for interrupting motor current and to display the malfunction, when the motor temperature exceeds the specified value. · When [OH] is opened, [OH] LED blinks and overheat signal [THALM] is output. · After [OH] activation, the alarm signal is output to display alarm 7 and the motor current is instantly interrupted by baseblocking. · To discriminate serious trouble from other trouble, connect pin ⑦ to 0V (pin ⑧ or pin ⑭ of 4CN), where the thermostat contact is used in an external sequence. In this case, to avoid noise in the resolver signal, run separate cables for the resolver and for motor thermostat detection.

2.7.2 Analog Input Signal

When designing analog input signals, take the information given in Table 2.12 into consideration.

Table 2.12 Functions of Analog Input Signals

Signal	Connector No.	Pin No.	Function
Speed Command [NCOM]	1CN	9	• Rated input voltage is ±10 VDC. • The allowable input voltage is ±12 VDC. However, since the controller limits it at 105% of rated value, the maximum speed of the motor is limited at 105% of the rated speed. • The input impedance of [NCOM] is 50 kΩ. • With various combinations of [NCOM] and run signals, speeds and directions of rotation shown below are obtained. • [NCOM] is effective and the motor runs when run signal [FORRN] or [REVRN] is closed. • While [FORRN] or [REVRN] is on, sometimes the motor will not stop completely even when [NCOM] is set to 0 V. To stop the motor completely, open [FORRN] or [REVRN] whichever is closed. (While either is closed, current flows.) • To improve noise resistance, use shielded lead for the [NCOM] circuit. • When setting [NCOM] manually, the output (±15 V) of the controller can be used, provided the current is kept up to 10 mA. Output (+15 V) is at pins ① and ② of 1CN, and −15 V is at pins ⑤ and ⑥ of 1CN, and 0V is either pin ③, ④ or ⑩ of 1CN.
Override [ORCAN]	2CN	5	• When applying a speed override, close [ORCAN]. Use a 2 kΩ resistor as the setting resistor, and use the following circuit. • Override speeds can be set between 60 and 130% of the set speed, but actually, speeds above 105% of the rated speed is not obtained. The characteristic curves are shown below.

2.7.3 Contact Output Signal

Use these contact signals under the following conditions.

· For output signals, reed relays are used. Their contact capacity is 24 VDC, 0.1 ADC.

· The contact chattering time is within 1 msec.

· To switch external relays or other inductive loads, be sure to connect a CR spark-killer in parallel to the load, and keep the surge voltage across the contacts below 200 V.

· Where a capacitive load is to be controlled, connect a protective resistor in series to the load to limit current.

· Fig. 2.6 shows the output circuit, and Table 2.13 gives functions of the output signals.
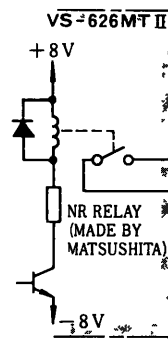
Fig. 2.6 Output Circuit

Table 2.13 Functions of Contact Output Signals
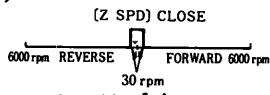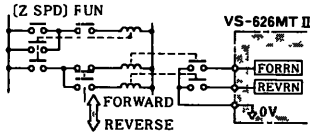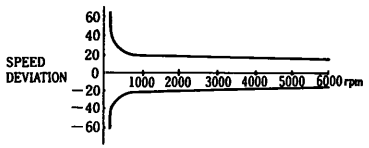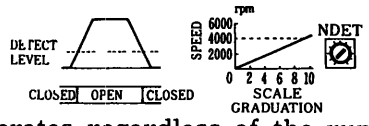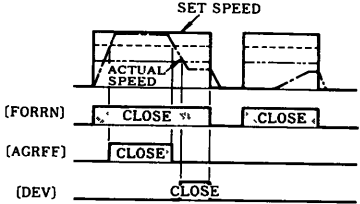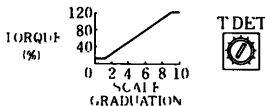
Signal	Connector No.	Contact and Pin No.	Function
Zero Speed [Z SPD]	1CN	Z SPD 23 24	• When- the motor speed drops below the set level (30 rpm), [Z SPD] closes, and Z SPD LED (green) lights. Once Z SPD is closed, it continues closed for 100 msec. • Since [Z SPD] is outputted irrespective of [FORRN] and (REVRN), it can be used as a safety run interlock signal. An example for this usage is shown below.
Speed Coincidence [AGREE]	1CN	AGREE 27 28	• When the motor speed enters the preset range of [NCOM], [AGREE] closes. and AGREE LED (green) lights. However, while a run signal is open or [Z SPD] is closed, it is not outputted. • When this signal is used as an answer to S command in NC program operation, the program is advanced to the next step. • Setting range of ±15% or ±30% at 6000rpm is selected by the shunt connector.
Malfunction [FALT]	1CN	ALARM 33 35 34	• When protective circuit for overcurrent or overload tripped, the motor current is instantly interrupted, and the motor stops after running by inertia. Upon current interruption, [ALARM] is outputted. • The [ALARM] relay may be selectively in the normally closed or normally-open mode. The contact is "C" type. (The normally-closed mode is the standard.) • While [ALARM] is outputted, the motor cannot run. • When [ALARM] is used to reset [NCOM], [FORRN] or [REVRN], displays a spindle alarm visual signal. • [ALARM] is sent to LEDs on the controller to light. For these, refer to Section 2.3.2 and Table 2.2. • For the relationship between [FALT] and [RESET], refer to 8. Malfunction reset [RESET] in Table 2.11(c).
Speed Detection [N DET]	1CN	NDET 25 26	• When the motor speed drops below a preset level, [N DET] closes, and the N DET LED (green) lights. • The speed detection level is set between 30 and 4000 rpm with potentiometer (N DET) in the controller. • [N DET] operates regardless of the run direction signals. • [N DET] can be used as the detection signal for the speed suitable for clutch actuation or gear shifting. • The standard setting is 600 rpm.

Table 2.13 Functions of Output Signal (Cont'd)

Signal	Connector No,	Contact and Pin No.	Function
Excessive Speed Deviation [DEV]	1CN	DEV 31 32	• When the motor speed deviates 50% or more from the level set by [NCOM] due to overloading, etc., [DEV] is closed and the DEV LED (red) lights. • When the speed deviation decreases below 50%, [DEV] opens automatically. • Unless [AGREE] has been outputted during run previously, [DEV] will not close even when the speed deviation exceeds 50%. Therefore, where [FORRN] or [REVRN] is closed, and [NCOM] is inputted, but the motor remains still, [DEV] will not close. • Since [DEV] is output when the cutting tool takes an excessive cut or other conditions detrimental to the tool and the machine develop, it can be used as a spindle alarm signal.
Torque Detection [T DET]	1CN	T DET 29 30	• When torque increases above a specified level, [T DET] closes, and the "T DET" LED (green) lights. • The torque detection level can be set between 0 and 120% with the potentiometer (T DET) in the controller. [T DET] can be used as a signal for checking the torque limit function, and for determining the load conditions.

2.7.4 Analog Output Signal

Use the analog output signals in the following conditions.

Table 2.13 Function of Output Signal

Signal	Connector No.	Pin No.	Function
Speed Meter Signal [SM-A] [SM-V]	2CN	1 11	· When an external speed meter is connected, the motor speed can be monitored. · Speed meter signal terminal outputs DC current signal or DC voltage signal proportional to the motor speed, regardless of the run direction. · Select an ammeter or a voltmeter as a speed meter which satisfies the following specifications. One-way Swing DC Ammeter *(see table below)* · The level of speed meter signal is adjustable with potentiometer [SMADJ]. · Since [SMADJ] is only for adjusting the speed meter, the actual speed is not influenced by it. · The forward and reverse run speed accuracy is ±2% max. of the rated speed. If the ammeter is used as a speed meter, use pin ① and select shunt connector S1; if the voltmeter, use pin ⑪ and select shunt connector S2.
Load Meter Signal [LM-A] [LM-V]	2CN	3 12	· The load meter indicates the percentage of the actual load to the 30-minute rated output of the motor. · Select a load meter conforming to the same specifications as the speed meter. · Load meter signal can be adjusted by the potentiometer (LMADJ). If the ammeter is used as a load meter, use pin ③ and select shunt connector L1; if the voltmeter, use pin ⑫ and select shunt connector S2.

One-way Swing DC Ammeter

Item	Specifications	
Speed Meter	Ammeter	Voltmeter
Activation	Moving coil Type	
Rating	1mA full-scale	10 V full-scale
Internal Resistance	100Ω	10 kΩ
Class	2.5 class or above	

Note: For the meter 0V, use pins ② adn ⑯ of 2CN.

30

2.8 SPARE PARTS

Main parts used in VS-626 MTⅡ Controller are shown in Table 2.15.
It is recommended that more than one set of fuses be stocked at all times.

Table 2.15 Spare Parts for VS-626MTⅡ

Spare Parts									
Name	Type	Code No.	Q'ty of Parts						
			CIMR -MTⅡ	CIMR -MTⅡ	CIMR -MTⅡ	CIMR -MTⅡ	CIMR -MTⅡ	CIMR -MTⅡ	CIMR -MTⅡ
			-5 5KB	-7 5KB	-11KB	-15KB	-18 5KB	-22KB	-26KB
Transistor Module	MG100G1AL3	STR000163	6	6	—	—	—	—	—
	EVK71-050	STR000142	1	1	6	11	11	3	—
	EVL31-055	STR000143	—	—	1	—	—	9	12
Thyristor Module*	MSG100L41A	SCR000235	3	3	3	3	—	—	—
	TM90DZ-H	SCR000198	—	—	—	—	3	3	—
	TM130DZ-H	SCR000238	—	—	—	—	—	—	3
Diode Module	RM60C2Z-H	SID000304	2	2	2	4	4	4	4
AC Circuit Fuse (DCFU)	25SHA75	FU000736	1	1	—	—	—	—	—
	25SH100	FU000697	—	—	1	—	—	—	—
	25SH125	FU000698	—	—	—	1	—	—	—
	25SH150	FU000699	—	—	—	—	1	—	—
	25SH200	FU000700	—	—	—	—	—	1	1
Control Circuit Fuse	GTX-5	FU000592	2	2	2	2	2	2	2
Cooling Fan	5915PC-22T	FAN000123	1	1	1	1	1	1	1
Control Circuit Board	JPAC-C220	ETC00750X	1	1	1	1	1	1	1
Base Drive Board	JPAC-C221	ETC00751X	1	1	1	1	1	1	1
Snabber Card	—	ETX00241X	1	1	1	1	1	1	1
Surge Absorber	TNR15G471K	XX000139	3	3	3	3	3	3	3

* For VS-626MTⅡ type CIMR-MTⅡ-5.5KB to -15KB, thyristor module type
  TM 55DZ-H are also available.

NOTE: The last digit of the code No. on the PC board is changed to X.