Operating principle

Motor Modules are designed for multi-axis drive systems and are controlled by either a CU320-2 or a SIMOTION D Control Unit. Motor Modules are interconnected by means of a shared DC busbar.

One or more Motor Modules are supplied with energy for the motors via the DC link. Both synchronous and induction motors can be operated.

Since the Motor Modules share the same DC link, they can exchange energy with one another, i.e. if one Motor Module operating in generator mode produces energy, the energy can be used by another Motor Module operating in motor mode. The DC link is supplied with line voltage by a Line Module.

Characteristics of the Motor Modules

- Version for 510 VDC to 750 VDC from 210 up to 1405 A

  Version for 675 VDC to 1080 VDC from 85 up to 1270 A
- Internal air cooling
- Short-circuit/ground-fault-proof
- Electronic rating plate
- Operating status and error status via LEDs
- DRIVE-CLiQ interface for communication with the Control Unit and/or other components in the drive line-up.
- Integration in system diagnostics

4.2 Safety information



⚠ WARNING

Dangerous electrical voltage

After disconnecting all the supply voltages, a hazardous voltage will be present in all components for another 5 minutes. Work cannot be carried out until this time has elapsed.

Before starting work, you should also measure the voltage after the 5 minutes have elapsed. The voltage can be measured on DC-link terminals DCP and DCN.

⚠ CAUTION

Danger notice in the local language

The DC-link discharge time hazard warning must be affixed to the component in the relevant local language.

NOTICE

Maintain ventilation clearances

The ventilation clearances above, below, and in front of the component, which are specified in the dimension drawings, must be observed.

⚠ WARNING

Potentially fatal touch voltage

Cable shields and power cable conductors which are not used, must be connected to PE potential in order to discharge charges as a result of capacitive coupling.

Non-observance can cause lethal shock voltages.

⚠ WARNING

Remove linkage levers for frame sizes HX and JX

For Motor Modules of frame sizes HX and JX, the linkage levers marked in red must be removed once the devices have been installed.

Non-observance can cause damage to the device through undershooting the necessary voltage clearances.

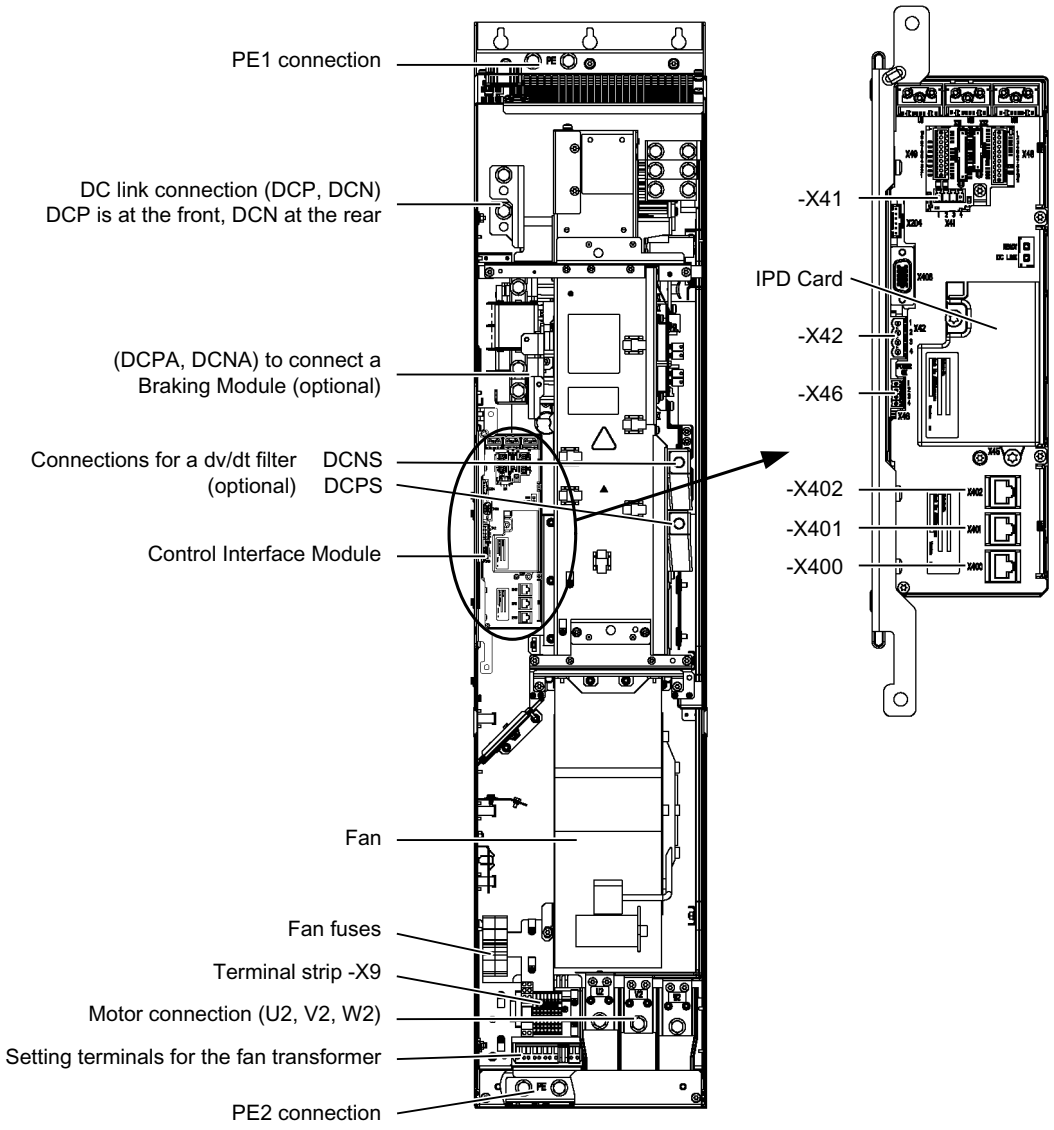


Figure 4-2 Motor Module, frame size GX

4.3.3 DC link/motor connection

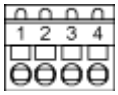
Table 4- 2 DC link/motor connection of the Motor Module

Terminals	Technical specifications
DCP, DCN DC power input	Voltage: • 510 ... 750 V DC • 675 ... 1080 V DC Connections: • Frame sizes FX / GX: Thread M10 / 25 Nm for cable lugs in accordance with DIN 46234 / DIN 46235 [1)] • Frame sizes HX / JX: d = 12 mm (M12/50 Nm) flat connector for busbar
DCPA, DCNA Connection for Braking Module	Voltage: • 510 ... 750 V DC • 675 ... 1080 V DC Connections: • Frame sizes FX / GX: Threaded bolts M6 / 6 Nm for cable lugs in accordance with DIN 46234 / DIN 46235 [1)] • Frame sizes HX / JX: Connection for connection clip
DCPS, DCNS connection for a dV/dt filter plus VPL	Voltage: • 510 ... 750 V DC • 675 ... 1080 V DC Connections: • Frame sizes FX / GX: Thread M8 / 13 Nm for cable lugs in accordance with DIN 46234 / DIN 46235 [1)] • Frame sizes HX / JX: Thread M10 / 25 Nm for cable lugs in accordance with DIN 46234 / DIN 46235 [1)]
U2, V2, W2 3 AC power output	Voltage: • 0 V 3 AC to 0.72 x DC link voltage Connecting thread: • Frame sizes FX / GX: M10 / 25 Nm for cable lugs in accordance with DIN 46234 / DIN 46235 [1)] • Frame sizes HX / JX: M12 / 50 Nm for cable lugs in accordance with DIN 46234 / DIN 46235 [1)]
PE connection PE1, PE2	Connecting thread: • Frame sizes FX / GX: M10 / 25 Nm for cable lugs in accordance with DIN 46234 / DIN 46235 [1)] • Frame sizes HX / JX: M12 / 50 Nm for cable lugs in accordance with DIN 46234 / DIN 46235 [1)]

[1]) Dimensions for connecting alternative cable lugs, see "cable lugs" in the appendix.

4.3.6 X41 EP terminal / temperature sensor connection

Table 4- 5 Terminal strip X41

	Terminal	Function	Technical specifications
	1	EP M1 (Enable Pulses)	Supply voltage: 24 VDC (20.4 ... 28.8 V) Current consumption: 10 mA Signal propagation delay times: L → H 100 µs H → L: 1000 µs The pulse inhibit function is only available when Safety Integrated Basic Functions are enabled.
	2	EP +24 V (Enable Pulses)	
	3	- Temp	Temperature sensor connection KTY84-1C130/PTC / PT100
	4	+ Temp	
Max. connectable cross-section 1.5 mm^2			

⚠ DANGER

Electrical shock hazard

Only temperature sensors that meet the safety isolation specifications stipulated in EN 61800-5-1 may be connected to terminals "+Temp" and "-Temp". If safe electrical separation cannot be guaranteed (for linear motors or third-party motors, for example), a Sensor Module External (SME120 or SME125) must be used.

If these instructions are not complied with, there is a risk of electric shock!

Note

Connectable sensor

The following probes can be connected to the temperature sensor connection: KTY84-1C130 / PTC / PT100.

NOTICE

Use shielded cables

The temperature sensor connection must be shielded. The shielding must be attached to the shield support of the Motor Module.

Note

KTY temperature sensor connected with the correct polarity

The KTY temperature sensor must be connected with the correct polarity.
If the polarity is reversed, the sensor will not be able to detect if the motor overheats.

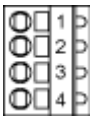
Note

EP terminals only for Safety Integrated Basic Functions

The function of the EP terminals is only available when Safety Integrated Basic Functions are enabled.

4.3.7 X42 terminal strip

Table 4- 6 Terminal strip X42 voltage supply for Control Unit, Sensor Module and Terminal Module

	Terminal	Function	Technical specifications
	1	P24L	Voltage supply for Control Unit, Sensor Module and Terminal Module (18 to 28.8 V) maximum load current: 3 A
	2		
	3	M	
	4		
Max. connectable cross-section 2.5 mm²			

⚠ CAUTION

Terminal strip is not intended for free 24 VDC availability

The terminal strip is not intended for free 24V DC availability (for example for supplying further line-side components), as the voltage supply of the Control Interface Module could also be overloaded and operating capability could thus be compromised.

4.3.8 X46 Brake control and monitoring

Table 4- 7 Terminal strip X46 brake control and monitoring

	Terminal	Function	Technical specifications
	1	BR output +	The interface is intended for connection of the Safe Brake Adapter.
	2	BR output -	
	3	FB input +	
	4	FB input -	
Max. connectable cross-section 1.5 mm²			

NOTICE

Cable length

The length of the connecting lead at terminal strip X46 must not exceed 10 m, and the lead must not be brought out outside the control cabinet or control cabinet group.

4.3.10 Meaning of the LEDs on the Control Interface Module in the Motor Module

Table 4- 9 Meaning of the LEDs "READY" and "DC LINK" on the Control Interface Module in the Motor Module

LED state		Description
READY	DC LINK	
Off	Off	The electronics power supply is missing or out of tolerance.
Green	Off	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.
	Orange	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place. The DC-link voltage is present.
	Red	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place. The DC-link voltage is too high.
Orange	Orange	DRIVE-CLiQ communication is being established.
Red	---	At least one fault is present in this component. Note: LED is driven irrespective of the corresponding messages being reconfigured.
Flashing light 0.5 Hz: Green / red	---	Firmware is being downloaded.
2 Hz flashing: Green / red	---	Firmware download is complete. Waiting for POWER ON.
2 Hz flashing: Green / orange or red / orange	---	Component detection using LED is activated (p0124) Note: The two options depend on the LED status when module recognition is activated via p0124 = 1.

Table 4- 10 Meaning of the LED "POWER OK" on the Control Interface Module in the Motor Module

LED	Color	Status	Description
POWER OK	Green	Off	DC-link voltage < 100 V and voltage at -X9:1/2 less than 12 V.
		On	The component is ready for operation.
		Flashing light	There is a fault. If the LED continues to flash after you have performed a POWER ON, please contact your Siemens service center.



⚠WARNING

Hazardous DC-link voltage

Irrespective of the state of the LED "DC LINK", hazardous DC-link voltages can always be present.

The warning information on the component must be carefully observed!

4.5 Electrical connection

Adjusting the fan voltage (-T10)

The power supply for the device fans (1 AC 230 V) in the Motor Module (-T10) is taken from the line supply using transformers. The installation position of the transformers is indicated in the interface descriptions.

The transformers are fitted with primary taps so that they can be fine-tuned to the line supply voltage.

If necessary, the connection fitted in the factory, shown with a dashed line, must be reconnected to the actual line voltage.

Note

Two transformers for Motor Modules of frame size JX

Two transformers (T10 and -T20) are installed in Motor Modules frame size JX. The two primary-side terminals on each of these devices must be adjusted together.

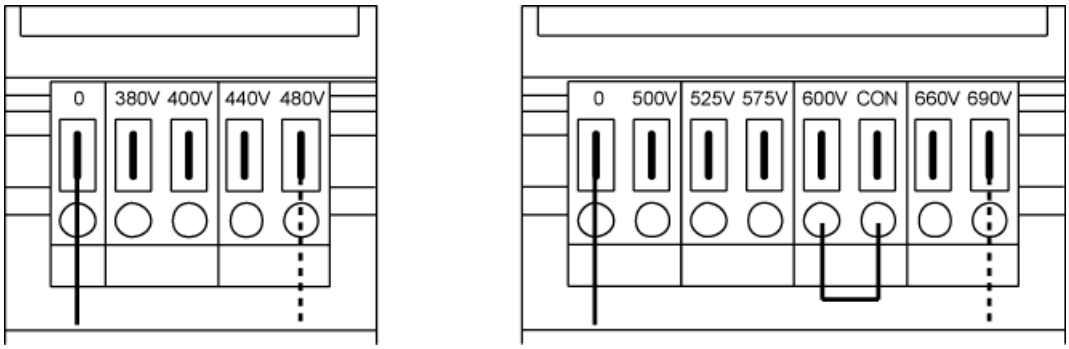


Figure 4-10 Setting terminals for the fan transformers (3 AC 380 to 480 V / 3 AC 500 to 690 V

The supply voltage assignments for making the appropriate setting on the fan transformer are indicated in the following tables (factory presetting: 480 V / 0 V or 690 V / 0 V).

Note

With the 3 AC 500 V to 690 V fan transformer, a jumper is inserted between the "600 V" terminal and "CON" terminal. The jumper between terminal "600 V" and "CON" is for internal use.

NOTICE

Consequences of incorrect voltage setting

If the terminals are not reconnected to the actual line voltage:

- The required cooling level will not be provided (risk of overheating).
- The fan fuses may blow (overload).

4.6 Technical specifications

4.6.1 510 V DC – 750 V DC Motor Modules

Table 4- 13 Technical data for Motor Modules, 510 ... 750 VDC, Part 1

Order number	6SL3320–	1TE32–1AA3	1TE32–6AA3	1TE33–1AA3	1TE33–8AA3
Output current					
- Rated current $I_{N\,A}$	A	210	260	310	380
- Base load current I_L	A	205	250	302	370
- Base load current I_H	A	178	233	277	340
- For S6 operation (40%) I_{S6}	A	230	285	340	430
- Max. output current I_{max}	A	307	375	453	555
Type rating					
- Based on I_L (50 Hz 400 V) 1)	kW	110	132	160	200
- Based on I_H (50 Hz 400 V) 1)	kW	90	110	132	160
- Based on I_L (60 Hz 460 V) 2)	HP	150	200	250	300
- Based on I_H (60 Hz 460 V) 2)	HP	150	200	200	250
DC-link current					
-Rated current $I_{N\,DC}$ when fed via					
- Basic/Smart Line Module	A	252	312	372	456
- Active Line Module	A	227	281	335	411
Base load current $I_{L\,DC}$ when fed via					
- Basic/Smart Line Module	A	245	304	362	444
- Active Line Module	A	221	273	326	400
Base load current $I_{H\,DC}$ when fed via					
- Basic/Smart Line Module	A	224	277	331	405
- Active Line Module	A	202	250	298	365
Supply voltages					
- DC-link voltage	V_{DC}	510 ... 750 3)			
- Electronic power supply	V_{DC}	24 (20.4 ... 28.8)			
- Output voltage	V_{ACrms}	0 ... 0.72 x DC-link voltage			
Rated pulse frequency	kHz	2	2	2	2
- Max. pulse frequency without derating	kHz	2	2	2	2
- Max. pulse frequency with derating	kHz	8	8	8	8
Max. ambient temperature					
- Without derating	° C	40	40	40	40
- With derating	° C	55	55	55	55
DC-link capacitance	µF	4200	5200	6300	7800
Current consumption					
- Electronics current consumption (24 VDC)	A	0.8	0.8	0.9	0.9
- Fan supply, at 2 AC 400 V, 50/60 Hz	A	0.63 / 0.95	1.13 / 1.7	1.8 / 2.7	1.8 / 2.7
Power loss, max. 4)					
- At 50 Hz 400 V	kW	1.86	2.5	2.96	3.67
- At 60 Hz 460 V	kW	1.94	2.6	3.1	3.8
Cooling air requirement	m^3/s	0.17	0.23	0.36	0.36
Sound pressure level					
L_{pA} (1 m) at 50/60 Hz	dB(A)	64 / 67	64 / 67	69 / 73	69 / 73

Order number	6SL3320–	1TE32–1AA3	1TE32–6AA3	1TE33–1AA3	1TE33–8AA3
Connections					
- DC-link connection		M10	M10	M10	M10
- Motor connection		M10	M10	M10	M10
- PE connection PE1		M10	M10	M10	M10
- PE connection PE2		M10	M10	M10	M10
Max. conductor cross-sections					
- DC-link connection (DCP, DCN)	mm²	2 x 185	2 x 185	2 x 240	2 x 240
- Motor connection (U2, V2, W2)	mm²	2 x 185	2 x 185	2 x 240	2 x 240
- PE connection PE1	mm²	2 x 185	2 x 185	2 x 240	2 x 240
- PE connection PE2	mm²	2 x 185	2 x 185	2 x 240	2 x 240
Max. motor cable length					
- Shielded	m	300	300	300	300
- Unshielded	m	450	450	450	450
Degree of protection		IP20	IP20	IP20	IP20
Dimensions					
- Width	mm	326	326	326	326
- Height	mm	1400	1400	1533	1533
- Depth	mm	356	356	545	545
Frame size		FX	FX	GX	GX
Weight	kg	95	95	136	136

1) Rated power of a typical 6-pole standard induction motor based on I_L or I_H at 3 AC 400 V 50 Hz.

2) Rated power of a typical 6-pole standard induction motor based on I_L or I_H at 3 AC 460 V 60 Hz.

3) Including overshoot capability

4) The specified power loss is the maximum value at 100% capacity utilization. The value in normal operation is lower.