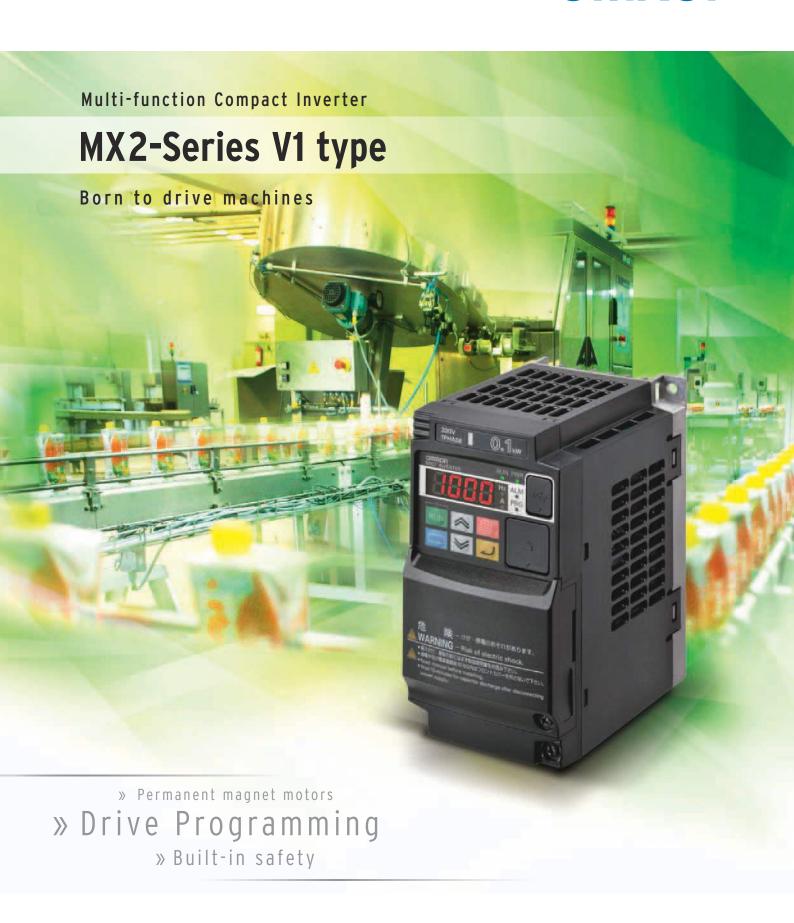
# **OMRON**





# Harmonised motor and machine control

# MOTOR CONTROL

# 200% starting torque

- Near stand-still operation (0.5 Hz)
- Smooth control of high inertia loads
- Control of fast cyclic loads

# Torque control in open loop

- Ideal for low to medium torque applications
- Can replace a flux vector or servo drive in suitable systems

# Motor control

- Surface Permanent Magnet Motor
- Interior Permanent Magnet Motor
- Induction Motor

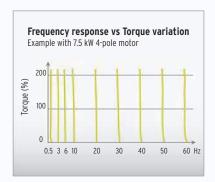
# One parameter auto-tuning

 Just by entering the kW rating of the motor the MX2-V1 gives you smooth





#### Torque master



The MX2-V1 delivers 200% starting torque near stand-still (0.5 Hz) and can operate in torque control in open loop mode. This allows the MX2-V1 to be used in applications where closed loop AC vector drives were previously used.

#### Easy network integration



Standard industrial networks, such as EtherCAT, CompoNet or DeviceNet as options. High-speed EtherCAT provides solutions for the entire system from input to output with Sysmac Series.

#### Easy communications setting



Built-in RS-485 Modbus communications. OMRON Function Blocks are available for the CP H/L and CJ-series PLCs. Those control the MX2-V1 via Modbus communications easily.



Safety is embedded in the MX2-V1, according to ISO 13849-1, Cat. 3, with two safety inputs and an External Device Monitoring (EDM) output.

No external contactors on the motor side are required, meaning simpler wiring for the user.

## Safety embedded; ISO 13849-1, Cat. 3



Dual contactors at the output of the inverter are no longer required. Direct connection to a safety controller ensures compliance to ISO 13849-1, Cat. 3.

# MOTOR CONTROL Permanent magnet motors



The PM motor conforming to highefficiency regulations can be controlled. The PM motor promotes further energy saving and achieves earth-friendly machine control.

# Position and run!

The MX2-V1 is a drive and position controller in one, ideal for modular machines where moderate positional accuracy is required. Speed synchronisation is also possible, with no additional programming required.



#### **Speed synchronisation**



With no external hardware required, and via standard parameter settings, speed synchronisation can be achieved. The MX2-V1 will act as a speed follower to an external pulse generator/encoder signal up to 32 KHz.

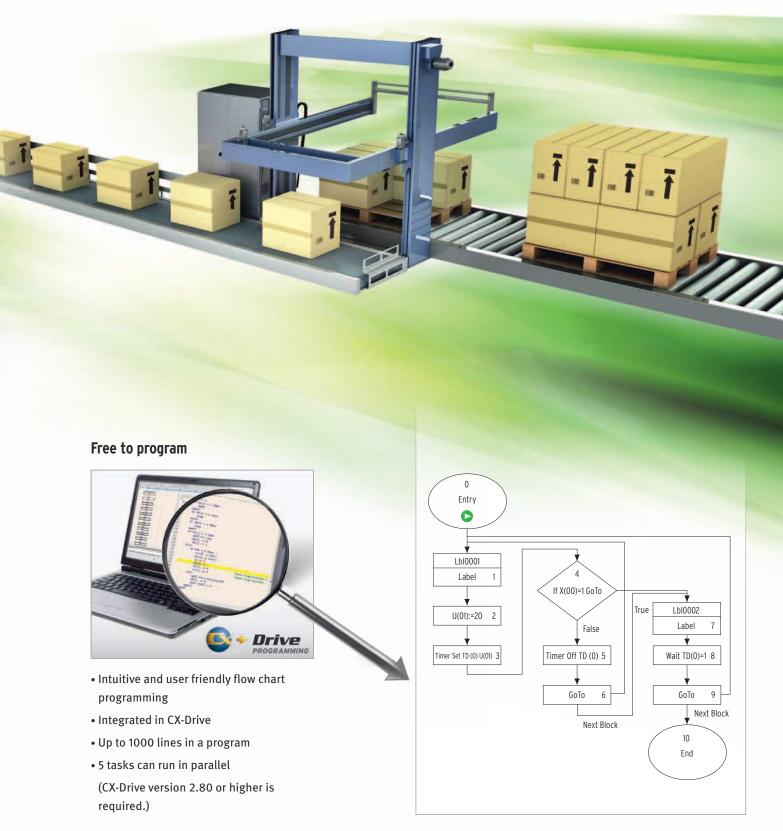
## **Positioning functionality**



Specially developed application functionality enables the MX2-V1 to solve simple positioning tasks without the need for an external controller. Up to 8 positions, plus home, can be selected by the user, and furthermore, the MX2-V1 can be switched between speed and position mode.

# Program and play!

The MX2-V1 gives you the power to create smart solutions using PLC functionality, as standard. Via an intuitive flow chart programming tool, you can create programs with up to 1000 lines of code and with 5 tasks running in parallel.



## **Multi-function Compact Inverter**

# MX2-Series V1 type

#### Born to drive machines

- Positioning functionality.
- Fieldbus communications with optional unit EtherCAT, CompoNet and DeviceNet
- Drive Programming.
- Current vector Control.
- High Starting torque: 200% at 0.5 Hz.
- Safety function \* EN ISO 13849-1:2008 (Cat.3/PLd)
   IEC 60204-1 Stop Category 0
- Speed range up to 580 Hz.
- \* When optional DeviceNet communication unit or CompoNet communication unit is mounted onto the MX2-series V1 type, the inverter will not conform to the safety standards.



## **Performance Specifications**

#### **Inverter MX2-series V1 type**

3-phase 200 V Class

Fun	ction nan	ne		3-phase 200 V									
Model name (3G3MX2-)			A2001-V1	A2002-V1	A2004-V1	A2007-V1	A2015-V1	A2022-V1	A2037-V1	A2055-V1	A2075-V1	A2110-V1	A2150-V1
	kW	СТ	0.1	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Applicable motor	KVV	VT	0.2	0.4	0.75	1.1	2.2	3.0	5.5	7.5	11	15	18.5
capacity	НР	СТ	1/8	1/4	1/2	1	2	3	5	7 1/2	10	15	20
	ПР	VT	1/4	1/2	1	1 1/2	3	4	7 1/2	10	15	20	25
Rated	200 V	СТ	0.2	0.5	1.0	1.7	2.7	3.8	6.0	8.6	11.4	16.2	20.7
output	200 V	VT	0.4	0.6	1.2	2.0	3.3	4.1	6.7	10.3	13.8	19.3	23.9
capacity [kVA]	240 V	СТ	0.3	0.6	1.2	2.0	3.3	4.5	7.2	10.3	13.7	19.5	24.9
[KVA]	240 V	VT	0.4	0.7	1.4	2.4	3.9	4.9	8.1	12.4	16.6	23.2	28.6
Rated input voltage				3-phase 200 V - 15% to 240 V + 10%, 50/60 Hz ± 5%									
Rated input	current	СТ	1.0	1.6	3.3	6.0	9.0	12.7	20.5	30.8	39.6	57.1	62.6
[A]		VT	1.2	1.9	3.9	7.2	10.8	13.9	23.0	37.0	48.0	68.0	72.0
Rated outpu	ıt voltage	•	3-phase 200 to 240 V (The output cannot exceed the incoming voltage).										
Rated outpu	ıt	СТ	1.0	1.6	3.0	5.0	8.0	11.0	17.5	25.0	33.0	47.0	60.0
current [A]		VT	1.2	1.9	3.5	6.0	9.6	12.0	19.6	30.0	40.0	56.0	69.0
Short-time of braking toro (Discharge R connected)	ue (%)		50	50	50	50	50	20	20	20	20	10	10
Braking Resistor	Regenera braking	ative		Built-in Braking Resistor circuit (sepa					arate Disc	harge Res	sistor)		
circuit *	Min. cor resistan	nnectable ice $[\Omega]$	100	100	100	50	50	35	35	20	17	17	10
Weight [kg]			1.0	1.0	1.1	1.2	1.6	1.8	2.0	3.3	3.4	5.1	7.4
Dimensions [mm]	(width × l	height)		68 ×	128		108 × 128		140 × 128	140 × 260		180 × 296	220 × 350
Dimensions (depth) [mm]		[mm]	10	09	122.5	145.5	17	0.5	170.5	15	55	17	75

<sup>\*</sup> The BRD usage is 10%.

#### 3-phase 400 V Class

Function name			3-phase 400 V									
Model name (3G3MX2-)			A4004-V1	A4007-V1	A4015-V1	A4022-V1	A4030-V1	A4040-V1	A4055-V1	A4075-V1	A4110-V1	A4150-V1
Annlicable	kW	СТ	0.4	0.75	1.5	2.2	3.0	4.0	5.5	7.5	11	15
Applicable motor	KW	VT	0.75	1.5	2.2	3.0	4.0	5.5	7.5	11	15	18.5
capacity	НР	СТ	1/2	1	2	3	4	5	7 1/2	10	15	20
сарасіту	ПР	VT	1	2	3	4	5	7 1/2	10	15	20	25
Rated	380 V	СТ	1.1	2.2	3.1	3.6	4.7	6.0	9.7	11.8	15.7	20.4
output	360 V	VT	1.3	2.6	3.5	4.5	5.7	7.3	11.5	15.1	20.4	25.0
capacity	480 V	СТ	1.4	2.8	3.9	4.5	5.9	7.6	12.3	14.9	19.9	25.7
[kVA]	460 V	VT	1.7	3.4	4.4	5.7	7.3	9.2	14.5	19.1	25.7	31.5
Rated input voltage					3-phas	e 380 V -	15% to 48	0 V + 10%	6, 50/60 H	z ± 5%	•	•
Rated input	current	СТ	1.8	3.6	5.2	6.5	7.7	11.0	16.9	18.8	29.4	35.9
[A]		VT	2.1	4.3	5.9	8.1	9.4	13.3	20.0	24.0	38.0	44.0
Rated outpu	ıt voltage	,	3-phase 380 to 480 V (The output cannot exceed the incoming voltage).									
Rated outpu	ıt	СТ	1.8	3.4	4.8	5.5	7.2	9.2	14.8	18.0	24.0	31.0
current [A]		VT	2.1	4.1	5.4	6.9	8.8	11.1	17.5	23.0	31.0	38.0
Short-time of braking toro (Discharge R connected)	que (%)		50	50	50	20	20	20	20	20	10	10
Braking Resistor	Regener braking	ative		ŀ	Built-in Bra	aking Resi	stor circuit	(separate	Discharge	e Resistor	)	
circuit *	Min. cor resistar	nnectable ice $[\Omega]$	180	180	180	100	100	100	70	70	70	35
Weight [kg]			1.5	1.6	1.8	1.9	1.9	2.1	3.5	3.5	4.7	5.2
Dimensions [mm]	(width × l	neight)			108 × 128			140 × 128	140 >	< 260	180	× 296
Dimensions	(depth)	[mm]	143.5		17	0.5		170.5	15	55	17	75

<sup>\*</sup> The BRD usage is 10%.

## 1-phase 200 V Class

Eun	ction nar	20	1-phase 200 V						
			AD004 \/4	A D 0 0 0 \ / 4	•		AD045 \/4	A D000 1/4	
Model name	e (3G3MX		AB001-V1	AB002-V1	AB004-V1	AB007-V1	AB015-V1	AB022-V1	
Annlicable	kW	СТ	0.1	0.2	0.4	0.75	1.5	2.2	
Applicable		VT	0.2	0.4	0.55	1.1	2.2	3.0	
motor capacity	НР	СТ	1/8	1/4	1/2	1	2	3	
	liir	VT	1/4	1/2	3/4	1 1/2	3	4	
Rated	200 V	СТ	0.2	0.5	1.0	1.7	2.7	3.8	
output	200 V	VT	0.4	0.6	1.2	2.0	3.3	4.1	
capacity	240 V	СТ	0.3	0.6	1.2	2.0	3.3	4.5	
[kVA]	240 V	VT	0.4	0.7	1.4	2.4	3.9	4.9	
Rated input voltage			1	-phase 200 \	/ - 15% to 24	0 V + 10%, 5	50/60 Hz ± 5%	%	
Rated input	current	СТ	1.3	3.0	6.3	11.5	16.8	22.0	
[A]		VT	2.0	3.6	7.3	13.8	20.2	24.0	
Rated outpu	ıt voltage	)	3-phase 200 to 240 V (The output cannot exceed the incoming voltage).						
Rated outpu	ıt	СТ	1.0	1.6	3.0	5.0	8.0	11.0	
current [A]		VT	1.2	1.9	3.5	6.0	9.6	12.0	
Short-time of braking toro (Discharge R connected)	que (%)		50	50	50	50	50	20	
Braking Resistor	Regener braking	ative	Built-	in Braking R	esistor circuit	(separate Di	ischarge Res	istor)	
circuit *	Min. connectable resistance [Ω]		100	100	100	50	50	35	
Weight [kg]			1.0	1.0	1.1	1.4	1.8	1.8	
Dimensions [mm]	(width × l	height)		68 × 128		108 × 128			
Dimensions	Dimensions (depth) [mm]			09	122.5		170.5		

<sup>\*</sup> The BRD usage is 10%.

# **Function Specifications**

Control method	le value set lower und fault overcur- vervoltage, exter-			
Output frequency range *2  Digital command: ±0.01% of the max. frequency, Analog command: ±0.2% of the (25±10°C)  Frequency precision *3  Frequency setting resolution  Voltage/Frequency characteristics  Overload current rating  Instantaneous overcurrent protection  Acceleration/Deceleration time  Carrier frequency adjustment range  Starting torque  External DC injection braking  Frequency settings  Overcurrent, overvoltage, undervoltage, electronic thermal, temperature error, green at a trower-or status, rush current prover outlage, energency cutoff, etc.  Protective functions  Frequency settings  Protective functions  Digital operator External analog input signal: 0 to 10 VDC/4 to 20 mA, Modbus communication (Modulti-function input  Analog input  Pulse input  1 point (RP terminal: 32 kHz max., 0 to 10 V)  Pulse output  Pulse output  1 point (MP terminal: 32 kHz max., 0 to 10 V)  Pulse output  Digital command: ±0.01% of the max. frequency, analog ormand: ±0.2% of the max. frequency, analog ormand: ±0.2% of the max. frequency, analog ormand: ±0.2% of the max. frequency one-thousandth of the max. frequency frequency one-thousandth of the max. frequency one-thousandth or frequency one-thousandth or frequency one-thousandth or frequency one-thousandth o	le value set lower und fault overcur- vervoltage, exter-			
Frequency precision *3  Digital command: ±0.01% of the max. frequency, Analog command: ±0.2% of the (25±10°C)  Frequency setting resolution  Voltage/Frequency characteristics  Overload current rating  Instantaneous overcurrent protection  Acceleration/Deceleration time  Carrier frequency adjustment range  Starting torque  External DC injection braking  Frequency settings  Overcurrent, overvoltage, undervoltage, electronic thermal, temperature error, grorent at power-on status, rush current provencion input tipp, memory error, CPU error, USP error, communication error, overvoltage, electerion upon momentary power outage, emergency cutoff, etc.  Digital Operator  External digital input signal: 0 to 10 VDC/4 to 20 mA, Modbus communication (Modbus input  Pulse input  Pulse input  1 point (RP terminal: 32 kHz max., 5 to 24 VDC)  Pulse output  1 point (MP terminal: 32 kHz max., 0 to 10 V)  Pulse output  1 point (MP terminal: 32 kHz max., 0 to 10 V)  Pulse output  1 point (MP terminal: 32 kHz max., 0 to 10 V)  Pulse output  1 point (MP terminal: 32 kHz max., 0 to 10 V)  Pulse output  1 point (MP terminal: 32 kHz max., 0 to 10 V)  Pulse output  1 point (MP terminal: 32 kHz max., 0 to 10 V)  Pulse output  1 point (MP terminal: 32 kHz max., 0 to 10 V)  Pulse output  1 point (MP terminal: 32 kHz max., 0 to 10 V)	le value set lower und fault overcur- vervoltage, exter-			
Prequency precision   Ca5±10°C   Digital setting: 0.01 Hz, Analog setting: One-thousandth of the maximum frequency   Voltage/Frequency characteristics   Sensorless vector control, V/f control with speed feedback   Heavy load rating (CT): 150%/60 s   Light load rating (VT): 120%/60 s   Light load rating (VT): 120%/6	le value set lower und fault overcur- vervoltage, exter-			
Voltage/Frequency characteristics  Vf characteristics (constant/reduced torque) Sensorless vector control, V/f control with speed feedback  Overload current rating  Instantaneous overcurrent protection  Acceleration/Deceleration time Carrier frequency adjustment range Starting torque  External DC injection braking  Protective functions  Overcurrent, overvoltage, undervoltage, electronic thermal, temperature error, gro rent at power-on status, rush current prevention circuit, overload limit, incoming on all trip, memory error, CPU error, USP error, communication error, overvoltage deceleration, protection upon momentary power outage, emergency cutoff, etc.  Digital Operator External analog input signal: 0 to 10 VDC/4 to 20 mA, Modbus communication (Modulti-function input Analog input Pulse input  Multi-function output Relay output 1 point (MP terminal: 32 kHz max., 0 to 10 V) (Frequency, current selectable) Pulse output 1 point (MP terminal: Voltage 10 bits/0 to 10 V) (Frequency, current selectable) Pulse output 1 point (MP terminal: 32 kHz max., 0 to 10 V) Pulse output 1 point (MP terminal: Voltage 10 bits/0 to 10 V) (Frequency, current selectable) Pulse output 1 point (MP terminal: Voltage 10 bits/0 to 10 V) (Frequency, current selectable) Pulse output 1 point (MP terminal: Voltage 10 bits/0 to 10 V) Pulse output 1 point (MP terminal: 32 kHz max., 0 to 10 V)	value set lower			
Overload current rating    Heavy load rating (CT): 150%/60 s   Light load rating (CT): 120%/60 s   Light load rating (CT): 120%/60 s   Light load rating (CT): 120%/60 s	value set lower und fault overcur-			
Instantaneous overcurrent protection   200% of the value of heavy load rating (CT)	value set lower und fault overcur-			
Instantaneous overcurrent protection   200% of the value of heavy load rating (CT)	value set lower und fault overcur-			
Carrier frequency adjustment range Starting torque  External DC injection braking  Covercurrent, overvoltage, undervoltage, electronic thermal, temperature error, grown and trip, memory error, CPU error, USP error, communication error, overvoltage sudeceleration, protection upon momentary power outage, emergency cutoff, etc.  Protective functions  Frequency settings  Frequency settings  Covercurrent, overvoltage, undervoltage, electronic thermal, temperature error, grown and trip, memory error, CPU error, USP error, communication error, overvoltage sudeceleration, protection upon momentary power outage, emergency cutoff, etc.  Digital Operator External analog input signal: 0 to 10 VDC/4 to 20 mA, Modbus communication (Modulti-function input)  Analog input  Pulse input  Digital Operator External digital input signal (3-wire input supported), Modbus communication (Modulti-function input)  1 point (Selectable from 59 functions)  Analog input  Pulse input  1 point (RP terminal: 32 kHz max., 5 to 24 VDC)  Multi-function output  2 points (Voltage FV terminal: 10 bits/0 to 10 V, Current FI terminal: 10 bits/4 to 20 mA, MB; selectable from 43 functions)  Relay output  1 point (RP terminal: 32 kHz max., 5 to 24 VDC)  Pulse output  1 point (1c contact: MC, MA, MB; selectable from 43 functions)  1 point (MP terminal: Voltage 10 bits/0 to 10 V) (Frequency, current selectable)  Pulse output  1 point (MP terminal: 32 kHz max., 0 to 10 V)	value set lower und fault overcur-			
Starting torque   200%/0.5 Hz (sensorless vector control)	und fault overcur- vervoltage, exter-			
External DC injection braking  Starts at a frequency lower than that in deceleration via the STOP command, at a than that during operation, or via an external input. (Level and time settable).  Overcurrent, overvoltage, undervoltage, electronic thermal, temperature error, grorent at power-on status, rush current prevention circuit, overload limit, incoming on all trip, memory error, CPU error, USP error, communication error, overvoltage stadeceleration, protection upon momentary power outage, emergency cutoff, etc.  Digital Operator External analog input signal: 0 to 10 VDC/4 to 20 mA, Modbus communication (Modbus communication)  Multi-function input  7 points (Selectable from 59 functions)  Analog input 2 points (Voltage FV terminal: 10 bits/0 to 10 V, Current FI terminal: 10 bits/4 to 20 mA, Modbus communication (Modbus communication)  Pulse input 1 point (RP terminal: 32 kHz max., 5 to 24 VDC)  Multi-function output 2 points (P1/EDM, P2; selectable from 43 functions)  Relay output 1 point (1c contact: MC, MA, MB; selectable from 43 functions) 1 point (AM terminal: Voltage 10 bits/0 to 10 V) (Frequency, current selectable) Pulse output 1 point (MP terminal: 32 kHz max., 0 to 10 V)	und fault overcur- vervoltage, exter-			
Protective functions  than that during operation, or via an external input. (Level and time settable).  Overcurrent, overvoltage, undervoltage, electronic thermal, temperature error, grown rent at power-on status, rush current prevention circuit, overload limit, incoming on all trip, memory error, CPU error, USP error, communication error, overvoltage state deceleration, protection upon momentary power outage, emergency cutoff, etc.  Digital Operator External analog input signal: 0 to 10 VDC/4 to 20 mA, Modbus communication (Modbus Communication)  Multi-function input  7 points (Selectable from 59 functions)  Analog input 2 points (Voltage FV terminal: 10 bits/0 to 10 V, Current FI terminal: 10 bits/4 to 20 mA, Modbus communication (Modbus Communication)  Pulse input 1 point (RP terminal: 32 kHz max., 5 to 24 VDC)  Multi-function output 2 points (P1/EDM, P2; selectable from 43 functions)  Relay output 1 point (1c contact: MC, MA, MB; selectable from 43 functions) 1 point (AM terminal: Voltage 10 bits/0 to 10 V) (Frequency, current selectable)  Pulse output 1 point (MP terminal: 32 kHz max., 0 to 10 V)	und fault overcur- vervoltage, exter-			
Protective functions  rent at power-on status, rush current prevention circuit, overload limit, incoming on nal trip, memory error, CPU error, USP error, communication error, overvoltage sudeceleration, protection upon momentary power outage, emergency cutoff, etc.  Prequency settings  Frequency settings  Digital Operator External analog input signal: 0 to 10 VDC/4 to 20 mA, Modbus communication (Modbus Communication)  Multi-function input  7 points (Selectable from 59 functions)  Analog input Pulse input  1 point (RP terminal: 32 kHz max., 5 to 24 VDC)  Multi-function output Relay output  1 point (1c contact: MC, MA, MB; selectable from 43 functions)  Analog output (Frequency monitor)  Pulse output  1 point (AM terminal: Voltage 10 bits/0 to 10 V) (Frequency, current selectable)  Pulse output  1 point (MP terminal: 32 kHz max., 0 to 10 V)	vervoltage, exter-			
RUN/STOP command  Bun/STOP command  Fixernal analog input signal: 0 to 10 VDC/4 to 20 mA, Modbus communication (Modbus communication)  Bun/STOP command  Bun/STOP command  Fixernal analog input signal: 0 to 10 VDC/4 to 20 mA, Modbus communication (Modbus communication)  Fixernal analog input signal: 0 to 10 VDC/4 to 20 mA, Modbus communication (Modbus communication)  Fixernal analog input signal: 0 to 10 VDC/4 to 20 mA, Modbus communication (Modbus communication)  Fixernal analog input signal: 0 to 10 VDC/4 to 20 mA, Modbus communication (Modbus communication)  Fixernal analog input signal: 0 to 10 VDC/4 to 20 mA, Modbus communication (Modbus communication)  Fixernal analog input signal: 0 to 10 VDC/4 to 20 mA, Modbus communication (Modbus communication)  Fixernal analog input signal: 0 to 10 VDC/4 to 20 mA, Modbus communication (Modbus communication)  Fixernal analog input signal: 0 to 10 VDC/4 to 20 mA, Modbus communication (Modbus com				
Pulse input  1 point (RP terminal: 32 kHz max., 5 to 24 VDC)  Multi-function output  2 points (P1/EDM, P2; selectable from 43 functions)  Relay output  1 point (1c contact: MC, MA, MB; selectable from 43 functions)  Analog output (Frequency monitor)  1 point (AM terminal: Voltage 10 bits/0 to 10 V) (Frequency, current selectable)  Pulse output  1 point (MP terminal: 32 kHz max., 0 to 10 V)	odbus-RTU)			
Pulse input  1 point (RP terminal: 32 kHz max., 5 to 24 VDC)  Multi-function output  2 points (P1/EDM, P2; selectable from 43 functions)  Relay output  1 point (1c contact: MC, MA, MB; selectable from 43 functions)  Analog output (Frequency monitor)  1 point (AM terminal: Voltage 10 bits/0 to 10 V) (Frequency, current selectable)  Pulse output  1 point (MP terminal: 32 kHz max., 0 to 10 V)	Digital Operator External digital input signal (3-wire input supported), Modbus communication (Modbus-RTU)			
Pulse input  1 point (RP terminal: 32 kHz max., 5 to 24 VDC)  Multi-function output  2 points (P1/EDM, P2; selectable from 43 functions)  Relay output  1 point (1c contact: MC, MA, MB; selectable from 43 functions)  Analog output (Frequency monitor)  1 point (AM terminal: Voltage 10 bits/0 to 10 V) (Frequency, current selectable)  Pulse output  1 point (MP terminal: 32 kHz max., 0 to 10 V)				
Multi-function output   2 points (P1/EDM, P2; selectable from 43 functions)	) mA)			
Relay output  Analog output (Frequency monitor)  1 point (1c contact: MC, MA, MB; selectable from 43 functions)  Analog output (Frequency monitor)  1 point (AM terminal: Voltage 10 bits/0 to 10 V) (Frequency, current selectable)  Pulse output  1 point (MP terminal: 32 kHz max., 0 to 10 V)				
Part ( )				
Part ( )				
Part ( in the part )				
RS-422 RJ45 connector (for Digital Operator)  RS-485 Control circuit terminal block, Modbus communication (Modbus-RTU)  USB USB1.1, mini-B connector				
RS-485 Control circuit terminal block, Modbus communication (Modbus-RTU)  USB USB1.1, mini-B connector				
USB USB USB USB1.1, mini-B connector				
Drive Programming *4 Calculate, Logic, Control I/O and so on				
AVR function, V/f characteristics switching, upper/lower limit, 16-step speeds, sta adjustment, jogging operation, carrier frequency adjustment, PID control, frequen gain/bias adjustment, S shape acceleration/deceleration, electronic thermal chara adjustment, restart function, torque boost function, fault monitor, soft lock function conversion display, USP function, motor 2 control function, UP/DWN, overcurrent etc.	cy jump, analog cteristics, level , frequency			
Ambient operating temperature -10 to 50°C (However, derating is required).				
Ambient storage temperature -20°C to 65°C				
Ambient operating temperature  -10 to 50°C (However, derating is required).  -20°C to 65°C  Ambient operating humidity  -20°C to 65°C  20% to 90% RH (with no condensation)  Vibration resistance  5.9 m/s² (0.6G), 10 to 55 Hz  Application environment  At a maximum altitude of 1,000 m; indoors (without corrosive gases or dust)				
Vibration resistance 5.9 m/s² (0.6G), 10 to 55 Hz				
EtherCAT Communication Unit 3G3AX-MX2-ECT				
CompoNet Communication Unit 3G3AX-MX2-ECT  SquipeNet Communication Unit 3G3AX-MX2-DDT E				
DeviceNet Communication Unit 3G3AX-MX2-DRT-E				

	Function name		Specifications
Other option			DC reactor, AC reactor, radio noise filter, input noise filter, output noise filter, regenerative braking unit, Braking Resistor, etc.
standard		EMC directive	EN61800-3: 2004
	EC directive	Low voltage directive	EN61800-5-1: 2007
International		Machinery directives	IEC 60204-1 Stop Category 0, EN IEC 61800-5-2 (STO), EN ISO 13849-1: 2008 (PLd)
Interi	UL/cUL		UL508C

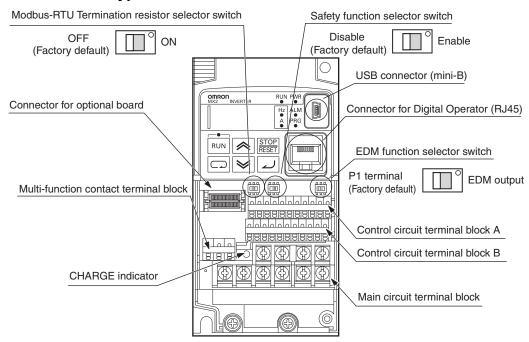
<sup>\*1</sup> Protection method complies with JEM 1030.

Note: 1. The applicable motor is a 3-phase standard motor. For using any other type, be sure that the rated current does not exceed that of the Inverter.
2. Output voltage decreases according to the level of the power supply voltage.
3. The braking torque at the time of capacitor feedback is an average deceleration torque at the shortest deceleration (when it stops from 50 Hz). It is not a continuous regeneration torque. Also, the average deceleration torque varies depending on the motor loss. The value is reduced in operation over 50 Hz.

<sup>\*2</sup> To operate the motor at over 50/60 Hz, contact the motor manufacturer to find out the maximum allowable speed of revolution.
\*3 For the stable control of the motor, the output frequency may exceed the maximum frequency set in A004 (A204) by 2 Hz max.
\*4 Refer to the Drive Programming USER'S MANUAL (No. I580).

## **Components and Functions**

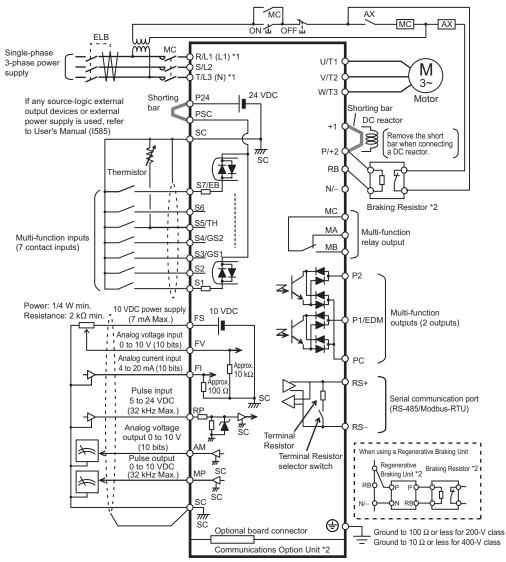
## **Inverter MX2-series V1 type**



Name	Function
Modbus-RTU Termination resistor selector switch	Use this Terminal Resistor selector switch for RS-485 terminals on the control circuit terminal block. When this switch is turned ON, the internal 200 $\Omega$ Resistor is connected.
Safety function selector switch	Turn this switch ON when using the safety function. Turn OFF the power before turning this switch ON/OFF. For details, refer to USER'S MANUAL (Cat.No.1585).
EDM function selector switch	Turn this switch ON when using the EDM output of the safety function. Turn OFF the power before turning this switch ON/OFF.For details, refer to USER'S MANUAL (Cat.No.I585).
USB connector	Use this mini-B USB connector to connect a PC. Even when the Inverter is being operated by a PC, etc., via USB connection, it can still be operated using the Digital Operator.
Connector for Digital Operator	Use this connector to connect the Digital Operator.
Connector for optional board	Use this connector to mount the optional board. (Communications Units and other options can be connected.)
Control circuit terminal blocks A and B	These terminal blocks are used to connect various digital/analog input and output signals for inverter control, etc.
Multi-function contact terminal block	Use this SPDT contact terminal block for relay outputs.
Main circuit terminal block	Use this terminal block to connect an output to the motor and Braking Resistor, etc. Also, use this terminal block to connect the inverter to the main power supply.
CHARGE indicator (Charge indicator LED)	This LED indicator is lit if the DC voltage of the main circuit (between terminals P/+2 and N/-) remains approx. 45 V or above after the power has been cut off. Before wiring, etc. confirm that the Charge LED indicator is turned OFF.

Note: This illustration shows the terminal block with the front cover removed.

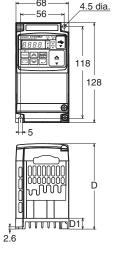
## **Connection Diagram**

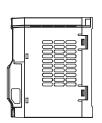


<sup>\*1</sup> Connect to terminals L1 and N on a single-phase, 200-V Inverter (3G3MX2-AB  $\Box\Box\Box$  -V1).

Dimensions (Unit: mm)

3G3MX2-AB001-V1 3G3MX2-AB002-V1 3G3MX2-AB004-V1 3G3MX2-A2001-V1 3G3MX2-A2002-V1 3G3MX2-A2004-V1 3G3MX2-A2007-V1

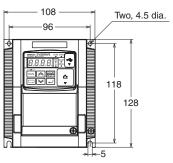


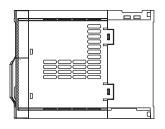


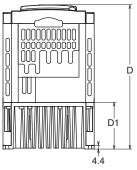
Power supply	Model	W [mm]	H [mm]	D [mm]	D1 [mm]
1-phase	3G3MX2-AB001-V1 3G3MX2-AB002-V1			109	13.5
200 V	3G3MX2-AB004-V1			122.5	27
3-phase	3G3MX2-A2001-V1 3G3MX2-A2002-V1	68	128	109	13.5
200 V	3G3MX2-A2004-V1			122.5	27
	3G3MX2-A2007-V1			145.5	50

<sup>\*2</sup> Optional.

3G3MX2-AB007-V1 3G3MX2-AB015-V1 3G3MX2-AB022-V1 3G3MX2-A2015-V1 3G3MX2-A2022-V1 3G3MX2-A4004-V1 3G3MX2-A4007-V1 3G3MX2-A4015-V1 3G3MX2-A4022-V1 3G3MX2-A4030-V1

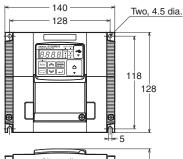


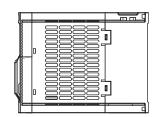


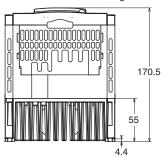


Power supply	Model	W [mm]	H [mm]	D [mm]	D1 [mm]
1-phase 200 V	3G3MX2-AB007-V1 3G3MX2-AB015-V1 3G3MX2-AB022-V1			170.5	55
3-phase 200 V	3G3MX2-A2015-V1 3G3MX2-A2022-V1	108	128		
	3G3MX2-A4004-V1	100	120	143.5	28
3-phase 400 V	3G3MX2-A4007-V1 3G3MX2-A4015-V1 3G3MX2-A4022-V1 3G3MX2-A4030-V1			170.5	55

3G3MX2-A2037-V1 3G3MX2-A4040-V1

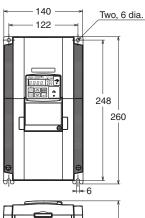


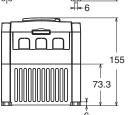




Power supply	Model	W [mm]	H [mm]	D [mm]	D1 [mm]
3-phase 200 V	3G3MX2-A2037-V1	140	100	170 5	55
3-phase 400 V	3G3MX2-A4040-V1	140	128	170.5	55

3G3MX2-A2055-V1 3G3MX2-A2075-V1 3G3MX2-A4055-V1 3G3MX2-A4075-V1

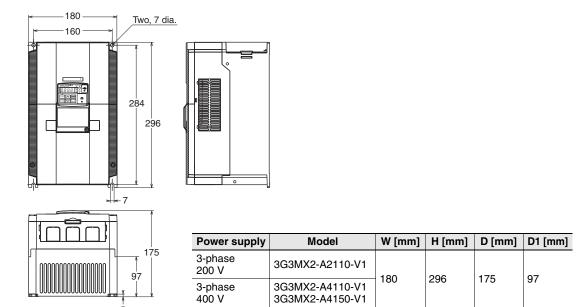




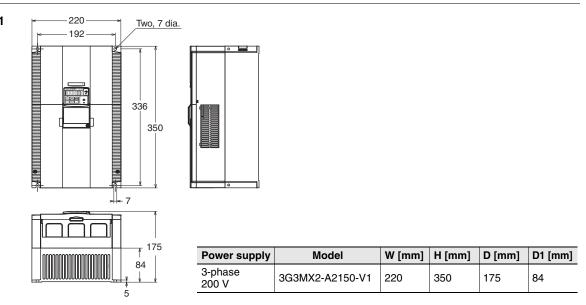
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	0

I	Power supply	Model	W [mm]	H [mm]	D [mm]	D1 [mm]
	3-phase 200 V	3G3MX2-A2055-V1 3G3MX2-A2075-V1	140	260	155	73.3
	3-phase 400 V	3G3MX2-A4055-V1 3G3MX2-A4075-V1	140	200	155	73.3

3G3MX2-A2110-V1 3G3MX2-A4110-V1 3G3MX2-A4150-V1



#### 3G3MX2-A2150-V1



## **Communication Unit**

#### MX2-Series EtherCAT Communication Unit 3G3AX-MX2-ECT

This is the communication unit to connect the Multi-function Compact Inverter MX2 to EtherCAT network. This communication unit passed the conformance test of EtherCAT.

#### **Common Specifications**

It	em	Specifications					
Power supply		Supplied from the inverter					
Protective structure		Open type (IP20)					
Ambient operating t	emperature	-10 to +50°C					
Ambient storage temperature		-20 to +65°C					
Ambient operating h	numidity	20% to 90% RH (with no condensation)					
Vibration resistance	)	5.9 m/s <sup>2</sup> (0.6 G), 10 to 55 Hz					
Application environr	ment	At a maximum altitude of 1,000 m; indoors (without corrosive gases or dust)					
Weight		100 g max.					
International standard	UL/cUL	UL508C					
	EC directive	EMC Directive :EN61800-3: 2004 Low Voltage Directive :EN61800-5-1: 2003					

#### **EtherCAT Communications Specifications**

Item	Specifications
Communications standard	IEC 61158 Type12, IEC 61800-7 CiA 402 drive profile
Physical layer	100BASE-TX (IEEE802.3)
Connector	RJ45 × 2 (shielded type) ECAT IN : EtherCAT input ECAT OUT : EtherCAT output
Communications media	Category 5 or higher (cable with double, aluminum tape and braided shielding) is recommended.
Communications distance	Distance between nodes: 100 m max.
Process data	Fixed PDO mapping PDO mapping
Mailbox (CoE)	Emergency messages, SDO, SDO responses, and information
Distributed clock	FreeRun mode (asynchronous)
LED display	L/A IN (Link/Activity IN) × 1 L/A OUT (Link/Activity OUT) × 1 RUN × 1 ERR × 1
CiA402 drive profile	Velocity mode

#### **EtherCAT Communication Unit Version Information**

As a Sysmac Device, the MX2-series Multi-function Compact Inverter is designed to provide optimal functionality and enhanced operability when used in conjunction with a Machine Automation Control such as NJ/NX series and the automation software Sysmac Studio.

#### **Unit Versions**

Unit	Model	Unit version			
Oilit	Model	Ver.1.0	Ver1.1		
EtherCAT Communication Unit for MX2-Series	3G3AX-MX2-ECT	Supported	Supported		
Compatible Sysmac Studio version (To connect the N	J Controller)	Version1.05 or higher*	Version1.05 or higher		
Compatible Sysmac Studio version (To connect the N	X Controller)	Version1.13 or higher*	Version1.13 or higher		

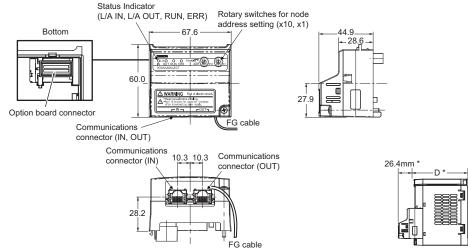
<sup>\*</sup> The function that was enhanced by the upgrade for Unit version1.1 can not be used. For detail, refer to "Function Support by Unit Version".

#### **Function Support by Unit Version**

Unit  Model  Unit version Item	Unit version 1.0	Unit version 1.1
Store-function of back-up number of parameters	Not supported	Supported
Initializing function as parameters.	Not supported	Supported

#### **Dimensions (Unit: mm)**





<sup>\*</sup>After the EtherCAT Communication Unit is installed, dimension D of the inverter increases by 26.4 mm.
(Dimension D of the inverter varies depending on the capacity. Refer to the MX2-series V1 type USER'S MANUAL (Cat.No.I585))

## MX2-Series CompoNet Communication Unit 3G3AX-MX2-CRT-E

This is the communication unit to connect the Multi-function Compact Inverter MX2 to CompoNet network.

#### **Common Specification**

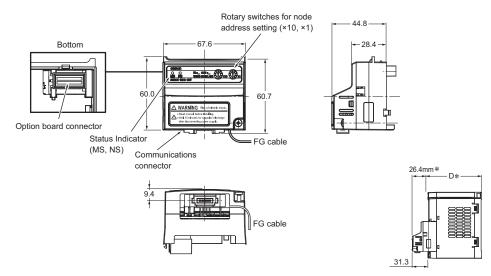
Item		Specification				
Power supply		Supplied from the inverter				
Protective structure		IP20				
Ambient operating tempe	rature	– 10 to 50 °C				
Ambient storage tempera	ture	– 20 to 65 °C				
Ambient operating humidity		20 to 90%RH (with no condensation)				
Vibration resistance		5.9m/s <sup>2</sup> (0.6G), 10 to 55Hz				
Application environment		At a maximum altitude of 1,000 m; indoors (without corrosive gases or dust)				
Insulation resistance		500VAC (between isolated circuits)				
Weight		Approx. 170g				
	UL/cUL	UL508				
International standard	EC directive	EN61800-3: 2004 (2004/108/EC) Second environment, Category C3				
		EN61800-5-1: 2007 (2006/95/EC) SELV				

#### **CompoNet Communications Specifications**

Item	Specification
Slave type	Word Slave Unit (Mixed)
Certification	CompoNet Conformance Tested
CompoNet Profile	AC Drive (0x02)
Node Address	0 to 63, set with inverter parameter P190 or the rotary switches.
Communication power supply	- (External power not required)
Baud rates supported	4 Mbps, 3 Mbps, 1.5 Mbps, 93.75 kbps. Automatically detecting baud rate of Master Unit
Default Connection path	Supported, set with inverter parameter P046
Supported Assemblies	Basic Remote IO (Output assembly 20, Input assembly 70) Extended Speed IO (21, 71) Extended Speed and Torque Control (123, 173) Special IO (100, 150) Extended Control IO (101, 151) Extended Control IO and Multi function IO monitor (101, 153) Flexible Format (139, 159) Extended Speed and Acceleration Control (110, 111)
EDS file	Depending on the MX2 inverter model

#### **Dimensions (Unit: mm)**

#### 3G3AX-MX2-CRT-E



<sup>\*</sup> After the CompoNet Communication Unit is installed, dimension D of the inverter increases by 26.4 mm. (Dimension D of the inverter varies depending on the capacity. Refer to the MX2-series V1 type USER'S MANUAL (Cat.No.I585))

#### MX2-Series DeviceNet Communication Unit 3G3AX-MX2-DRT-E

This is the communication unit to connect the Multi-function Compact Inverter MX2 to DeviceNet network.

#### **Common Specification**

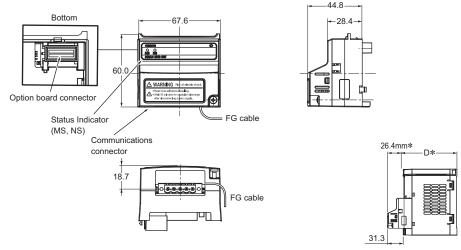
Item		Specification					
Power supply		Supplied from the inverter					
Protective structure		IP20					
Ambient operating tempe	rature	– 10 to 50 °C					
Ambient storage tempera	ture	− 20 to 65 °C					
Ambient operating humidity		20 to 90%RH (with no condensation)					
Vibration resistance		5.9m/s <sup>2</sup> (0.6G), 10 to 55Hz					
Application environment		At a maximum altitude of 1,000 m; indoors (without corrosive gases or dust)					
Insulation resistance		500VAC (between isolated circuits)					
Weight		Approx. 170g					
UL/cUL		UL508					
International standard	EC directive	EN61800-3: 2004 (2004/108/EC) Second environment, Category C3					
		EN61800-5-1: 2007 (2006/95/EC) SELV					

## **DeviceNet Communications Specifications**

Item	Specification
Certification	DeviceNet Conformance Tested
DeviceNet Profile	AC Drive (0x02)
Supported connections	Remote I/O: Master-Slave connection Poll Bit-Strobe COS Cyclic Explicit Messages Conform to DeviceNet specifications
Communication power supply	11 to 25VDC (MAX 50 mA, type 20 mA)
Unit device address range	MAC ID 0 to 63, set with inverter parameter P192
Baud rates supported	125, 250, or 500kbps. Automatically detects baud rate of Master Unit.
Default Connection path	Supported, set with inverter parameter P046
Supported Assemblies	Basic Remote IO (Output assembly 20, Input assembly 70) Extended Speed IO (21, 71) Extended Speed and Torque Control (123, 173) Special IO (100, 150) Extended Control IO (101, 151) Extended Control IO and Multi function IO monitor (101, 153) Flexible Format (139, 159) Extended Speed and Acceleration Control (110, 111) In case the DeviceNet master is configured using user allocation, only the input / output pairs can be configured.
EDS file	Depending on the MX2 Inverter model

#### **Dimensions (Unit: mm)**

#### 3G3AX-MX2-DRT-E



\* After the DeviceNet Communication Unit is installed, dimension D of the inverter increases by 26.4 mm.
(Dimension D of the inverter varies depending on the capacity. Refer to the MX2-series V1 type USER'S MANUAL (Cat.No.I585))

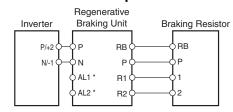
## **Options**

#### Regenerative Braking Unit 3G3AX-RBU□□

Used with a Braking Resistor when the deceleration time of the motor is needed to be reduced in the MX2.



#### **Connection Example**



The alarm output terminals for the Regenerative Braking Unit.

Provide a circuit to turn off the primary power supply for the Inverter when the temperature relay of the built-in resistor or optional Braking Resistor is activated.

#### **Specifications**

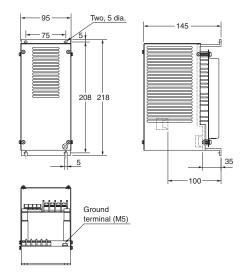
Built-in Resistance Type (3G3AX-RBU21/-RBU22/-RBU41)

Class		3-phas	3-phase 400-V class					
ı	Model name (3G3AX-)	RBU21	RBU22	RBU41*1				
Connection res	sistance	17 Ω min.	17 $\Omega$ min.	34 Ω min.				
Operating voltage ON/OFF Operation indication		ON: 362.5 ± 5 V OFF: 355 ± 5 V (-5% or -10% setting available)	ON: 725 ± 5 V OFF: 710 ± 5 V (-5% or -10% setting available)					
		LED ON (Lit)						
Parallel interlo	cking operation function*2	5 units max.						
Internal resistance		120 W, 180 W	120 W, 20 W	120 W, 180 W x 2 in series				
Built-in resistor	Allowable consecutive ON time	10 s max.	0.5 s max.	10 s max.				
	Allowable operation cycle	Cycle 1/10 (ON for 10 s, OFF for 90 s)	Cycle 1/80 (ON for 0.5 s, OFF for 40 s)	Cycle 1/10 (ON for 10 s, OFF for 90 s)				
	Power consumption	Instantaneous 0.73 kW Short-time rating 120 W	Instantaneous 6.6 kW Short-time rating 120 W	Instantaneous 1.46 kW Short-time rating 240 W				
Protective function	Built-in resistor overheat protection	Cooling fin temperatureRelay of Recovers at approximately 170°     Built-in temperature fuse (recolon Rating of contact250 V AC 20012 V DC 500mA (R load)     V DC 200mA (R load)     Minimum load1mA (R load)	very impossible)*3	nigher.				
	Ambient temperature	-10 to 50°C						
	Ambient storage temperature	-20 to 65°C						
Operating environment	Ambient operating humidity	20% to 90% (with no condensat						
CHVITOHINIEHU	Vibration	5.9 m/s <sup>2</sup> (0.6G) 10 to 55 Hz						
	Location	At a maximum altitude of 1,000 m (without corrosive gases or dust)						
Paint color	<del>'</del>	Munselle 5Y7/1 (cooling fan: aluminum ground color)						

To use the braking resistor (Model: 3G3AX-RAB/RBB/RBC) for the 400-V class regenerative braking unit, be sure to remove the built-in resistor and connect two resistors of the same model in series. Using a 400-V class regenerative braking unit with only a single braking resistor connected may cause damage to the braking

#### **Dimensions (Unit: mm)**

3G3AX-RBU21/-RBU22/-RBU41



Use DIP switches to set the number of connected units.

The built-in resistor has a thermal fuse. If the alarm terminals are not connected, the fuse may blow out in order to prevent the resistor from burning due to overheating. If the fuse blows out, the built-in resistor must be replaced.

## **Braking Resistor** 3G3AX-RBA/-RBB/-RBC

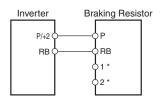
Consumes the regenerative motor energy with a resistor to reduce deceleration time.







#### **Connection Example**



\* The alarm output terminals for the Braking Resistor. Provide a circuit to turn off the primary power supply for the Inverter when the temperature relay of the Braking Resistor is activated.

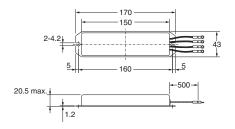
#### **Specifications**

Model		Compact type (3G3AX-RBA□□□□)			Standard type (3G3AX-RBB□□□□)			Medium capacity type (3G3AX-RBC□□□□)				
		1201	1202	1203	1204	2001	2002	3001	4001	4001	6001	12001
Resistance Capacity			120	W		200	) W	300 W	400 W	400 W	600 W	1200 W
Resistance	Resistance (W)	180	100	50	35	180	100	50	35	50	35	17
Allowable braking	ngfrequency (%)	5	2.5	1.5	1.0	10	7.5	7.5	7.5		10	
Allowable contin	nuousbraking time (s)	20	12	5	3		30		20		10	
Weight (kg)			0.	27		0.	97	1.68	2.85	2.5	3.6	6.5
Fault detection	Fault detection function			Built-in thermal (Contact capacity: 240 V AC 2 A max.) Minimum current: 5 mA, Normally ON (NC contact) Built-in temperature fuse (recovery impossible)*						Built-in temperature relay, Normally ON (NC contact) Contact capacity:240 V AC 3 A (R load), 0.2 A (L load), 36 V DC 2 A (R load)		
	Ambient operating temperature	-10 to 50°C										
	Ambient storage temperature	-20 to 65°C										
General specifications	Ambient operating humidity	20% to	90% (RH	) with no	condens	ation						
	Vibration	5.9 m/s	(0.6 G) 1	0 to 55 H	Iz Compl	ies with .	IISC0911					
	Location	At a ma	ximum al	titude of	1,000 m	(without o	corrosive	gases or	dust)			
	Cooling method	Self-cooling										

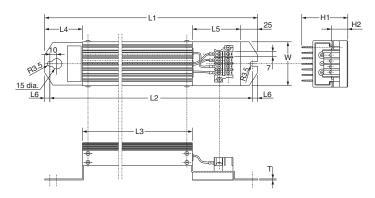
<sup>\*</sup> Built-in resistors are equipped with thermal fuses. If the alarm is not connected, the fuse may blow to prevent burnout due to overheating. If the fuse blows, the built-in resistor will need to be replaced.

## **Dimensions (Unit: mm)**

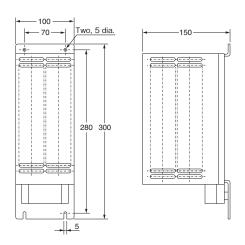
#### 3G3AX-RBA



#### 3G3AX-RBB



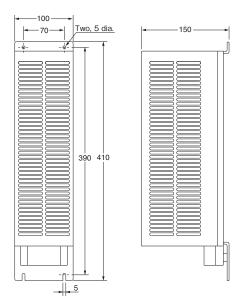
#### 3G3AX-RBC4001



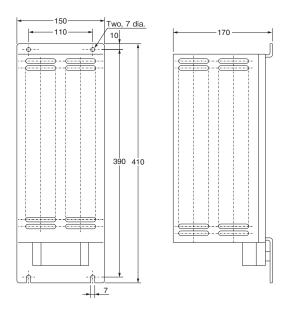
Model	Dimensions (mm)								
Wodei	L1	L2	L3	L4	L5	L6			
3G3AX-RBB2001	310	295	160	55	70	7.5			
3G3AX-RBB2002	310	295	160	55	70	7.5			
3G3AX-RBB3001	470	455	320	55	70	7.5			
3G3AX-RBB4001	435	422	300	50	60	6.5			

Model		Dimensio	Weight	Screw			
wodei	H1	H2	w	Т	(kg)	size	
3G3AX-RBB2001	67	12	64	1.6	0.97		
3G3AX-RBB2002	67	12	64	1.6	0.97	M3.5	
3G3AX-RBB3001	67	12	64	1.6	1.68		
3G3AX-RBB4001	94	15	76	2	2.85		

#### 3G3AX-RBC6001

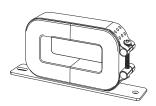


#### 3G3AX-RBC12001



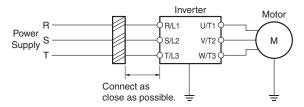
#### Radio Noise Filter 3G3AX-ZCL□

Connected to the inverter input/output cables to reduce noise coming into the inverter from the power supply line and noise flowing from the inverter into the power supply line.





#### **Connection Example**



Note 1: Wind each of three phase wires in the same direction. 2: Can be used on both the input and output sides of the Inverter.

# Specifications 3G3AX-ZCL1

Applicable		200 V	class		400 V class				
Inverter	ln	put	ou	tput	ln	put	ou	output	
capacity (kW)	Quan- tity	No. of turns							
0.4					1	4	1	4	
0.75					1	4	1	4	
1.5		_		_	1	4	1	4	
2.2					1	4	1	4	
3.0					1	4	1	4	
3.7	1	4	1	4		_	_		
4.0		_	_		1	4	1	4	
5.5	1	4	1	4	1	4	1	4	
7.5	1	4	1	4	1	4	1	4	
11	1	4	1	4	1	4	1	4	
15	1	4	1	4	1	4	1	4	

# Specifications 3G3AX-ZCL2

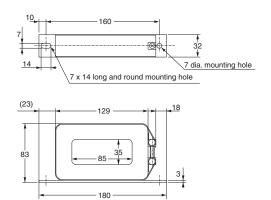
Applicable		200 V	class		400 V class							
Inverter	In	put	ou	tput	In	put	output					
capacity (kW)	Quan- tity	No. of turns	Quan- tity	No. of turns	Quan- tity	No. of turns						
0.1	1	4	1	4								
0.2	1	4	1	4		_		_				
0.4	1	4	1	4	1	4	1	4				
0.75	1	4	1	4	1	4	1	4				
1.5	1	4	1	4	1	4	1	4				

Applicable		200 V	400 V class							
Inverter	In	put	ou	tput	In	put	ou	tput		
capacity (kW)	Quan- tity	No. of turns								
2.2	1	4	1	4	1	4	1	4		
3.0					1	4	1	4		
4.0		_		_		4	1	4		
5.5						4	1	4		

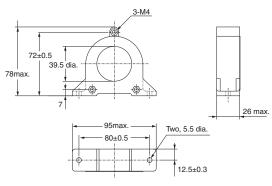
Note: Select options by the maximum applicable motor capacity of heavy and light load rating.

#### **Dimensions (Unit: mm)**

#### 3G3AX-ZCL1



#### 3G3AZ-ZCL2

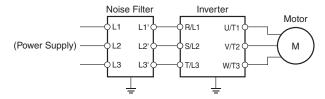


## Input Noise Filter 3G3AX-NFI□□

Reduces noise coming into the inverter from the power supply line and noise flowing from the inverter into the power supply line. Connect as close to the Inverter as possible.



#### **Connection Example**



#### **Specifications**

Power supply	Model	Inverter model	Rated input current In (A) at an ambient temperature of 50°C	Power loss (W)	Leakage current (mA/phase) at 60 Hz
	3G3AX-NFI21	3G3MX2-A2001-V1	3×6 A	3	< 1.5 (250 V)
	3G3AX-NFI21	3G3MX2-A2002-V1	3×6 A	3	< 1.5 (250 V)
	3G3AX-NFI21	3G3MX2-A2004-V1	3×6 A	3	< 1.5 (250 V)
	3G3AX-NFI22	3G3MX2-A2007-V1	3×10 A	4	< 1.5 (250 V)
	3G3AX-NFI23	3G3MX2-A2015-V1	3×20 A	6	< 1.5 (250 V)
3-phase 200 VAC	3G3AX-NFI23	3G3MX2-A2022-V1	3×20 A	6	< 1.5 (250 V)
VAO	3G3AX-NFI24	3G3MX2-A2037-V1	3×30 A	9	< 1.5 (250 V)
	3G3AX-NFI25	3G3MX2-A2055-V1	3×40 A	12	< 1.5 (250 V)
	3G3AX-NFI26	3G3MX2-A2075-V1	3×60 A	17	< 1.5 (250 V)
	3G3AX-NFI27	3G3MX2-A2110-V1	3×80 A	21	< 1.5 (250 V)
	3G3AX-NFI28	3G3MX2-A2150-V1	3×100 A	23	< 1.5 (250 V)
	3G3AX-NFI21	3G3MX2-AB001-V1	3×6 A	3	< 1.5 (250 V)
	3G3AX-NFI21	3G3MX2-AB002-V1	3×6 A	3	< 1.5 (250 V)
4	3G3AX-NFI22	3G3MX2-AB004-V1	3×10 A	4	< 1.5 (250 V)
1-phase 200 VAC	3G3AX-NFI23	3G3MX2-AB007-V1	3×20 A	6	< 1.5 (250 V)
	3G3AX-NFI24 3G3AX-NFI23*	3G3MX2-AB015-V1	3 × 30 A 3 × 20 A	9 6	< 1.5 (250 V)
	3G3AX-NFI24	3G3MX2-AB022-V1	3×30 A	9	< 1.5 (250 V)
	3G3AX-NFI41	3G3MX2-A4004-V1	3×7 A	2	< 7.5 (480 V)
	3G3AX-NFI41	3G3MX2-A4007-V1	3×7 A	2	< 7.5 (480 V)
	3G3AX-NFI41	3G3MX2-A4015-V1	3×7 A	2	< 7.5 (480 V)
	3G3AX-NFI42	3G3MX2-A4022-V1	3×10 A	4	< 7.5 (480 V)
3-phase 400	3G3AX-NFI42	3G3MX2-A4030-V1	3×10 A	4	< 7.5 (480 V)
VÁC	3G3AX-NFI43	3G3MX2-A4040-V1	3×20 A	6	< 7.5 (480 V)
	3G3AX-NFI43	3G3MX2-A4055-V1	3×20 A	6	< 7.5 (480 V)
	3G3AX-NFI44	3G3MX2-A4075-V1	3×30 A	9	< 7.5 (480 V)
	3G3AX-NFI45	3G3MX2-A4110-V1	3×40 A	12	< 7.5 (480 V)
	3G3AX-NFI46	3G3MX2-A4150-V1	3×50 A	15	< 7.5 (480 V)

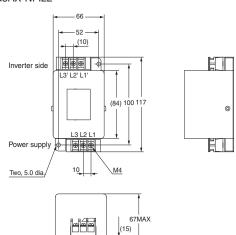
<sup>\*</sup> With the 3G3AX-NFI23, only the CT rating is supported.

Model	Case enclosure rating	Terminal size	Wire dia.	Weight (kg)
3G3AX-NFI21	Plastic, IP00	M4	1.25 mm <sup>2</sup>	0.5
3G3AX-NFI22	Plastic, IP00	M4	2 mm²	0.6
3G3AX-NFI23	Plastic, IP00	M4	2 mm <sup>2</sup> , 3.5 mm <sup>2</sup>	0.7
3G3AX-NFI24	Plastic, IP00	M4	5.5 mm <sup>2</sup>	0.8
3G3AX-NFI25	Plastic, IP00	M5	8 mm <sup>2</sup>	1.4
3G3AX-NFI26	Plastic, IP00	M5	14 mm <sup>2</sup>	1.8
3G3AX-NFI27	Metal, IP00	M6	22 mm <sup>2</sup>	3.6
3G3AX-NFI28	Metal, IP00	M8	30 mm <sup>2</sup>	4.6
3G3AX-NFI41	Plastic, IP00	M4	1.25 mm², 2 mm²	0.7
3G3AX-NFI42	Plastic, IP00	M4	2 mm <sup>2</sup>	0.7
3G3AX-NFI43	Plastic, IP00	M4	2 mm², 3.5 mm²	0.7
3G3AX-NFI44	Plastic, IP00	M4	5.5 mm <sup>2</sup>	0.8
3G3AX-NFI45	Plastic, IP00	M5	8 mm <sup>2</sup>	1.4
3G3AX-NFI46	Plastic, IP00	M5	14 mm <sup>2</sup>	1.6

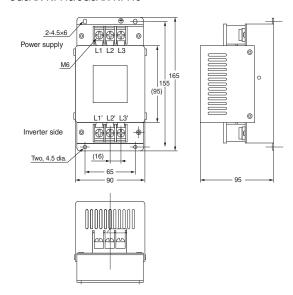
Note: Select options by the maximum applicable motor capacity of heavy and light load rating.

#### **Dimensions (Unit: mm)**

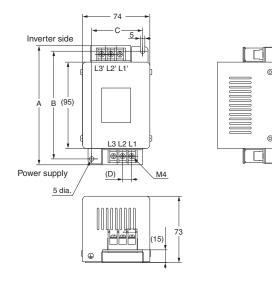




#### 3G3AX-NFI25/3G3AX-NFI26 3G3AX-NFI45/3G3AX-NFI46

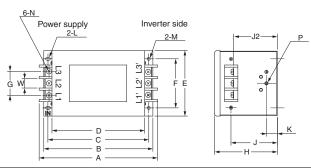


3G3AX-NFI23/3G3AX-NFI24 3G3AX-NFI41/3G3AX-NFI42 3G3AX-NFI43/3G3AX-NFI44



Madal		Dimensions (mm)									
Model	Α	В	С	D							
3G3AX-NFI23	128	118	56	10							
3G3AX-NFI24	144	130	56	11							
3G3AX-NFI41	144	130	56	11							
3G3AX-NFI42	144	130	56	11							
3G3AX-NFI43	144	130	56	11							
3G3AX-NFI44	144	130	56	11							

#### 3G3AX-NFI27/3G3AX-NFI28



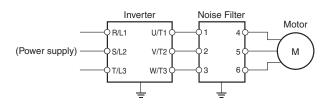
Model		Dimensions (mm)														
Wodel	Α	B C D E F G H J J2 K L M N P W														W
3G3AX-NFI27	217	200	185	170	120	90	44	115	85	82	20	R2.75 Length 7	5.5 dia.	M6	M4	17
3G3AX-NFI28	254	230	215	200	150	120	57	115	80	75	30	R3.75 Length 8	6.5 dia.	M8	M6	23

## Output Noise Filter 3G3AX-NFO ...

Reduces noise generated by the Inverter. Connect as close to the Inverter as possible.



#### **Connection Example**

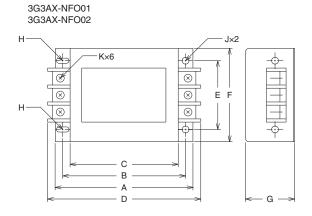


#### **Specifications**

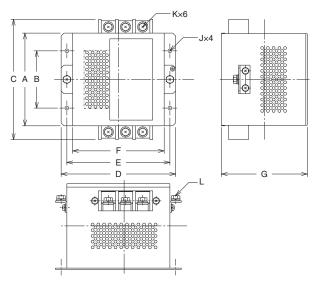
		Rated		Inverter model		Weight
Power supply	Model	current (A)	3-phase AC 200 V class	1-phase AC 200 V class	3-phase AC 400 V class	(kg)
	3G3AX-NFO01	6	3G3MX2-A2001-V1 /-A2002-V1/-A2004-V1	3G3MX2-AB001-V1 /-AB002-V1	3G3MX2-A4004-V1 /-A4007-V1	0.7
3	3G3AX-NFO02	12	3G3MX2-A2007-V1 /-A2015-V1	3G3MX2-AB004-V1 /-AB007-V1	3G3MX2-A4015-V1 /-A4022-V1/-A4030-V1	0.9
3-phase, 3-wire Rated voltage 500 VAC	3G3AX-NFO03	25	3G3MX2-A2022-V1 /-A2037-V1	3G3MX2-AB015-V1 /-AB022-V1	3G3MX2-A4040-V1 /-A4055-V1/-A4075-V1	2.1
500 VAC	3G3AX-NFO04	50	3G3MX2-A2055-V1 /-A2075-V1	_	3G3MX2-A4110-V1 /-A4150-V1	3.7
	3G3AX-NFO05	75	3G3MX2-A2110-V1	-	_	5.7
	3G3AX-NFO06	100	3G3MX2-A2150-V1	_	_	8.4

Note: Select options by the maximum applicable motor capacity of heavy and light load rating.

#### **Dimensions (Unit: mm)**



3G3AX-NFO03/3G3AX-NFO04/3G3AX-NFO05 3G3AX-NFO06

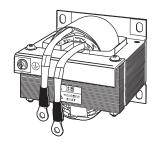


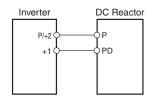
Model	Α	В	С	D	E	F	G	Н	J	K	L
3G3AX-NFO01	140	125	110	156	70	95	50	R: 2.25mm Length: 6mm	4.5 mm dia.	M4	-
3G3AX-NFO02	160	145	130	176	80	110	70	R: 2.75mm Length: 7mm	5.5 mm dia.	M4	-
3G3AX-NFO03	112	80	154	160	145	130	120	-	6.5 mm dia.	M4	-
3G3AX-NFO04	162	100	210	200	180	160	150	_	6.5 mm dia.	M5	M5
3G3AX-NFO05	182	100	230	220	200	180	170	_	6.5 mm dia.	M6	M6
3G3AX-NFO06	182	100	237	220	200	180	170	_	6.5 mm dia.	M8	M8

## DC Reactor 3G3AX-DL

Used to suppress harmonic current generated from the Inverter.

Suppresses harmonic current better than the AC Reactor and can be used with the AC Reactor.





**Connection Example** 

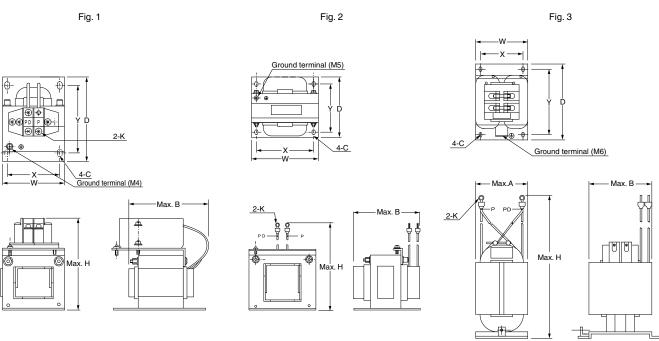
## **Specifications**

Inverter Input		Figure	Applicable		Dir	nensio	ns (m	m) Bm	ax: co	il dime	nsions		Weight	Standard
power supply	Model	No.	Inverter	w	D	Н	Α	В	х	Υ	С	K	(kg)	applicable wire
	3G3AX-DL2002		3G3MX2- A2001-V1, AB001-V1	66	90	98	_	85	56	72	5.2×8	M4	0.8	1.25 mm <sup>2</sup> min.
	3G3AX-DL2004		3G3MX2- A2002-V1, AB002-V1	66	90	98	_	95	56	72	5.2×8	M4	1.0	1.25 mm <sup>2</sup> min.
	3G3AX-DL2007	Fig. 1	3G3MX2- A2004-V1, AB004-V1	66	90	98	_	105	56	72	5.2×8	M4	1.3	2 mm² min.
	3G3AX-DL2015	Fig. 1	3G3MX2- A2007-V1, AB007-V1	66	90	98	_	115	56	72	5.2×8	M4	1.6	2 mm² min.
	3G3AX-DL2022		3G3MX2- A2015-V1, AB015-V1	86	100	116	_	105	71	80	6 × 9	M4	2.1	2 mm² min.
3/1-phase 200 VAC	3G3AX-DL2037		3G3MX2- A2022-V1, AB022-V1	86	100	118	_	120	71	80	6 × 9	M4	2.6	3.5 mm <sup>2</sup> min.
	3G3AX-DL2055		3G3MX2- A2037-V1	111	100	210	-	110	95	80	7 × 11	M5	3.6	8 mm² min.
	3G3AX-DL2075	→ Fig. 2	3G3MX2- A2055-V1	111	100	212	_	120	95	80	7×11	M6	3.9	14 mm² min.
	3G3AX-DL2110	1 lg. 2	3G3MX2- A2075-V1	146	120	252	_	110	124	96	7×11	M6	6.5	22 mm² min.
	3G3AX-DL2150		3G3MX2- A2110-V1	146	120	256	_	120	124	96	7 × 11	M8	7.0	38 mm² min.
	3G3AX-DL2220	Fig. 3	3G3MX2- A2150-V1	120	175	356	140	145	98	151	7×11	M8	9.0	60 mm <sup>2</sup> min.

Inverter Input		Figure	Applicable		Dir	nensio	ns (m	m) Bm	ax: co	il dime	nsions		Weight	Standard
power supply	Model	No.	Inverter	W	D	Н	A	В	Х	Υ	С	K	(kg)	applicable wire
	3G3AX-DL4007		3G3MX2- A4004-V1	66	90	98	_	95	56	72	5.2 × 8	M4	1.1	1.25 mm <sup>2</sup> min.
	3G3AX-DL4015		3G3MX2- A4007-V1*	66	90	98	_	115	56	72	5.2 × 8	M4	1.6	2 mm² min.
	3G3AX-DL4022	F: 4	3G3MX2- A4007-V1, A4015-V1	86	100	116	_	105	71	80	6 × 9	M4	2.1	2 mm² min.
	3G3AX-DL4037	Fig. 1	3G3MX2- A4022-V1 A4030-V1	86	100	116	_	120	71	80	6 × 9	M4	2.6	2 mm² min.
3-phase 400 VAC	3G3AX-DL4055		3G3MX2- A4040-V1	111	100	138	_	110	95	80	7×11	M4	3.6	3.5 mm <sup>2</sup> min.
	3G3AX-DL4075		3G3MX2- A4055-V1*	111	100	138	_	115	95	80	7×11	M4	3.9	3.5 mm <sup>2</sup> min.
	3G3AX-DL4110	Fig. 2	3G3MX2- A4055-V1, A4075-V1*	146	120	250	_	105	124	96	7×11	M5	5.2	5.5 mm <sup>2</sup> min.
	3G3AX-DL4150	Fig. 2	3G3MX2- A4075-V1, A4110-V1	146	120	252	_	120	124	96	7×11	M6	7.0	14 mm² min.
	3G3AX-DL4220	Fig. 3	3G3MX2- A4150-V1	120	175	352	140	145	98	151	7×11	M6	9.5	22 mm² min.

**Note:** Select options by the maximum applicable motor capacity of heavy and light load rating. \* Only the CT rating is supported.

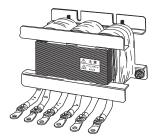
## **Dimensions (Unit: mm)**

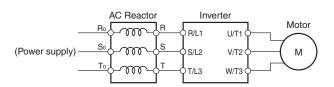


**Connection Example** 

## AC Reactor 3G3AX-AL

Connect the AC Reactor if the capacity of the power supply is much larger than that of the Inverter or the power factor is required to be improved.





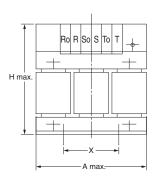
#### **Specifications**

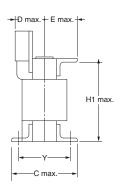
		Motor o	capacity				D	imensi	ons (mr	n)				Weight
Model	Inverter model	VT	СТ	Α	С	D	Е	Н	H1	J	W	Х	Υ	(kg)
	3G3MX2-A2001-V1	√	√											
	3G3MX2-A2002-V1	√	<b>V</b>											
	3G3MX2-A2004-V1	√	<b>√</b>											
3G3AX-AL2025	3G3MX2-A2007-V1	√	<b>V</b>	120	82	60	40	150	94	_	_	50	67	2.8
	3G3MX2-AB001-V1	√	<b>V</b>											
	3G3MX2-AB002-V1	√	<b>V</b>											
	3G3MX2-AB004-V1	√	<b>V</b>											
	3G3MX2-A2015-V1	√	<b>V</b>											
000AV AL 0055	3G3MX2-A2022-V1	√	<b>√</b>	100	00	00	40	150	0.4				75	4.0
3G3AX-AL2055	3G3MX2-AB007-V1	√	<b>√</b>	120	98	60	40	150	94	_	_	50	75	4.0
	3G3MX2-AB015-V1*	_	<b>√</b>											
	3G3MX2-A2037-V1	√	<b>√</b>											
00000 010110	3G3MX2-A2055-V1*	_	<b>√</b>	450	400	70		470	400	- 0	40.0	00	00	5.0
3G3AX-AL2110	3G3MX2-AB015-V1	√	<b>√</b>	150	103	70	55	170	108	5.3	12.0	60	80	5.0
	3G3MX2-AB022-V1	√	√											
	3G3MX2-A2055-V1	√	<b>√</b>											
3G3AX-AL2220	3G3MX2-A2075-V1	√	<b>√</b>	180	113	75	55	190	140	8.4	16.5	90	90	10.0
	3G3MX2-A2110-V1*	_	<b>√</b>											
000AV AL 0000	3G3MX2-A2110-V1	√	<b>√</b>	100	110	0.5	00	000	140	0.4	00.0	105	00	11.0
3G3AX-AL2330	3G3MX2-A2150-V1	√	<b>√</b>	180	113	85	60	230	140	8.4	22.0	125	90	11.0
000AV AL 400F	3G3MX2-A4004-V1	√	<b>√</b>	100	00	00	40	150	0.4			<b>50</b>	67	0.7
3G3AX-AL4025	3G3MX2-A4007-V1	√	<b>√</b>	130	82	60	40	150	94	_	_	50	67	2.7
	3G3MX2-A4015-V1	√	√											
3G3AX-AL4055	3G3MX2-A4022-V1	√	<b>√</b>	130	98	60	40	150	94	_	_	50	75	4.0
	3G3MX2-A4030-V1	√	<b>√</b>											
200AV AL 4440	3G3MX2-A4040-V1	√	√	150	110	75		170	100			00	00	0.0
3G3AX-AL4110	3G3MX2-A4055-V1*	_	<b>√</b>	150	116	75	55	170	106	_	_	60	98	6.0
	3G3MX2-A4055-V1	√	√											
3G3AX-AL4220	3G3MX2-A4075-V1	√	√	180	103	75	55	190	140	5.3	12.0	100	80	10.0
	3G3MX2-A4110-V1*	_	√											
000AV AL 4000	3G3MX2-A4110-V1	√	√	100	100	0.5		000	1.10	_	10.5	100	100	44.5
3G3AX-AL4330	3G3MX2-A4150-V1	√	√	180	123	85	60	230	140	6	16.5	100	100	11.5

**Note:** Select options by the maximum applicable motor capacity of heavy and light load rating. \* Only the CT rating is supported.

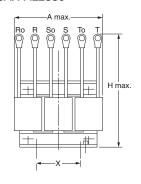
## **Dimensions (Unit: mm)**

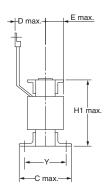
3G3AX-AL2025 3G3AX-AL2055



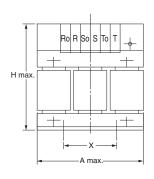


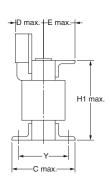
3G3AX-AL2110/3G3AX-AL2220 3G3AX-AL2330



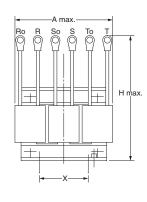


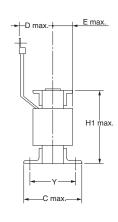
3G3AX-AL4025/3G3AX-AL4055 3G3AX-AL4110





3G3AX-AL4220/3G3AX-AL4330





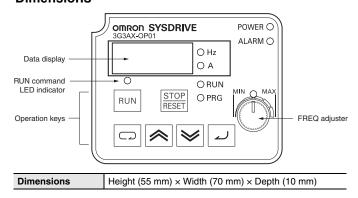
## **Digital Operator**

Used to set parameters, perform various monitoring, and start and stop the Inverter.

#### **3G3AX-OP01**



#### **Dimensions**



## Digital operator extension cable 3G3AX-OPCN□

Used to install the Digital Operator away from the Inverter.



**3G3AX-OPCN1** (Cable length: 1 m) **3G3AX-OPCN3** (Cable length: 3 m)

# **Ordering Information**

■ System Configuration	33
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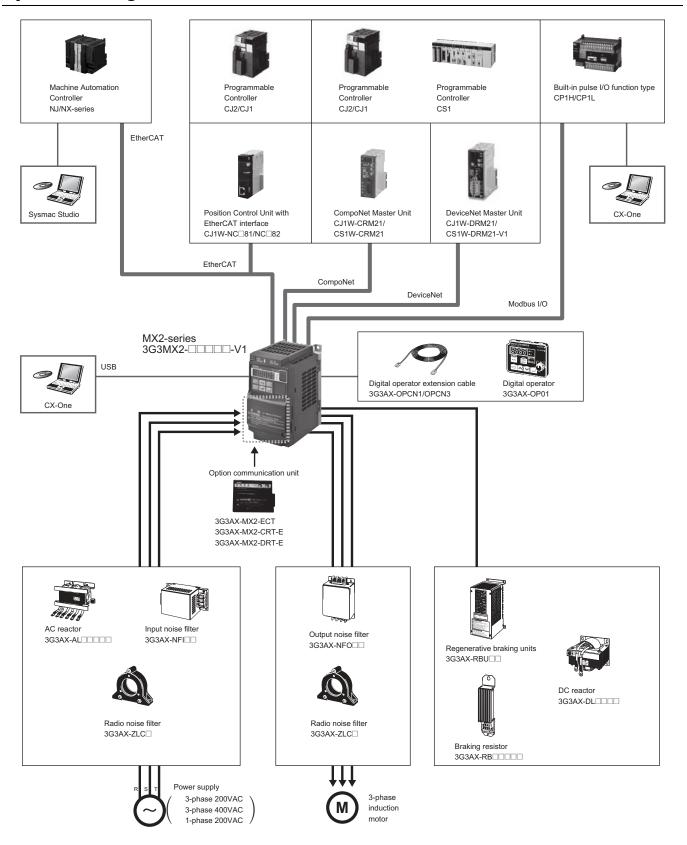
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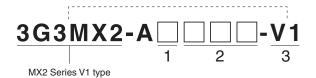
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## **System Configuration**



## **Interpreting Model Numbers**



1) Voltage class

В	1-phase 200 VAC (200-V class)
2	3-phase 200 VAC (200-V class)
4	3-phase 400 VAC (400-V class)

2) Max. applicable motor capacity (CT)

0.1 kW
0.2 kW
0.4 kW
0.75 kW
1.5 kW
2.2 kW
3.0 kW
3.7 kW
4.0 kW
5.5 kW
7.5 kW
11 kW
15 kW

3) Area

.,	Japan and areas other
-V	than China and Europe
-ZV1	China
-E	Europe

## **Ordering Information**

#### **3G3MX2 Inverter Models**

**Note:** Inverters with model numbers ending in "-V1" are designed to be used in areas other than China and Europe. Refer to the above "Interpreting Model Numbers" for the model numbers for China and Europe.

Data diveltana	Englesure retings	Max. applicable	Model		
Rated voltage	Enclosure ratings	CT: Heavy load	Wiodei		
		0.1kW	0.2 kW	3G3MX2-A2001-V1	
		0.2 kW	0.4 kW	3G3MX2-A2002-V1	
		0.4 kW	0.75 kW	3G3MX2-A2004-V1	
		0.75 kW	1.1 kW	3G3MX2-A2007-V1	
		1.5 kW	2.2 kW	3G3MX2-A2015-V1	
3-phase 200 VAC	IP20	2.2 kW	3.0 kW	3G3MX2-A2022-V1	
		3.7 kW	5.5 kW	3G3MX2-A2037-V1	
		5.5 kW	7.5 kW	3G3MX2-A2055-V1	
		7.5 kW	11 kW	3G3MX2-A2075-V1	
		11 kW	15 kW	3G3MX2-A2110-V1	
		15 kW	18.5 kW	3G3MX2-A2150-V1	
		0.4 kW	0.75 kW	3G3MX2-A4004-V1	
		0.75 kW	1.5 kW	3G3MX2-A4007-V1	
		1.5 kW	2.2 kW	3G3MX2-A4015-V1	
		2.2 kW	3.0 kW	3G3MX2-A4022-V1	
2 mbass 400 VAC	IP20	3.0 kW	4.0 kW	3G3MX2-A4030-V1	
3-phase 400 VAC	IP20	4.0 kW	5.5 kW	3G3MX2-A4040-V1	
		5.5 kW	7.5 kW	3G3MX2-A4055-V1	
		7.5 kW	11 kW	3G3MX2-A4075-V1	
		11 kW	15 kW	3G3MX2-A4110-V1	
		15 kW	18.5 kW	3G3MX2-A4150-V1	
		0.1 kW	0.2 kW	3G3MX2-AB001-V1	
		0.2 kW	0.4 kW	3G3MX2-AB002-V1	
1 nhoos 200 VAC	IPOO	0.4 kW	0.55 kW	3G3MX2-AB004-V1	
1-phase 200 VAC	IP20	0.75 kW	1.1 kW	3G3MX2-AB007-V1	
		1.5 kW	2.2 kW	3G3MX2-AB015-V1	
		2.2 kW	3.0 kW	3G3MX2-AB022-V1	

## **Communication Unit**

Name	Model
EtherCAT Communication Unit	3G3AX-MX2-ECT
CompoNet Communication Unit	3G3AX-MX2-CRT-E
DeviceNet Communication Unit	3G3AX-MX2-DRT-E

## **Related Options**

Name		Model	
Regenerative Braking Units	2 phase 200 VAC	General purpose with Braking resistor	3G3AX-RBU21
	3-phase 200 VAC	High Regeneration purpose with Braking resistor	3G3AX-RBU22
	3-phase 400 VAC	General purpose with Braking resistor	3G3AX-RBU41
		Resistor 120 W, 180 Ω	3G3AX-RBA1201
	Compact type	Resistor 120 W, 100 Ω	3G3AX-RBA1202
		Resistor 120 W, 5 Ω	3G3AX-RBA1203
		Resistor 120 W, 35 Ω	3G3AX-RBA1204
	Standard type	Resistor 200 W, 180 Ω	3G3AX-RBB2001
Braking Resistor		Resistor 200 W, 100 Ω	3G3AX-RBB2002
		Resistor 300 W, 50 Ω	3G3AX-RBB3001
		Resistor 400 W, 35 Ω	3G3AX-RBB4001
	Medium capacity type	Resistor 400 W, 50 Ω	3G3AX-RBC4001
		Resistor 600 W, 35 Ω	3G3AX-RBC6001
		Resistor 1200 W, 17 Ω	3G3AX-RBC12001

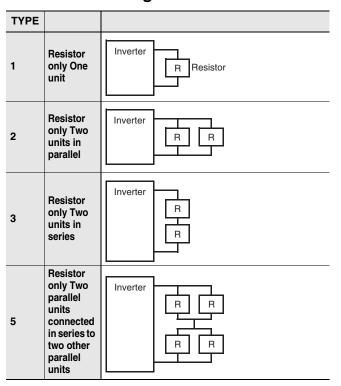
## Regenerative Braking Unit and Braking Resistor Combination

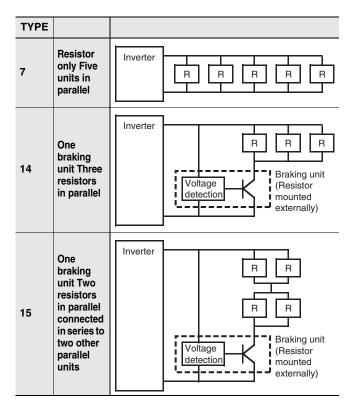
	Inverter		Usage conditions		Regenerative braking unit		Braking resistor		•	Restrictions	
Voltage	Max.applicable motor capacity (kW)	Model	%ED *1 [%]	Approximate braking torque [% *2 ]	Model	Number of units	Model	Number of units	Connection configuration	Allowable continuous braking time(s)	$\begin{array}{c} \text{Min.} \\ \text{connectable} \\ \text{resistance} \\ [\Omega] \end{array}$
	0.1	3G3MX2-A2001-V1	3.0%	220%	Built-in Inverter		3G3AX-RBA1201	1	1	20	100
	0.1	3G3MX2-AB001-V1	10.0%	220%			3G3AX-RBB2001	1	1	30	100
	0.2	3G3MX2-A2002-V1	3.0%	220%	Built-in Inverter		3G3AX-RBA1201	1	1	20	100
	0.2	3G3MX2-AB002-V1	10.0%	220%	built-in inverter		3G3AX-RBB2001	1	1	30	100
	0.4	3G3MX2-A2004-V1	3.0%	220%	Built-in Inverter		3G3AX-RBA1201	1	1	20	100
	0.4	3G3MX2-AB004-V1	10.0%	220%	built-in inverter		3G3AX-RBB2001	1	1	30	100
	0.75	3G3MX2-A2007-V1 3G3MX2-AB007-V1	3.0%	120%	Built-in Inverter		3G3AX-RBA1201	1	1	20	50
	0.75		10.0%	120%	built-in inverter		3G3AX-RBB2001	1	1	30	50
	1.5	3G3MX2-A2015-V1 3G3MX2-AB015-V1	2.5%	110%	Built-in Inverter		3G3AX-RBA1202	1	1	12	50
			10.0%	215%			3G3AX-RBC4001	1	1	10	50
	0.0	3G3MX2-A2022-V1 3G3MX2-AB022-V1	3.0%	150%	Built-in Inverter		3G3AX-RBB3001	1	1	30	35
200-V Class	2.2		10.0%	150%			3G3AX-RBC4001	1	1	10	35
	3.7	3G3MX2-A2037-V1	3.0%	125%	Built-in Inverter		3G3AX-RBB4001	1	1	20	35
			10.0%	125%			3G3AX-RBC6001	1	1	10	35
	5.5	OCOMYO AGOEF VI	3.0%	120%	Built-in Inverter		3G3AX-RBB3001	2	2	30	20
	5.5	3G3MX2-A2055-V1	10.0%	120%			3G3AX-RBC4001	2	2	10	20
	7.5	3G3MX2-A2075-V1	3.0%	125%	Built-in Inverter		3G3AX-RBB4001	2	2	20	17
	7.5		10.0%	125%	built-in inverter		3G3AX-RBC6001	2	2	10	17
			3.0%	90%	Duilt in Invester		3G3AX-RBC12001	1	1	10	17
	11	3G3MX2-A2110-V1	10.0%	90%	Built-in Inverter		3G3AX-RBC12001	1	1	10	17
			10.0%	125%	3G3AX-RBU23 *3	1	3G3AX-RBC6001	3	14	10	4
	15	3G3MX2-A2150-V1	3.0%	110%	Built-in Inverter		3G3AX-RBB3001	5	7	30	10
	15	3G3WAZ-AZ13U-V I	10.0%	110%	Duilt-III IIIVerter		3G3AX-RBC4001	5	7	10	10

Inverter		Usage conditions		Regenerative braking unit		Braking resistor		Connection	Restrictions		
Voltage	Max.applicable motor capacity (kW)	Model	%ED *1 [%]	Approximate braking torque [% *2 ]	Model	Number of units	Model	Number of units	configuration	Allowable continuous braking time(s)	$\begin{array}{c} \text{Min.} \\ \text{connectable} \\ \text{resistance} \\ [\Omega] \end{array}$
	0.4	3G3MX2-A4004-V1	3.0%	220%	Built-in Inverter		3G3AX-RBA1201	2	3	20	180
	0.4	3G3WAZ-A4004-V I	10.0%	220%	Built-iii iiivertei		3G3AX-RBB2001	2	3	30	180
	0.75	3G3MX2-A4007-V1	3.0%	220%	Built-in Inverter		3G3AX-RBA1201	2	3	20	180
	0.75	3G3WAZ-A4007-V1	10.0%	220%	Built-iii iiivertei		3G3AX-RBB2001	2	3	30	180
	1.5	2C2MV2 A4015 V1	3.0%	120%	Built-in Inverter		3G3AX-RBA1201	2	3	20	180
	1.5	3G3MX2-A4015-V1	10.0%	120%	Built-in inverter		3G3AX-RBB2001	2	3	30	180
	2.2	3G3MX2-A4022-V1	2.5%	150%	Built-in Inverter		3G3AX-RBA1202	2	3	12	100
			10.0%	220%			3G3AX-RBC4001	2	3	10	100
	3.0	3G3MX2-A4030-V1	2.5%	110%	Built-in Inverter		3G3AX-RBA1202	2	3	12	100
			10.0%	215%			3G3AX-RBC4001	2	3	10	100
400-V	4.0	3G3MX2-A4040-V1	3.0%	165%	Built-in Inverter		3G3AX-RBB3001	2	3	30	100
Class			10.0%	165%			3G3AX-RBC4001	2	3	10	100
		3G3MX2-A4055-V1	3.0%	120%	D ::: 1 .		3G3AX-RBB3001	2	3	30	70
	5.5 3G3MX2-A		10.0%	120%	Built-in Inverter		3G3AX-RBC4001	2	3	10	70
	7.5	3G3MX2-A4075-V1	3.0%	125%	Duilt in Investor		3G3AX-RBB4001	2	3	20	70
	7.5		10.0%	125%	Built-in Inverter		3G3AX-RBC6001	2	3	10	70
			3.0%	85%	Duille in Januarian		3G3AX-RBB4001	2	3	20	70
	11	3G3MX2-A4110-V1	10.0%	85%	Built-in Inverter		3G3AX-RBC6001	2	3	10	70
			10.0%	120%	3G3AX-RBU41 *3	1	3G3AX-RBC4001	4	15	10	34
	15	3G3MX2-A4150-V1	3.0%	125%	Built-in Inverter		3G3AX-RBB4001	4	5	20	35
			10.0%	125%			3G3AX-RBC6001	4	5	10	35

<sup>\*1 %</sup>ED shows the ratio that can be used for braking (deceleration time) among operating time of one task period.

## **Connection configuration**





<sup>\*2</sup> Approximate breaking torque is shown in % of rating torque of the motor (100%).

<sup>\*3</sup> Please remove the built-in resistor.

Name		Specifications of Inverte	r	Model	
ivaille	Voltage class	CT: Heavy load	VT: Light load	Wodel	
		0.1 kW	0.2 kW		
		0.2 kW	0.4 kW		
		0.4 kW	0.75 kW		
		0.75 kW	1.1 kW	3G3AX-ZCL2	
		1.5 kW	2.2 kW		
	3-phase 200 VAC	2.2 kW	3.0 kW		
	•	3.7 kW	5.5 kW		
		5.5 kW	7.5 kW	— 3G3AX-ZCL1 (3G3AX-ZCL2)	
		7.5 kW	11 kW		
		11 kW	15 kW	3G3AX-ZCL1	
		15 kW	18.5 kW		
		0.1 kW	0.2 kW		
		0.2 kW	0.4 kW		
Radio Noise Filter		0.4 kW	0.55 kW		
naulo Noise Fillei	1-phase 200 VAC	0.4 kW	1.1 kW	3G3AX-ZCL2	
			2.2 kW		
		1.5 kW			
		2.2 kW	3.0 kW		
		0.4 kW	0.75 kW		
		0.75 kW	1.5 kW		
		1.5 kW	2.2 kW		
		2.2 kW	3.0 kW	3G3AX-ZCL2 (3G3AX-ZCL	
	3-phase 400 VAC	3.0 kW	4.0 kW		
		4.0 kW	5.5 kW		
		5.5 kW	7.5 kW		
		7.5 kW	11 kW		
		11 kW	15 kW	3G3AX-ZCL1	
		15 kW	18.5 kW		
		0.1 kW	0.2 kW		
		0.2 kW	0.4 kW	3G3AX-NFI21	
		0.4 kW	0.75 kW		
		0.75 kW	1.1 kW	3G3AX-NFI22	
		1.5 kW	2.2 kW		
	3-phase 200 VAC	2.2 kW	3.0 kW	3G3AX-NFI23	
		3.7 kW	5.5 kW	3G3AX-NFI24	
		5.5 kW	7.5 kW	3G3AX-NFI25	
		7.5 kW	11 kW	3G3AX-NFI26	
		11 kW	15 kW	3G3AX-NFI27	
		15 kW	18.5 kW	3G3AX-NFI28	
		0.1 kW	0.2 kW	JOHN HI IZU	
		0.1 kW	0.4 kW	3G3AX-NFI21	
Innut Naine Filter				2C2AV NEI22	
Input Noise Filter	1-phase 200 VAC	0.4 kW	0.55 kW	3G3AX-NFI22	
		0.75 kW	1.1 kW	3G3AX-NFI23	
		1.5 kW	2.2 kW	3G3AX-NFI23 *	
		2.2 kW	3.0 kW	3G3AX-NFI24	
		0.4 kW	0.75 kW		
		0.75 kW	1.5 kW	3G3AX-NFI41	
		1.5 kW	2.2 kW		
		2.2 kW	3.0 kW	3G3AX-NFI42	
	3-phase 400 VAC	3.0 kW	4.0 kW	VVVIII ITE	
	o phase 400 VAC	4.0 kW	5.5 kW	3G3AX-NFI43	
		5.5 kW	7.5 kW	JUJAA-NEHJ	
		7.5 kW	11 kW	3G3AX-NFI44	
		11 kW	15 kW	3G3AX-NFI45	
		15 kW	18.5 kW	3G3AX-NFI46	

 $<sup>^{\</sup>star}\,$  Only the CT rating is supported.

		Specifications of Inverte	r	
Name	Voltage class	CT: Heavy load	VT: Light load	Model
		0.1 kW	0.2 kW	
		0.2 kW	0.4 kW	3G3AX-NFO01
		0.4 kW	0.75 kW	
		0.75 kW	1.1 kW	
		1.5 kW	2.2 kW	3G3AX-NFO02
	3-phase 200 VAC	2.2 kW	3.0 kW	
	5 p.1.055 255 1715	3.7 kW	5.5 kW	3G3AX-NFO03
		5.5 kW	7.5 kW	
		7.5 kW	11 kW	3G3AX-NFO04
		11 kW	15 kW	3G3AX-NFO05
		15 kW	18.5 kW	3G3AX-NFO06
				3G3AX-NFO06
		0.1 kW	0.2 kW	3G3AX-NFO01
		0.2 kW	0.4 kW	
utput Noise Filter	1-phase 200 VAC	0.4 kW	0.55 kW	3G3AX-NFO02
		0.75 kW	1.1 kW	
		1.5 kW	2.2 kW	3G3AX-NFO03
		2.2 kW	3.0 kW	
		0.4 kW	0.75 kW	3G3AX-NFO01
		0.75 kW	1.5 kW	JUDAN-NI OUI
		1.5 kW	2.2 kW	
		2.2 kW	3.0 kW	3G3AX-NFO02
		3.0 kW	4.0 kW	
	3-phase 400 VAC	4.0 kW	5.5 kW	
		5.5 kW	7.5 kW	3G3AX-NFO03
		7.5 kW	11 kW	
		11 kW	15 kW	
		15 kW	18.5 kW	3G3AX-NFO04
		0.1 kW	0.2 kW	3G3AX-DL2002
		0.1 kW	0.4 kW	3G3AX-DL2002
		0.4 kW	0.4 kW	3G3AX-DL2004 3G3AX-DL2007
		0.4 kW	1.1 kW	3G3AX-DL2007 3G3AX-DL2015
	0	1.5 kW	2.2 kW	3G3AX-DL2022
	3-phase 200 VAC	2.2 kW	3.0 kW	3G3AX-DL2037
		3.7 kW	5.5 kW	3G3AX-DL2055
		5.5 kW	7.5 kW	3G3AX-DL2075
		7.5 kW	11 kW	3G3AX-DL2110
		11 kW	15 kW	3G3AX-DL2150
		15 kW	18.5 kW	3G3AX-DL2220
		0.1 kW	0.2 kW	3G3AX-DL2002
		0.2 kW	0.4 kW	3G3AX-DL2004
Reactor	1-phase 200 VAC	0.4 kW	0.55 kW	3G3AX-DL2007
	, p	0.75 kW	1.1 kW	3G3AX-DL2015
		1.5 kW	2.2 kW	3G3AX-DL2022
		2.2 kW	3.0 kW	3G3AX-DL2037
		0.4 kW	0.75 kW	3G3AX-DL4007
		0.75 kW	1.5 kW	3G3AX-DL4015 *
		1.5 kW	2.2 kW	3G3AX-DL4022
		2.2 kW	3.0 kW	
		3.0 kW	4.0 kW	3G3AX-DL4037
	3-phase 400 VAC	4.0 kW	5.5 kW	3G3AX-DL4055
		5.5 kW	7.5 kW	3G3AX-DL4075 *
		7.5 kW	11 kW	3G3AX-DL4110 *
		11 kW	15 kW	3G3AX-DL4150
		15 kW	18.5 kW	3G3AX-DL4220

N		Specifications of Inverter				
Name	Voltage class	CT: Heavy load	VT: Light load	Model		
		0.1 kW	0.2 kW			
		0.2 kW	0.4 kW	000AV AL 000E		
		0.4 kW	0.75 kW	3G3AX-AL2025		
		0.75 kW	1.1 kW			
		1.5 kW	2.2 kW	3G3AX-AL2055		
	3-phase 200 VAC	2.2 kW	3.0 kW	JG3AX-AL2U33		
		3.7 kW	5.5 kW	3G3AX-AL2110		
		5.5 kW	7.5 kW	3G3AX-AL2110 *		
		7.5 kW	11 kW	3G3AX-AL2220		
		11 kW	15 kW	3G3AX-AL2220 *		
		15 kW	18.5 kW	3G3AX-AL2330		
	4 mhaaa 000 VAO	0.1 kW	0.2 kW			
		0.2 kW	0.4 kW	3G3AX-AL2025		
AC Reactor		0.4 kW	0.55 kW	JGJAX-ALZUZS		
	1-phase 200 VAC	0.75 kW	1.1 kW			
		1.5 kW	2.2 kW	3G3AX-AL2055 *		
		2.2 kW	3.0 kW	3G3AX-AL2110		
		0.4 kW	0.75 kW	3G3AX-AL4025		
		0.75 kW	1.5 kW	JGJAA-AL4025		
		1.5 kW	2.2 kW			
		2.2 kW	3.0 kW	3G3AX-AL4055		
	2 phase 400 VAC	3.0 kW	4.0 kW			
	3-phase 400 VAC	4.0 kW	5.5 kW	3G3AX-AL4110		
		5.5 kW	7.5 kW	3G3AX-AL4110 *		
		7.5 kW	11 kW	3G3AX-AL4220		
		11 kW	15 kW	3G3AX-AL4220 *		
		15 kW	18.5 kW	3G3AX-AL4330		

\* Only the CT rating is supported.

Note: When using the Inverter for light load rating, select the model with one size larger capacity (rated current).

Name	Cable length(m)	Model
Digital Operator	-	3G3AX-OP01
Connection coble	1m	3G3AX-OPCN1
Connection cable	3m	3G3AX-OPCN3

# **Recommended EtherCAT Communications Cables**

Use Straight STP (shielded twisted-pair) cable of category 5 or higher with double shielding (braiding and aluminum foil tape) for EtherCAT.

### **Cabel with Connectors**

Item	Appearance	Recommended manufacturer	Cable length(m) *1	Model
Standard type			0.3	XS6W-6LSZH8SS30CM-Y
Cable with Connectors on Both Ends			0.5	XS6W-6LSZH8SS50CM-Y
(RJ45/RJ45) Wire Gauge and Number of Pairs:		OMBON	1	XS6W-6LSZH8SS100CM-Y
AWG27, 4-pair Cable		OWNON	2	XS6W-6LSZH8SS200CM-Y
Cable Sheath material: LSZH *2	N.		3	XS6W-6LSZH8SS300CM-Y
Cable color: Yellow *3			5	XS6W-6LSZH8SS500CM-Y
			0.3	XS5W-T421-AMD-K
Rugged type	-		0.5	XS5W-T421-BMD-K
Cable with Connectors on Both Ends (RJ45/RJ45)	*6	OMRON	1	XS5W-T421-CMD-K
Wire Gauge and Number of Pairs:			2	XS5W-T421-DMD-K
AWG22, 2-pair Cable			5	XS5W-T421-GMD-K
			10	XS5W-T421-JMD-K
		OMRON	0.3	XS5W-T421-AMC-K
Rugged type			0.5	XS5W-T421-BMC-K
Cable with Connectors on Both Ends (M12 Straight/RJ45)	100		1	XS5W-T421-CMC-K
Wire Gauge and Number of Pairs:			2	XS5W-T421-DMC-K
AWG22, 2-pair Cable			5	XS5W-T421-GMC-K
			10	XS5W-T421-JMC-K
			0.3	XS5W-T422-AMC-K
Rugged type			0.5	XS5W-T422-BMC-K
Cable with Connectors on Both Ends	15	OMBON	1	XS5W-T422-CMC-K
(M12 Right-angle/RJ45) Wire Gauge and Number of Pairs:		OWINON	2	XS5W-T422-DMC-K
AWG22, 2-pair Cable	* 0		5	XS5W-T422-GMC-K
			10	XS5W-T422-JMC-K

Standard type cables length 0.2, 0.3, 0.5, 1, 1.5, 2, 3, 5, 7.5, 10, 15 and 20m are available. Rugged type cables length 0.3, 0.5, 1, 2, 3, 5, 10 and 15m are available.

# **Cables / Connectors**

# Wire Gauge and Number of Pairs: AWG24, 4-pair Cable

Item	Appearance	Recommended manufacturer	Model
	_	Hitachi Metals, Ltd.	NETSTAR-C5E SAB 0.5 x 4P *
Cables	_	Kuramo Electric Co.	KETH-SB *
	_	SWCC Showa Cable Systems Co.	FAE-5004 *
RJ45 Connectors	-	Panduit Corporation	MPS588-C *

<sup>\*</sup> We recommend you to use above cable and connector together.

# Wire Gauge and Number of Pairs: AWG22, 2-pair Cable

Item	Appearance	Recommended manufacturer	Model
Cables	_	Kuramo Electric Co.	KETH-PSB-OMR *
Cables	-	JMACS Japan Co., Ltd.	PNET/B *
RJ45 Assembly Connector		OMRON	XS6G-T421-1 *

<sup>\*</sup> We recommend you to use above cable and connector together.

Note: Connect both ends of cable shielded wires to the connector hoods.

The lineup features Low Smoke Zero Halogen cables for in-cabinet use and PUR cables for out-of-cabinet use.

<sup>\*3</sup> Cables colors are available in blue, yellow, or Green **Note:** For details, refer to Cat.No.G019.

# **Software**

### **How to Select Required Support Software for Your Controller**

The required Support Software depends on the Controller to connect. Please check the following table when purchasing the Support Software.

Item	Omron PLC System	Omron Machine Automation Controller System
Controller	CS, CJ, CP, and other series	NJ/NX-series
Inverter	Inverter MX2-series V1 type Inverter MX2-series V1 type with EtherCAT Communication Unit (Applicable to the CJ series only.) Inverter MX2-series V1 type with CompoNet Communication Unit Inverter MX2-series V1 type with DeviceNet Communication Unit	Inverter MX2-series V1 type Inverter MX2-series V1 type with EtherCAT Communication Unit Inverter MX2-series V1 type with CompoNet Communication Unit Inverter MX2-series V1 type with DeviceNet Communication Unit
Software	FA Integrated Tool Package CX-One	Automation Software Sysmac Studio

# **FA Integrated Tool Package CX-One**

Product name	Specifications	Number of licenses	Media	Model	Standards
FA Integrated Tool Package CX-One Ver. 4.□	The CX-One is a comprehensive software package that integrates Support Software for OMRON PLCs and components.  CX-One runs on following OS. Windows XP (Service Pack 3 or higher, 32-bit version) / Windows Vista (32-bit/64-bit version) / Windows 7 (32-bit/64-bit version) / Windows 8 (32-bit/64-bit version) / Windows 8.1 (32-bit/64-bit version) / Windows 10 (32-bit/64-bit version)  CX-One Version.4. includes CX-Drive Ver.2 For details, refer to the CX-One catalog (Cat. No. R134)	1 license *	DVD	CXONE-AL01D-V4	-

<sup>\*</sup> Multi licenses (3, 10, 30, or 50 licenses) and DVD media without licenses are also available for the CX-One.

# **Automation Software Sysmac Studio**

Please purchase a DVD and required number of licenses the first time you purchase the Sysmac Studio. DVDs and licenses are available individually. Each model of licenses does not include any DVD.

					Standards
Product name	Specifications	Number of licenses	Media	Model	
	The Sysmac Studio provides an integrated development environment to set up, program, debug, and maintain NJ/NX-series Controllers and other Machine Automation Controllers, as well as EtherCAT slaves.  Sysmac Studio runs on the following OS. Windows XP (Service Pack 3 or higher, 32-bit version)		DVD	SYSMAC-SE200D	-
Sysmac Studio Standard Edition Ver.1.□□	/ Windows Vista (32-bit version) / Windows 7 (32-bit/64-bit version) / Windows 8 (32-bit/64-bit version) / Windows 8.1 (32-bit/64-bit version) / Windows 8.1 (32-bit/64-bit version) / Windows 10 (32-bit/64-bit version)  The Sysmac Studio Standard Edition DVD includes Support Software to set up EtherNet/IP Units, DeviceNet slaves, Serial Communications Units, and Support Software for creating screens on HMIs (CX-Designer). For details, refer to the Sysmac Integrated Catalogue (P072).	1 license	-	SYSMAC-SE201L	-

<sup>\*</sup> Multi licenses are available for the Sysmac Studio (3, 10, 30, or 50 licenses).

# **Overview of Inverter Selection**

For detail of Inverter selection, refer to the MX2 series V1 type User's Manual. (Man.No.I585).

# **Motor Capacity Selection**

Before selecting an invertor, first the motor should be chosen.In selecting the motor, first calculate the load inertia for the applications, and then calculate the required capacity and torque.

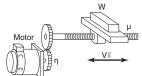
# Make a simple selection (use Formulas for the required output power)

This method of calculation helps select a motor by calculating the output (W) required by the motor to maintain its regular rotations. It does not include calculation of the effect of acceleration/deceleration. Therefore, make allowance for the calculated value to select a motor. This calculation method can be applied to applications that operate constantly such as fans, conveyers, agitators etc.

This calculation method must not be applied to the following applications:

- •Those requiring instant start-up.
- •Those that frequently repeat operation and stop.
- •Those that have a large inertia at the power transfer part.
- •Those that have an inefficient power transfer part.

# ●For Straight-Line Operation: Normal Power PO (kW)

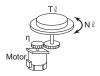


$$P_0 = \frac{\mu \cdot W \cdot V\ell}{6120 \cdot n}$$

u: Friction Coefficient

W: Mass of Straight-Line travelling part (kg) Vℓ: Speed of Straight-Line Travelling part (m/min) η: Decelerator (Transfer part) Efficiency

# ●For Rotating Operation: Normal Power PO (kW)



$$P_o (kW) = \frac{2\pi \cdot T\ell \cdot N\ell}{60 \cdot \eta} \times 10^{-3}$$

T ℓ: Load Torque (Load Shaft) (N·m) N €: Load Shaft Rotation Speed (r/min) η: Transfer part (η≤1)

# **Detailed Selection Method (R.M.S Algorithm)**

This method helps to select a motor by calculating the effective torque and maximum torque required to achieve a certain pattern of operation for the application. It selects a motor that is optimal for a particular operation pattern.

# Calculate the inertia with a Motor Shaft **Conversion Value**

Calculate inertias of all the components with the formula for inertia calculation shown below to convert them to a motor conversion value.



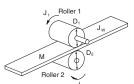
$$J_W = J_1 + J_2 = \left(\frac{M_1 \cdot D^2}{8} + \frac{M_2 \cdot D^2}{4}\right) \times 10^{-6} (kg \cdot m^2)$$

- J, : Cylinder Inertia (kg·m²)
- J<sub>a</sub>: Inertia from Object (kg·m²)
- M.: Mass of Cylinder (kg) Ma: Mass of Object (kg)

$$J_{w} = J_{1} + J_{2} + J_{3} + J_{4} = \left(\frac{M_{1} \cdot D_{1}^{2}}{8} + \frac{M_{2} \cdot D_{2}^{2}}{8} \cdot \frac{D_{1}^{2}}{D_{2}^{2}} + \frac{M_{3} \cdot D_{1}^{2}}{4} + \frac{M_{4} \cdot D_{1}^{2}}{4}\right) \times 10^{-6} (kg \cdot m^{2})$$

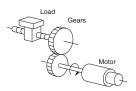


- Jw: Inertia (kg·m²)
- J₁: Cylinder 1 Inertia (kg·m²)
- J<sub>2</sub>: Inertia from Cylinder 2 (kg·m²)
- J<sub>2</sub>: Inertia from Object (kg·m<sup>2</sup>)
- J<sub>4</sub>: Inertia from Belt (kg·m<sup>2</sup>)
- D.: Cylinder 1 Diameter (mm)
- Da: Cylinder 2 Diameter (mm)
- M.: Mass of Cylinder 1 (kg)
- Mass of Cylinder 2 (kg)
- Mass of Object (kg)
- M.: Mass of Belt (kg)



$$J_w = J_1 + \left(\frac{D_1}{D_2}\right)^2 J_2 + \frac{M \cdot D_1^2}{4} \times 10^{-6} (kg \cdot m^2)$$

- J<sub>1</sub>: Roller 1 Inertia (kg·m<sup>2</sup>)
- J<sub>2</sub>: Roller 2 Inertia (kg·m<sup>2</sup>)
- D.: Roller 1 Diameter (mm)
- D<sub>2</sub>: Roller 2 Diameter (mm)
- M : Work Equivalent Mass (kg)



$$J_1 = J_1 + G^2(J_2 + J_w) (kg \cdot m^2)$$

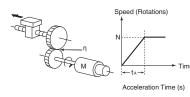
- J.: Load Inertia of Motor Shaft Conversion (kg·m²)
- J...: Load Inertia (kg·m²)
- J.: Gear Inertia on Motor Side (kg·m²)
- J<sub>2</sub>: Gear Inertia on Load Side (kg·m²)
- Z, : Number of Gear Teeth on Motor Side
- Z : Number of Gear Teeth on Load Side

Gear Ratio G = Z<sub>1</sub>/Z<sub>2</sub>

# Calculate Motor Shaft Conversion Torque and **Effective Torque**

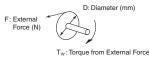
Calculate the acceleration torque from the load torque calculated from both the motor shaft conversion value and the motor rotor inertia. Then Combine this acceleration torque and the Load torque calculated from the friction force and the external force that are applied to the load. Now you get the required torque to operate a motor.

#### **Acceleration Torque**



- T<sub>A</sub>: Acceleration/Deceleration Torque (N·m)
- J<sub>L</sub>: Motor Shaft Conversion Load Inertia (kg·m2)
- J<sub>M</sub> : Inertial of Motor Itself (kg⋅m²)
- η : Gear Transmission Efficiency
- N: Motor Rotation Speed (r/min)

#### Motor Shaft Conversion Load Torque (External Force/Friction)



 $T_W = \ F \cdot \frac{D}{2} \times 10^{-3} \, (\text{N} \cdot \text{m})$ 

(Friction is generally, μ: Friction Coefficient  $F = \mu W$ W: Mass of Moving Part)



 $T_1$ : Motor Shaft Conversion Load Torque (N·m)

Tw: Load Torque (N-m)

Z,: Number of Gear Teeth on Motor Side

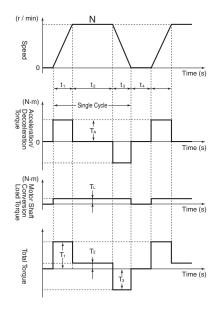
Z<sub>2</sub>: Number of Gear Teeth on Load Side Gear (Deceleration) Ratio G = Z<sub>1</sub>/Z<sub>2</sub>

# Calculation of Total Torque and Effective Torque

Effective Torque: TRMS (N·m)

$$= \sqrt{\frac{\sum (T_i)^2 \cdot t_i}{\sum t_i}} = \sqrt{\frac{T_1^2 t_1 + T_2^2 \cdot t_2 + T_3^2 \cdot t_3 + T_4^2 \cdot t_4}{t_1 + t_2 + t_3 + t_4}}$$

Maximum Torque:  $T_{MAX} = T_1 = T_A + T_L$ 



Note: Please make use of the Servo Motor selection software, which can calculate the motor shaft conversion inertia and effective/maximum torque, as above.

# Motor Selection

Use the formula below to calculate the motor capacity from the effective torque and the maximum torque that were obtained above. Select the larger of the two generated values as the motor capacity. Select a motor the capacity of which is larger than the calculated value and makes allowance for an error.

# • Motor Capacity corresponding to Effective Torque

Motor Capacity (kW) = 1.048·N·T<sub>RMS</sub>·10<sup>-4</sup> N: Maximum Rotations (r/min)

#### Motor Capacity capable of Providing Maximum Torque

Motor Capacity (kW) =  $1.048 \cdot N \cdot T_{MAX} \cdot 10^{-4} / 1.5$ N: Maximum Rotations (r/min)

# **Inverter Capacity Selection**

Select an inverter that can be used for the selected motor in the process of "Motor Selection".

Generally, select an inverter which fits the maximum applicable motor capacity of the selected motor.

After selecting an inverter, check if it meets with all of the following conditions. If it does not, select an inverter that has a one class larger capacity and check the feasibility again.

# Motor Rated Current $\leq$ Inverter Rated Output Current Maximum Time of Continuous Torque Output Time in an Application $\leq$ 1 minute

**Note: 1.** Where the inverter overload capacity is "120% of Rated Output Current for 1 minute", check it for 0.8 minute.

2. Where a 0 Hz sensor-less vector control is being used, or where torque must be maintained for 0 (r/min) rotation speed and where 150% of the rated torque is frequently required, use an invertor which is one rank larger than the one selected by the above method.

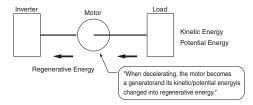
# Outline of Braking Resistor Selection Importance of Braking Resistor

If the regenerative energy generated in deceleration or descent in an application is too great, the main circuit of an inverter may have an increased voltage and it may be damaged.

Because the inverter usually contains the overvoltage LAD stop function, it is not actually damaged. However, the motor stops detecting an error, making a stable and continuous operation disabled. Therefore, you must discharge the regenerative energy outside of the inverter.

# • What is Regenerative Energy?

A load connected to a motor has kinetic energy when rotating, and potential energy when it is located in a high position. When the motor decelerates, or when the load descends, the energy is returned to an inverter. It is known as regeneration, and the energy generated by the phenomenon is known as regenerative energy.



### Preventing Breaking Resistence

The following are methods to prevent the connection of braking resistance.

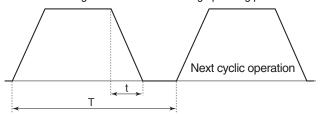
These methods will make the deceleration time increase, so check if it will not cause problems.

- Enable the deceleration stall prevention (enabled in factory settings) (It will automatically increase deceleration time not to cause an overvoltage to stop the motor).
- Set a longer deceleration time. (Cause the regenerative energy to decrease per unit of time.)
- Disable Free-Run. (Prevent the regenerative energy from returning to an inverter.)

# Make a Simple Selection for Braking Resistors

It can be a simple selecting method by using the ratio of time in which regenerative energy is produced in a normal operating pattern.

Calculate the usage ratio from the following operating pattern.



Usage Rate =  $t/T \times 100$  (% ED)

- t : Deceleration Time (Regenerative Time)
- T : Single Cycle Operation Time

%ED is the unit used for a usage rate.

The usage rate is used as the ratio of deceleration time (regenerative operation time) to simplify the selection of the braking options.

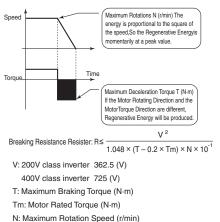
# For Models with a Built-in Braking Circuit (3G3MX2 Max. 22 kW)

Select the braking resistor based on the usage rate calculated from the operation patterns.

Refer to the braking resistor list described in the User's manual and catalog, and connect it according to your Inverter.

When the usage ratio for the braking resistor selected on the previous page exceeds 10% ED, or when an extremely large braking torque is required, use the method below to calculate a regenerative energy and make your selection.

# Calculation of Required Braking Resistor

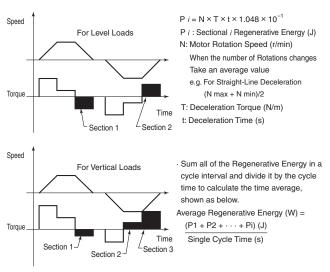


**Note:** Calculate a braking torque using the above "Motor Capacity Selection".

### Calculation of Average Regenerative Energy

Regenerative Energy is produced when the motor rotation direction and the torque direction are opposite.

Use the following formula to calculate a regenerative energy per cycle interval.



**Note: 1.** Forward rotation direction is forward for the speed, and the torque in the forward rotation direction is forward for the torque.

Calculate a braking torque using the above "Motor Capacity Selection".

### Braking Resistor Selection

Select a Braking Resistor from the required braking resistance and average regenerative energy on the left.

- Required Braking Resistence ≥ Resistence of Braking Resistor ≥ Minimum Connection Resistence of Invertor or Regenerative Braking Unit
- Average Regenerative Energy ≤ Permissible Power for Braking Resister

Note: 1. If a resistance that has a less then the minimum connectable value is connected on an inverter or regenerative braking resistor unit, the internal breaking transistor can be damaged. When the required braking resistance is less than the minimum connectable resistance, change the inverter or regenerative energy braking to the one having a larger capacity and a minimum connection resistance less than the required braking resistance.

- 2. Two or more regenerative braking units can be operated in parallel. Refer to the following formula to know the braking resistance value in such a case. Braking Resistence( $\Omega$ ) = (Required Braking Resistance as calculated above) × (No. of Units in use)
- 3. Do not use the above formula to select a generative braking resistance value. 150W does not reflect a permissible power capacity, but the maximum rated power per unit of resistance. The actual permissible power varies according to a resistance.

# **Related Manuals**

Man. No.	Model	Manual
1585	2C2MV2	Multi-function Compact Inverter MX2 series V1 type USER'S MANUAL
1580	3G3MX2-□□□□-V1	Drive Programming USER'S MANUAL
1570	3G3MX2-□□□□	Multi-function Compact Inverter MX2-series USER'S MANUAL
1574	3G3AX-MX2-ECT	MX2 series / MX2 series V1 type/ RX series V1 type EtherCAT Communication Unit USER'S MANUAL
I581	3G3AX-MX2-DRT-E	MX2 series / MX2 series V1 type/ RX series V1 type DeviceNet Communication Unit USER'S MANUAL
1582	3G3AX-MX2-CRT-E	MX2 series / MX2 series V1 type/ RX series V1 type CompoNet Communication Unit USER'S MANUAL
W463	CXONE-AL□□D-V□	CX-One FA Integrated Tool Package Setup Manual
W453	CXONE-AL D-V WS02-DRVC01	CX-Drive OPERATION MANUAL
W504	SYSMAC-SE2	Sysmac Studio Version 1 Operation Manual

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- and (ii) Buyer has no past due amounts.

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