

Type number key

VFD	4A8	MS	43	A	N	S	A	A
				Version	Installation type	STO	EMC/PFC	Protection
								Mains input voltage
								Series
								Rated current
								VFD
								Version letter
								A=Standard H=Hi-speed
								N=No S=Built-in
								F=Built-in filter N=No function P=PFC
								A=IP20 E=IP40
								11=110V 1-phase 21=230V 1-phase 23=230V 3-phase 43=460V 3-phase
								MS300
								1A6=1.6Amp 4A2=4.2Amp 11A=11Amp 38A=38Amp
								Variable Frequency Drive



230V 1phase 0.2 ~ 2.2kW with built-in filter

Type number	VFD□□□MS21A F SAA	1A6	2A8	4A8	7A5	11A
Rated power	kW	0.2	0.4	0.75	1.5	2.2
Rated output current (HD/ND)	A RMS	1.6/1.8	2.8/3.2	4.8/5	7.5/8.5	11/12.5
Overload (HD/ND)	%	150% 60s 200% 3s / 120% 60s 150% 3s				
Rated output capacity (HD/ND)	kVA	0.6/0.7	1.1/1.2	1.8/1.9	2.9/3.2	4.2/4.8
Rated input current (HD/ND)	A RMS	3.4/3.8	5.9/6.7	10.1/10.5	15.8/17.9	23.1/26.3
Mains fuse (for UL: Bussmann)		JJS-10	JJS-15	JJS20	JJS-35	JJS-50
Non-fuse current breaker	A	15	20	30	45	70
Dimensions HxWxD	mm	142x72x159			157x87x179	
Frame *		B3			C2	
Weight	kg	1.32			1.8	
Protection **		IP20				
Power cable entry (with conduit box)	Ømm	2x 22.5			2x 27.8	
Signal cable entry (with conduit box)	Ømm	2x 22.5				
Section of power cables, stranded (with ring)	mm ²	2.1~3.3			5.3~8.4	8.4
Cooling		Convection	Fan			
Cooling air flow rate	m ³ /hr	n.a.	16.99		27.2	
Carrier frequency (HD/ND)	kHz	2~15				
EMC-Filter		Built-in: C3 30m, C2 20m				
DC-Choke		Connection for option				
DC-Bus connection		Yes				
Brake chopper		Built-in				
Recommended brake resistor	Ω/W	750/80	200/80	200/80	91/200	70/300
Minimum brake resistor value	Ω	190	95	63.3	47.5	38

230V 1phase 0.2 ~ 2.2kW no filter

Type number	VFD□□□MS21A N SAA VFD□□□MS21 E NSAA	1A6	2A8	4A8	7A5	11A
Rated power	kW	0.2	0.4	0.75	1.5	2.2
Rated output current (HD/ND)	A RMS	1.6/1.8	2.8/3.2	4.8/5	7.5/8.5	11/12.5
Overload (HD/ND)	%	150% 60s 200% 3s / 120% 60s 150% 3s				
Rated output capacity (HD/ND)	kVA	0.6/0.7	1.1/1.2	1.8/1.9	2.9/3.2	4.2/4.8
Rated input current (HD/ND)	A RMS	3.4/3.8	5.9/6.7	10.1/10.5	15.8/17.9	23.1/26.3
Mains fuse (for UL: Bussmann)		JJS-10	JJS-15	JJS20	JJS-35	JJS-50
Non-fuse current breaker	A	15	20	30	45	70
Dimensions HxWxD	mm	128x68x96	128x68x125	142x72x143	157x87x152	
Frame *		A1	A3	B2	C1	
Weight	kg	0.65	0.76	0.95	1.24	
Protection		A: IP20 E: IP40				
Power cable entry (with conduit box)	Ømm	2x 22.5			2x 27.8	
Signal cable entry (with conduit box)	Ømm	2x 22.5			2x 22.5	
Section of power cables, stranded (with ring)	mm ²	2.1	2.1~3.3		5.3~8.4	8.4
Cooling		Convection			Fan	
Cooling air flow rate	m ³ /hr	n.a.			27.2	
Carrier frequency (HD/ND)	kHz	2~15				
EMC-Filter		External option				
DC-Choke		Connection for option				
DC-Bus connection		Yes				
Brake chopper		Built-in				
Recommended brake resistor ***	Ω/W	750/80	200/80	200/80	91/200	70/300
Minimum brake resistor value ***	Ω	190	95	63.3	47.5	38

* See dimensional drawing on Page 5~6.

** See User Manual

400V 0.4 ~ 3.7kW with built-in filter

Type number	VFD□□□MH43A F SAA	1A5	2A7	4A2	5A5	9A0
Rated power	kW	0.4	0.75	1.5	2.2	3.7
Rated output current (HD/ND)	A RMS	1.5/1.8	2.7/3	4.2/4.6	5.5/6.5	9/10.5
Overload (HD/ND)	%	150% 60s 200% 3s / 120% 60s 150% 3s				
Rated output capacity (HD/ND)	kVA	1.1/1.4	2.1/2.3	3.2/3.5	4.2/5	6.9/8
Rated input current (HD/ND)	A RMS	2.1/2.5	3.7/4.2	5.8/6.4	6.1/7.2	9.9/11.6
Mains fuse (for UL: Bussmann)		JJS-10	JJS-15	JJS20	JJS-25	JJS-45
Non-fuse current breaker	A	15			20	30
Dimensions HxWxD	mm	142x72x159			157x87x179	
Frame *		B3			C2	
Weight	kg	1.32			1.8	
Protection **		IP20				
Power cable entry (with conduit box)	Ømm	2x 22.5			2x 27.8	
Signal cable entry (with conduit box)	Ømm	2x 22.5				
Section of power cables, stranded (with ring)	mm ²	2.1~3.3			2.1~8.4	
Cooling		Fan				
Cooling air flow rate	m ³ /hr	16.99			27.2	
Carrier frequency (HD/ND)	kHz	2~15				
EMC-Filter		Built-in: C3 30m, C2 20m				
DC-Choke		Connection for option				
DC-Bus connection		Yes				
Brake chopper		Built-in				
Recommended brake resistor	Ω/W	750/80		360/200	250/300	150/400
Minimum brake resistor value	Ω	380	190	126.7	108.6	84.4

400V 0.4 ~ 3.7kW no filter

Type number	VFD□□□MH43AN SAA VFD□□□MH43 EN SAA	1A5	2A7	4A2	5A5	9A0
Rated power	kW	0.4	0.75	1.5	2.2	3.7
Rated output current (HD/ND)	A RMS	1.5/1.8	2.7/3	4.2/4.6	5.5/6.5	9/10.5
Overload (HD/ND)	%	150% 60s 200% 3s / 120% 60s 150% 3s				
Rated output capacity (HD/ND)	kVA	1.1/1.4	2.1/2.3	3.2/3.5	4.2/5	6.9/8
Rated input current (HD/ND)	A RMS	2.1/2.5	3.7/4.2	5.8/6.4	6.1/7.2	9.9/11.6
Mains fuse (for UL: Bussmann)		JJS-10	JJS-15	JJS20	JJS-25	JJS-45
Non-fuse current breaker	A	15			20	30
Dimensions HxWxD	mm	128x68x129	128x68x143	142x72x143	157x87x152	
Frame *		A4	A5	B1	C1	
Weight	kg	0.76	0.81	1.05	1.24	
Protection **		A: IP20 E: IP40				
Power cable entry (with conduit box)	Ømm	2x 22.5			2x 27.8	
Signal cable entry (with conduit box)	Ømm	2x 22.5				
Section of power cables, stranded (with ring)	mm ²	2.1		2.1~3.3	2.1~8.4	
Cooling		Convection		Fan		
Cooling air flow rate	m ³ /hr	n.a.		16.99	27.2	
Carrier frequency (HD/ND)	kHz	2~15				
EMC-Filter		External option				
DC-Choke		Connection for option				
DC-Bus connection		Yes				
Brake chopper		Built-in				
Recommended brake resistor	Ω/W	750/80		360/200	250/300	150/400
Minimum brake resistor value	Ω	380	190	126.7	108.6	84.4

* See dimensional drawing on Page 5~6.

** See User Manual

400V 5.5 ~ 22kW with built-in filter

Type number	VFD□□□MS43A FSAA	13A	17A	25A	32A	38A	45A
Rated power	kW	5.5	7.5	11	15	18.5	22
Rated output current (HD/ND)	A RMS	13/15.7	17/20.5	25/28	32/36	38/41.5	45/49
Overload (HD/ND)	%	150% 60s 200% 3s / 120% 60s 150% 3s					
Rated output capacity (HD/ND)	kVA	9.9/12	13/15.6	19.1/21.3	24.4/27.4	29/31.6	34.3/37.3
Rated input current (HD/ND)	A RMS	14.3/17.3	18.7/22.6	27.5/30.8	35.2/39.6	41.8/45.7	49.5/53.9
Mains fuse (for UL: Bussmann)		JJS-35	JJS-45	JJS-60	JJS-80	JJS-90	JJS-110
Non-fuse current breaker	A	32	45	60	80	90	100
Dimensions HxWxD	mm	207x109x187		250x130x219		300x175x244	
Frame *		D2		E2		F2	
Weight	kg	2.91		5.15		8.5	
Protection **		IP20					
Power cable entry (with conduit box)	Ømm	2x 34.5		2x 43.7		2x 50.1	
Signal cable entry (with conduit box)	Ømm	2x 22.5					
Section of power cables (stranded)	mm ²	5.3~8.4		8.4~21.2		13.3~33.6	
Cooling		Fan					
Cooling air flow rate	m ³ /hr	39.7		91.2		115.2	
Carrier frequency (HD/ND)	kHz	2~15					
EMC-Filter		Built-in: C3 30m, C2 20m					
DC-Choke		Connection for option					
DC-Bus connection		Yes					
Brake chopper		Built-in					
Recommended brake resistor	Ω/W	75/1000		43/1500	32/2000		26/3000
Minimum brake resistor value	Ω	50.7	40	33	26.2		23

400V 5.5 ~ 22kW no filter

Type number	VFD□□□MS43A NSAA VFD□□□MS43 ENSAA	13A	17A	25A	32A	38A	45A
Rated power	kW	5.5	7.5	11	15	18.5	22
Rated output current (HD/ND)	A RMS	13/15.7	17/20.5	25/28	32/36	38/41.5	45/49
Overload (HD/ND)	%	150% 60s 200% 3s / 120% 60s 150% 3s					
Rated output capacity (HD/ND)	kVA	9.9/12	13/15.6	19.1/21.3	24.4/27.4	29/31.6	34.3/37.3
Rated input current (HD/ND)	A RMS	14.3/17.3	18.7/22.6	27.5/30.8	35.2/39.6	41.8/45.7	49.5/53.9
Mains fuse (for UL: Bussmann)		JJS-35	JJS-45	JJS-60	JJS-80	JJS-90	JJS-110
Non-fuse current breaker	A	32	45	60	80	90	100
Dimensions HxWxD	mm	207x109x154		250x130x185		300x175x192	
Frame *		D1		E1		F1	
Weight	kg	2.07		3.97		6.25	
Protection **		A: IP20 E: IP40					
Power cable entry (with conduit box)	Ømm	2x 34.5		2x 43.7		2x 50.1	
Signal cable entry (with conduit box)	Ømm	2x 22.5					
Section of power cables (stranded)	mm ²	5.3~8.4		8.4~21.2		13.3~33.6	
Cooling		Fan					
Cooling air flow rate	m ³ /hr	39.7		91.2		115.2	
Carrier frequency (HD/ND)	kHz	2~15					
EMC-Filter		External option					
DC-Choke		Connection for option					
DC-Bus connection		Yes					
Brake chopper		Built-in					
Recommended brake resistor	Ω/W	75/1000		43/1500		32/2000	
Minimum brake resistor value	Ω	50.7	40	33	26.2		23

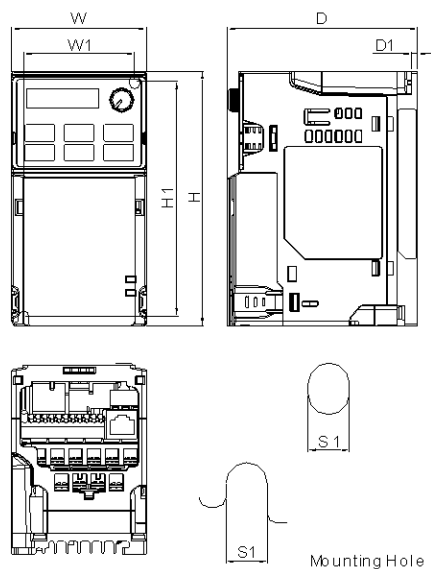
* See dimensional drawing on Page 5~6.

** See User Manual

Frame sizes and dimensions in mm [inches]

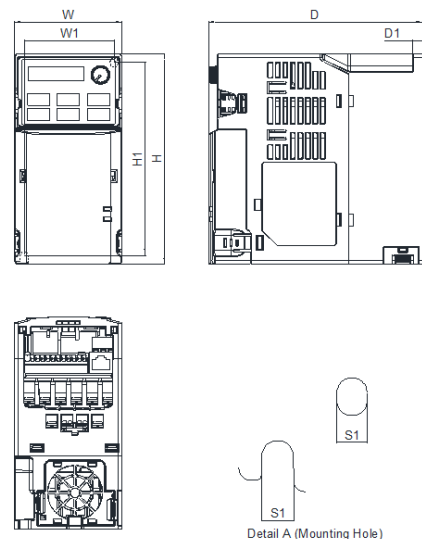
Frame A

Unit : mm [inch]							
Frame	W	H	D	W1	H1	D1	S1
A1	68.0 [2.68]	128.0 [5.04]	96.0 [3.78]	56.0 [2.20]	118.0 [4.65]	3.0 [0.12]	5.2 [0.20]
A2	68.0 [2.68]	128.0 [5.04]	110.0 [4.33]	56.0 [2.20]	118.0 [4.65]	3.0 [0.12]	5.2 [0.20]
A3	68.0 [2.68]	128.0 [5.04]	125.0 [4.92]	56.0 [2.20]	118.0 [4.65]	3.0 [0.12]	5.2 [0.20]
A4	68.0 [2.68]	128.0 [5.04]	129.0 [5.08]	56.0 [2.20]	118.0 [4.65]	3.0 [0.12]	5.2 [0.20]
A5	68.0 [2.68]	128.0 [5.04]	143.0 [5.63]	56.0 [2.20]	118.0 [4.65]	3.0 [0.12]	5.2 [0.20]



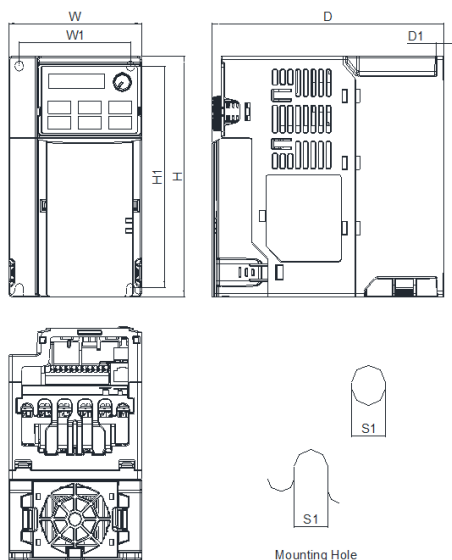
Frame B

Unit : mm [inch]							
Frame	W	H	D	W1	H1	D1	S1
B1	72.0 [2.83]	142.0 [5.59]	143.0 [5.63]	60.0 [2.36]	130.0 [5.13]	6.4 [0.25]	5.2 [0.20]
B2	72.0 [2.83]	142.0 [5.59]	143.0 [5.63]	60.0 [2.36]	130.0 [5.13]	3.0 [0.12]	5.2 [0.20]
B3	72.0 [2.83]	142.0 [5.59]	159.0 [6.26]	60.0 [2.36]	130.0 [5.13]	4.3 [0.17]	5.2 [0.20]



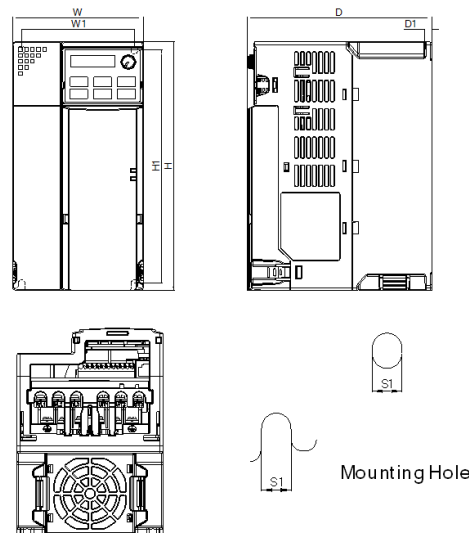
Frame C

Unit : mm [inch]							
Frame	W	H	D	W1	H1	D1	S1
C1	87.0 [3.43]	157.0 [6.18]	152.0 [5.98]	73.0 [2.87]	144.5 [5.69]	5.0 [0.20]	5.5 [0.22]
C2	87.0 [3.43]	157.0 [6.18]	179.0 [7.05]	73.0 [2.87]	144.5 [5.69]	5.0 [0.20]	5.5 [0.22]



Frame D

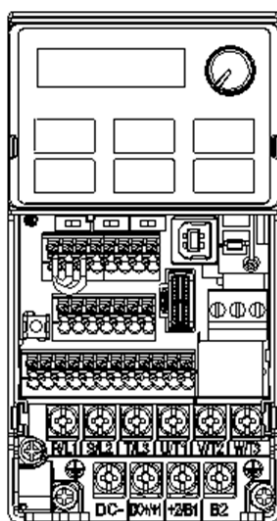
Unit : mm [inch]							
Frame	W	H	D	W1	H1	D1	S1
D1	109.0 [4.29]	207.0 [8.15]	154.0 [6.06]	94.0 [3.70]	193.8 [7.63]	6.0 [0.24]	5.5 [0.22]
D2	109.0 [4.29]	207.0 [8.15]	187.0 [7.36]	94.0 [3.70]	193.8 [7.63]	6.0 [0.24]	5.5 [0.22]



Frame E

[illegible][illegible]

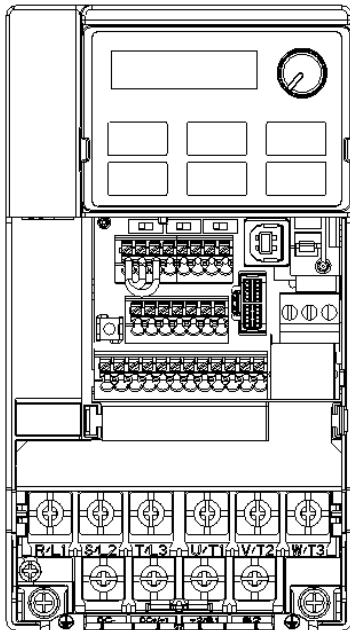
Main circuit wiring Frame A



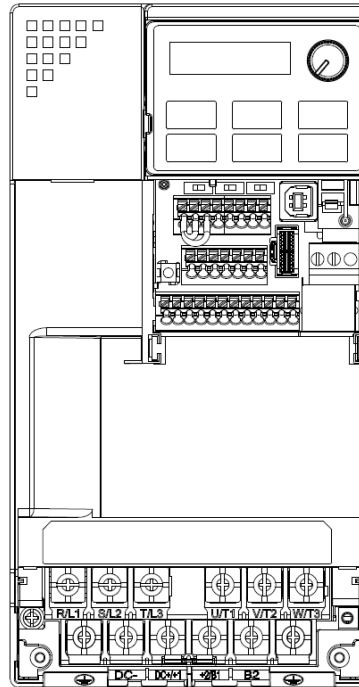
The diagram shows the rear panel of the HP-41C calculator. At the top, there is a large rectangular area for the calculator's body and a circular dial on the right. Below these are six rectangular slots arranged in two rows of three. The main body of the calculator is shown in the center, with various components labeled: 'R/L1', 'S/L2', 'T/L3', 'U/L1', 'V/L2', 'W/L3' for the top row of switches; 'DC-', 'DC+H', '42B1', 'B2' for the bottom row of switches; and 'R/L1', 'S/L2', 'T/L3', 'U/L1', 'V/L2', 'W/L3' for the bottom row of switches. A small circular dial is also visible on the right side of the main body.

Main circuit wiring (cont'd)

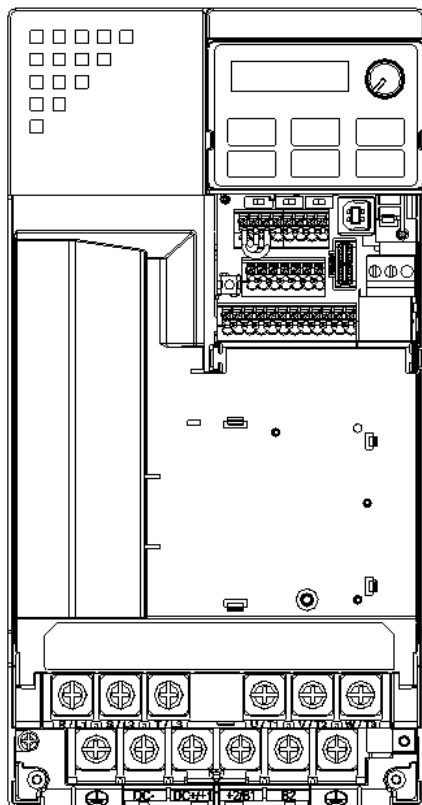
Main circuit wiring Frame C



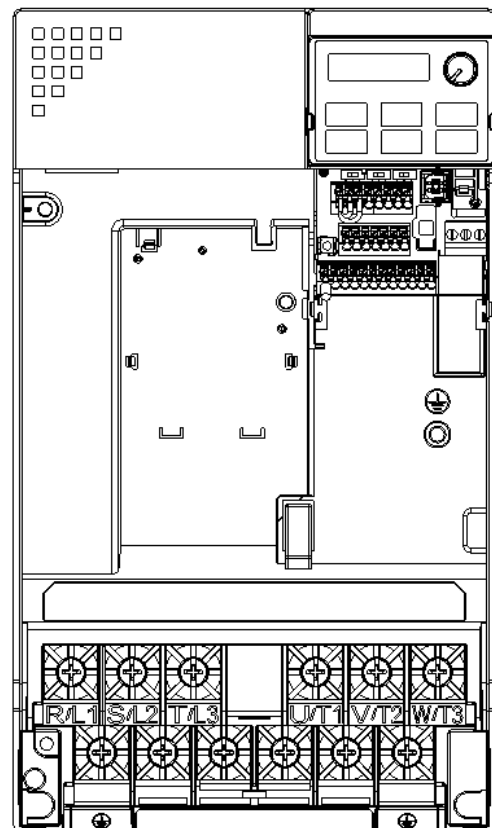
Main circuit wiring Frame D



Main circuit wiring Frame E



Main circuit wiring Frame F

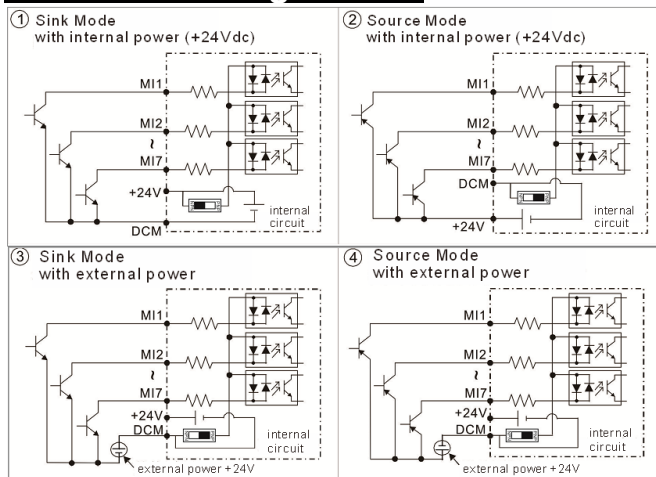


Common data MS300

Mains voltage range	VAC	230VAC: 170 ~ 265 400VAC: 323 ~ 528
Mains frequency	Hz	47 ~ 63
Output frequency range	Hz	0 ~ 599
Output voltage range	V	0 ~ Mains
Operating		
Temperature	°C	IP20: -20 ~ +50 (+60 with derating)
Atmospheric pressure	kPa	IP40/zero stacking: -20 ~ +40 (+50 with derating)
Relative humidity	%	86 ~ 106
Installation location		≤90 (non condensing, non frozen)
PCB conformal coating & Pollution level		IEC60364-1/60664-1: Pollution degree 2, Indoor use only IEC721-3-3: 3C2, 3S2
Storage		
Temperature	°C	-40 ~ +85
Atmospheric pressure	kPa	70 ~ 106
Relative humidity	%	≤95 (non condensing, non frozen)
Pollution level		IEC721-3-3: 2C2, 2S2
Transportation		
Temperature	°C	-20 ~ +70
Atmospheric pressure	kPa	70 ~ 106
Relative humidity	%	≤95 (non condensing, non frozen)
Pollution level		IEC721-3-3: 1C2, 1S2
Vibration	Operating	IEC60068-2-6: 2~13.2Hz 1mm 13.2~55Hz 0.7~2.0G 55~512Hz 2G
	Non operating	IEC60068-2-6: 2~2000Hz 0.381mm max 2.5G peak
Shock		IEC60068-2-27: 15G 11ms operating 30G 11ms non-operating
Package drop		IEC60068-2-31 ISTA 1A (acc. to weight)
Degree of protection		IP20 IP40 with option conduit box
Altitude	m	≤1000 derate 1% rated current or 0.5°C per 100m up to 2000m
Keypad		Detachable
Signal cable section	mm ²	0.5 (Relay 0.2~3.3)
Digital inputs	7x MIx	SINK or SOURCE Via switch Range 24VDC Scan time 0~30s Pull-up (internal) ca. 4kΩ Current (ON) 3.3mA MI7 33kHz max.
STO inputs	S1-DCM S2-DCM	Range 24VDC (30VDCmax) Current (ON) 6.67mA (11VDC switching)
Analogue inputs		Resolution 12 bits Delay 0~20s
	1x AVI	Range 0~10VDC / -10 ~ +10VDC Impedance 20kΩ
	1x ACI	Range 0/4~20mA / 0~10VDC Impedance 250Ω / 20kΩ
Digital outputs	2x MOx	Optocoupler OC (common + or -) 48VDC/50mA
Frequency output	1x DFM	Optocoupler OC 30VDC/30mA Duty-cycle 50% Range 1~55x Output frequency (33kHz max)
Analogue output	AFM	Resolution 10 bits Range 0~10VDC / 0/4~20mA (switch) Max load 2mA / 500Ω

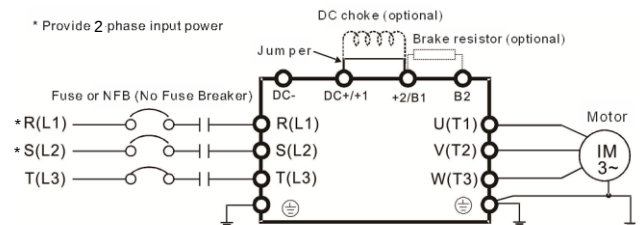
Relays	1x	Change-over	
		NO: $R_A \sim R_C$	Resistive 3A/250VAC - 5A/30VDC Inductive 1.2A/250VAC - 2A/30VDC
		NC: $R_B \sim R_C$	Resistive 3A/250VAC - 3A/30VDC Inductive 1.2A/250VAC - 1.2A/30VDC
Signal supply	1x	+24VDC $\pm$ 10%/100mA	
Potentiometer supply	1x	+10.5 $\pm$ 0.5VDC/20mA	
Trip memory		Last 6 errors	
Acc/Dec Times	s	0.0 ~ 6000	
Serial communication	RJ45 SG+/SG-	Modbus RS485 COM1	
		Baudrate	4800 ~ 115200bps
		Address	1 ~ 254
		Mode	ASCII 7,N,2 / 7,E,1 / 7,O,1 / 7,E,2 / 7,O,2 / 8,N,1 / 8,N,2 / 8,E,1 / 8,O,1 / 8,E,2 / 8,O,2
	USB	Modbus RTU	8,N,1 / 8,N,2 / 8,E,1 / 8,O,1 / 8,E,2 / 8,O,2
			Automatic

NPN/PNP wiring for MIx

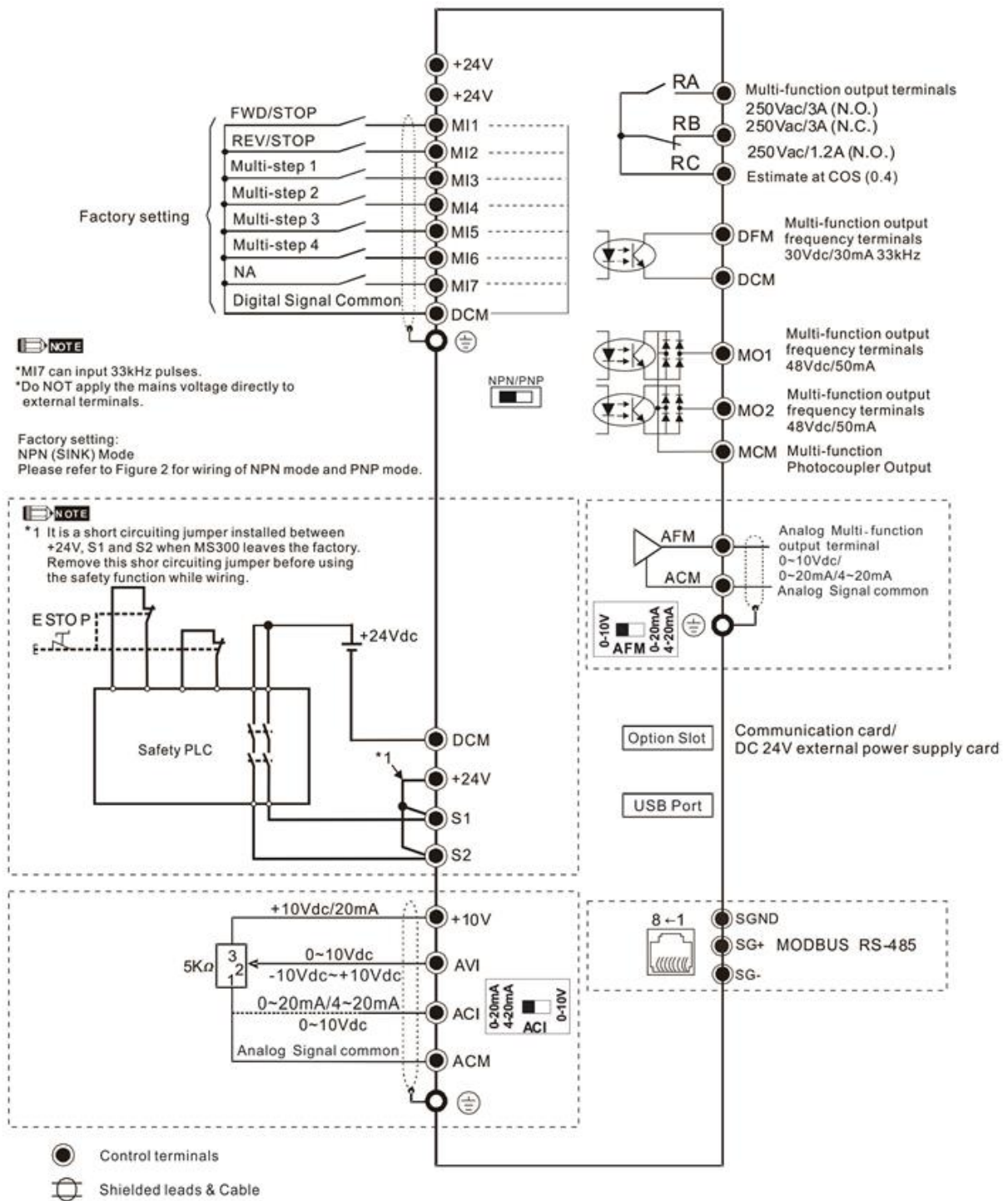


Power terminals (general)

Terminal symbol	Terminal function
R/L1, S/L2, T/L3	Mains input
U/T1, V/T2, W/T3	Motor output
+1/DC+ ~ +2/B1	Connection DC-choke (external option)
+2/B1 ~ B2	Brake resistor (external option)
+1/DC+ ~ DC-	DC-bus connection
	Ground



Basic wiring diagram



Options

Filters

Built-in filter: C3, motor cable $\leq 30\text{m}$, carrier frequency 2~15kHz
C2, motor cable $\leq 20\text{m}$, carrier frequency 2~15kHz

Option EMC filters
Capacitive filter

Braking

Brake resistors.

Keypad&Cables

The standard keypad KPMS-LE01 can be connected to the drive via EGx010C cable.
The option keypad KPC-CC01 can be connected to the RS485 port.

Reactors

AC input reactors
AC output reactors
DC-chokes
Zero-phase reactors

Mechanical options

Earth plates
Conduit boxes
Fan kits
DIN-rail adapters (up to Frame C)
Mounting adapters (feed-through installation)

Communication

IFD6500/IFD6530 USB-RS485 converter, Splitters, Cables.

Fieldbus

CMM-DN01	Devicenet
CMM-PD01	Profibus
CMM-COP01	CANopen
CMM-MOD01	Modbus over TCP/IP
CMM-EIP01	Ethernet

Option cards

EMM-BPS01 To connect external 24VDC supply

Software

To read, save, copy, change parameters. Download VFDSOft 1.50 or higher from
www.delta-emea.com.

Programming

Group 00-xx

Drive Parameters

Drive ID, Software version, Password, Parameter reset, Control Mode, Duty HD/ND selection, User-defined display, Carrier frequency, Source of frequency/operation, Stop method, Motor direction inhibit, etc.

Group 01-xx

Basic Parameters

V/f-curve (2), Max/Min Voltage and frequency, Acc/Dec times, Jogging, S-curve, 3 Skip frequencies, etc.

Group 02-xx

Digital Input/Output Parameters

2-3 Wire operation, Function and setting of digital inputs, outputs and relay, Count values, Debounce time, Brake delay, etc.

Group 03-xx

Analogue Input/Output Parameters

Function, Gain, Bias, Filtering of analogue inputs and outputs, 3-Point setting of analogue inputs.

Group 04-xx

Multi-step Speed and Position

15 Speed steps and positions.

Group 05-xx

Motor Parameters

Setting of motor parameters (4 motors), Auto-tuning, Slip compensation, Torque boost, Y- Δ switch-over, Motor operation time, IM/PM selection, etc.

Group 06-xx

Protection Parameters

Protection settings, Fault memory and conditions, PTC, Derating, etc.

Group 07-xx

Special Parameters

Brake level, DC-Braking, Power loss override, DEB, Speed search, Auto reset, Fan control, Emergency stop, Auto Energy Saving, AVR, Slip compensation, Autorestart, Dwell time, etc.

Group 08-xx

PID Control Parameters

PID settings, Sleep/Wake-up function, etc.

Group 09-xx

Communication Parameters

Protocol, Address, Transmission speed, Block Transfer, CANopen, Fieldbus option card settings, etc.

Group 10-xx

PG (Encoder) Parameters

Settings for encoder feedback operation, Auto Speed Regulation, Mechanical gear ratio, Electrical gear ratio, PM Speed estimator, etc.

Group 11-xx

Advanced Parameters

ASR, PWM Mode, Several advanced bit settings, etc.

Group 13-xx

Macro

Application Macro settings

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