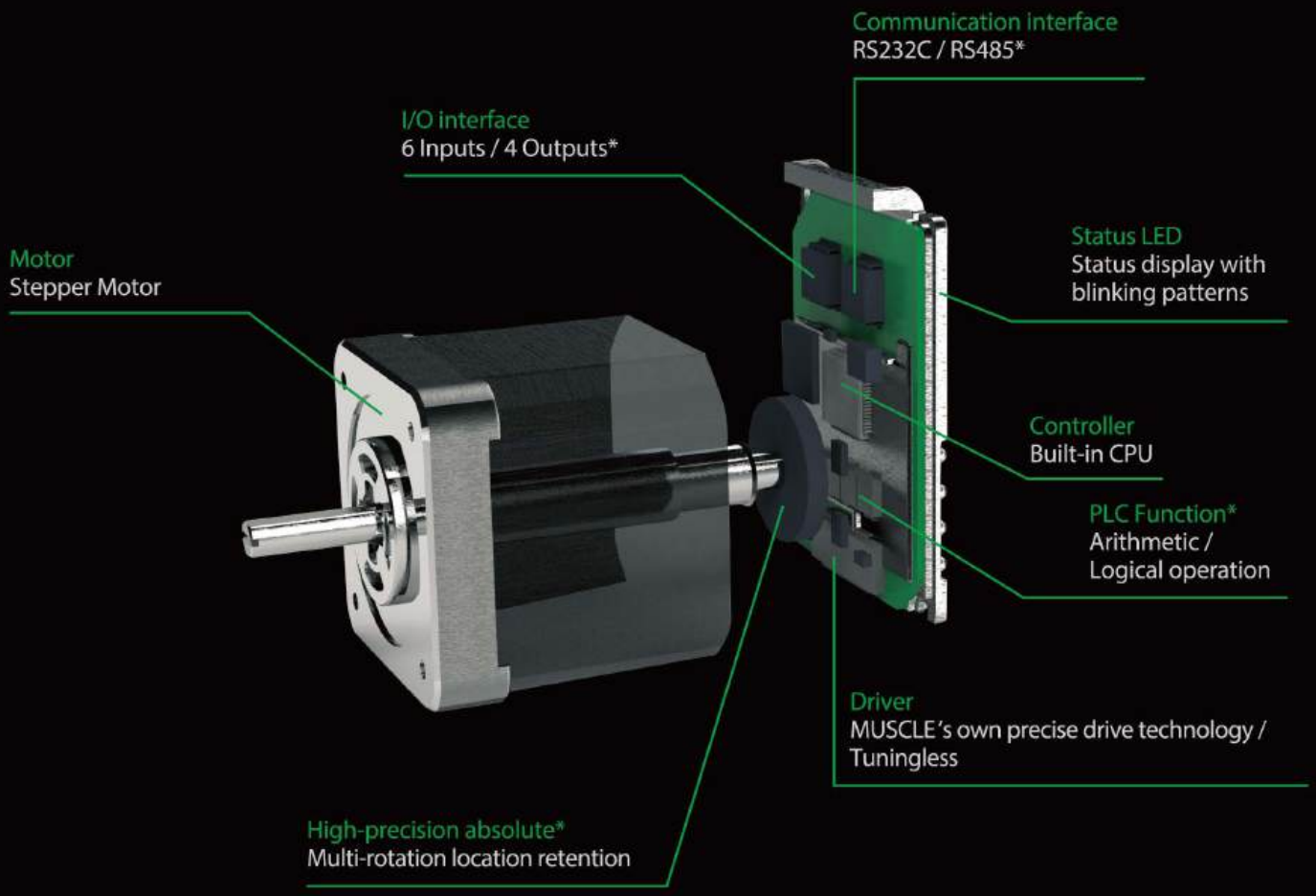
COOL MUSCLE 3 3+

Simple High performance

MUSCLE CORPORATION

MOTOR REVOLUTION

- Stunning Power Density
- IoT Function Implemented

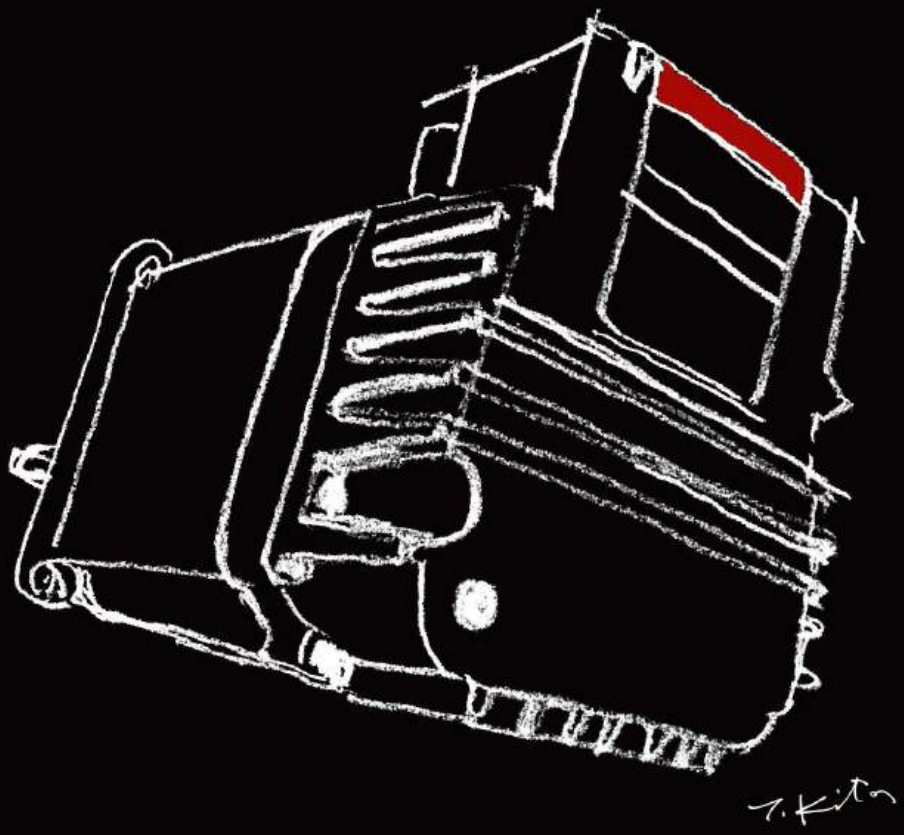


* CM3+ only

Motor performance drives you to a new dimension

The basic performance of the torque/speed and positioning accuracy of the stepper motor has been improved, making it easier to obtain the performance equivalent to servo motors.

Powerful, Intelligent, Integrated Motor, Compact Design

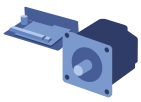
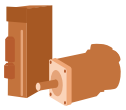


New Generation

COOL MUSCLE

Perform Like a Servo, Simple Like a Stepper Mot

Performance Comparison of COOL MUSCLE 3 with Existing Motors

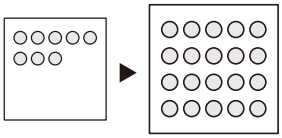
	Stepping motor (Open-loop control)	Stepping motor (Semi closed-loop control)	AC servo motor (Closed-loop control)	COOL MUSCLE 3 (Closed-loop control)
				
Price	◎	△	×	○
Torque (low speed range)	○	○	×	◎
Torque (high speed range)	×	◎	◎	◎
High Speed	×	◎	◎	◎
Positioning Accuracy	×	○	◎	○
Responsiveness	×	○	◎	○
No step-out	×	○	◎	◎
Smoothness	×	×	◎	○
Vibration/Quietness	×	×	◎	○
Temperature/ Energy Saving	×	×	◎	○
Monitoring/ Maintenance	×	○	◎	◎
Tuningless	◎	◎	○	◎
Wire-saving/ Space-saving	○	×	×	◎

Open-loop control : Without encoder, no position feedback
Semi closed-loop control : Equipped with encoder, there is position feedback, and position correction is performed only when de-tone.
Closed-loop control : Equipped with encoder, there is position feedback, always performs position correction and no step out .

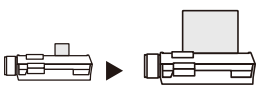
COOL MUSCLE 3
solves problems
such as

Faster / Stronger

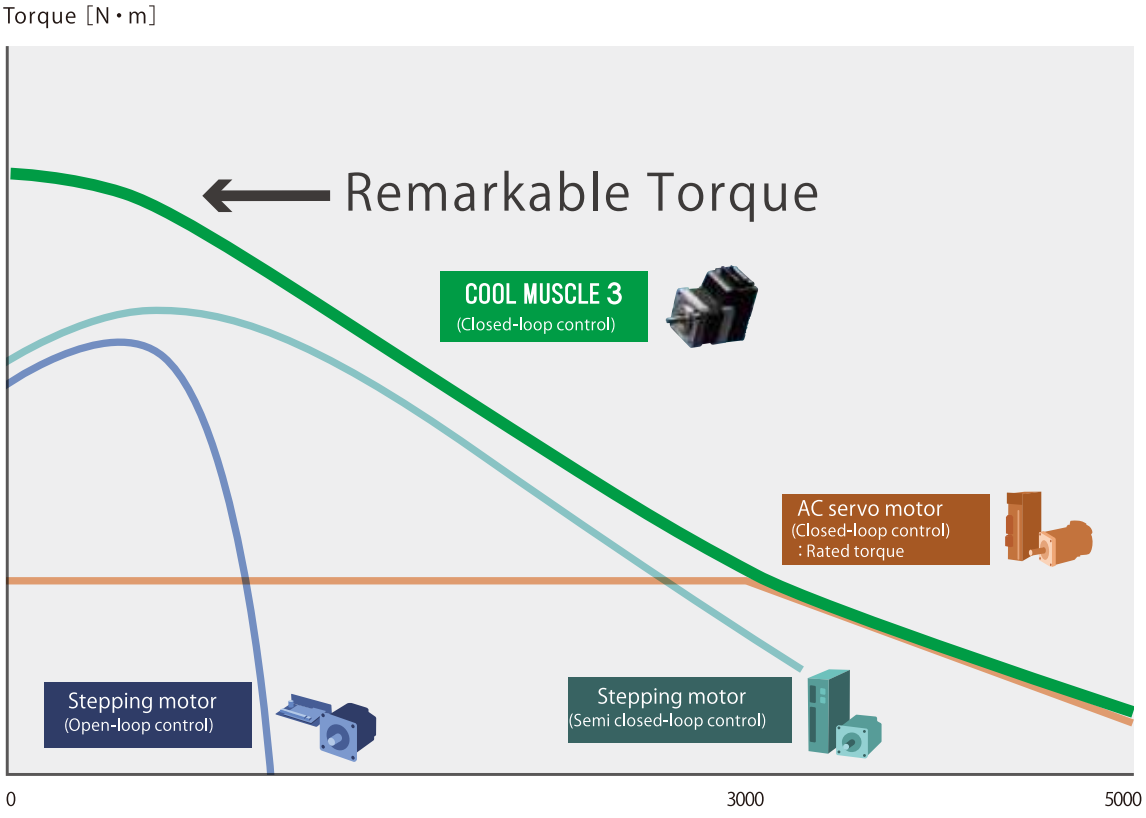
Productivity up



Power up
in the same size



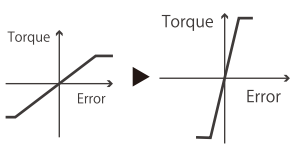
or.



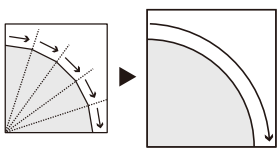
* According to our research (Comparison with motors of the same class)

Precisely / Smoothly

Improve positioning accuracy

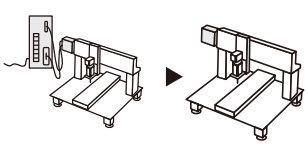


Smoother motion

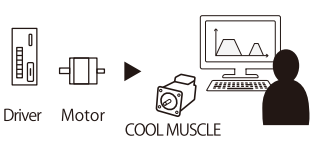


Simple / Safe

Simple mechanical configuration



IoT function implemented



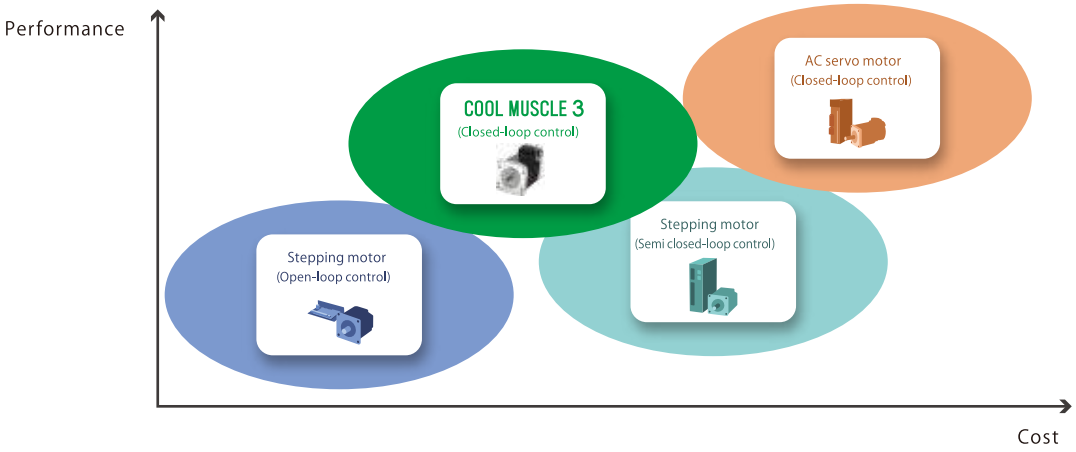
For Servo Motor Users

Get servo motor performance at a more economical price

Price

Realize AC servo motor performance at lower price

■Price comparison by motor type
*According to our research

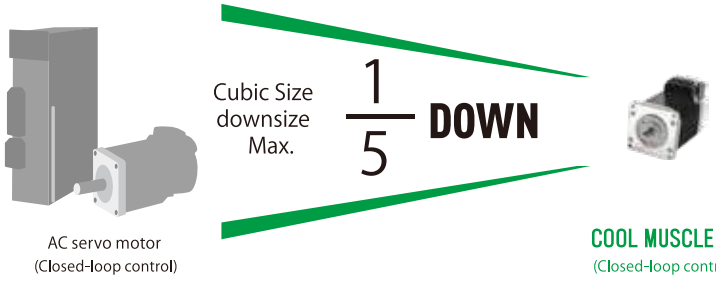


Minimized total cost by using affordable stepper motor and integrating control devices.
Equivalent performance as AC servo motor is realized by improving torque at high speed range that was a weakness of stepper motor and realizing Max. 5,000rpm high speed control without step-out.

Size

Space saving / Wiring saving

■Size Comparison



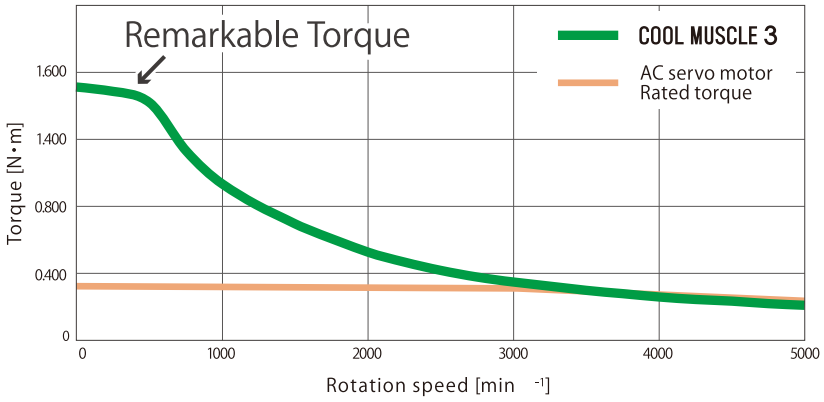
*According to our research
Comparison by equivalent torque, driver + total size of motor

An encoder, driver, and controller are integrated in a motor. The total volume can be significantly reduced by wiring saving. Ideal for desktop type devices, mobile devices, and small products where a controller board cannot be installed.

Torque

Higher rated torque (mid to low speed range)

■Torque comparison with AC servo motor (100W)
*According to our research



Pursuing the output efficiency of stepper motor, COOL MUSCLE 3 maintains higher output at high speed range and produces equivalent torque as 100W AC servo motor.
AC servo motor is used with gearbox in applications that require high torque at low speed range.
For COOL MUSCLE 3, the gearbox can be omitted.

Speed

Max. Speed 5,000rpm

Max. Speed 5,000rpm. COOL MUSCLE 3 can used in an application that requires high speed control.

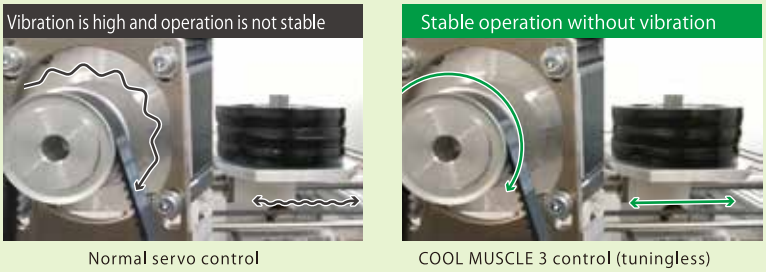
Responsiveness

Responsiveness just as servo motor.

COOL MUSCLE 3 can output high torque in the low speed range, it can also be used for applications that require high responsivenesss such as those normall controlled by servo motors, such as during short-distance repetitive operations.

Adjustment

No need to adjust servo parameters. (Tuning-less)



Normal servo control

COOL MUSCLE 3 control (tuningless)

Modern control theory, the H∞ realize Tuning-less.

For Stepper Motor Users

To improve the functional value of your product

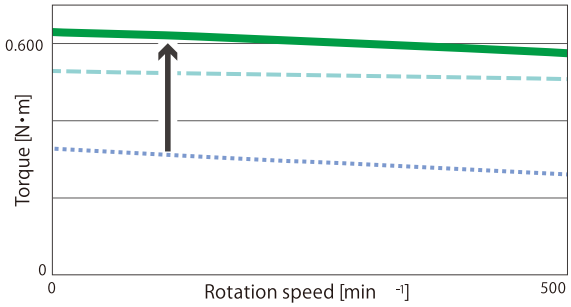
Basic performance

Improves all major performance

Performance comparison of stepper motor (open-loop control/semi closed-loop control) and COOL MUSCLE 3.
*According to our research

Low Speed Torque

High torque output is possible even at low speed without risk of step-out



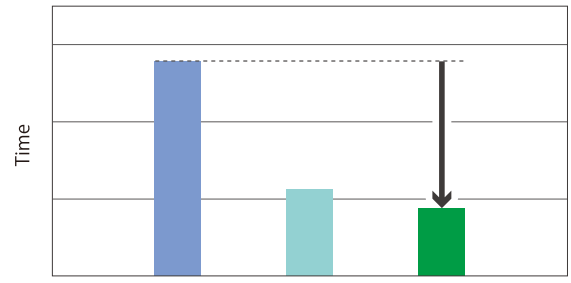
■Application Example

Reduced motor size

Suitable for products that require precise motion in limited space.

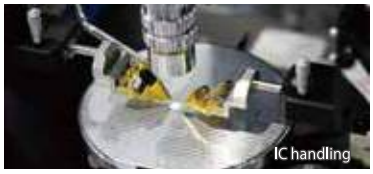
Responsiveness

High acceleration and deceleration control reduces repetitive operation time greatly



*Repetitive operation time (1 cycle)

■Application Example

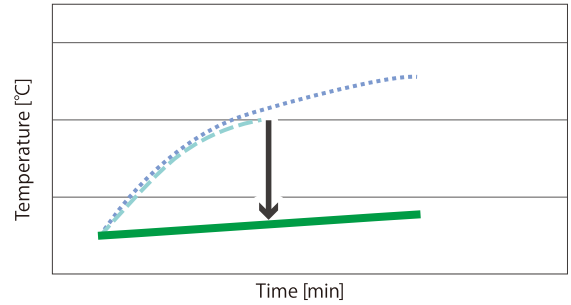


Improvement of throughput

Suitable for products that require higher throughput by where short time & short distance positioning are necessary.

Temperature

Low heat generation allows long-term continuous use

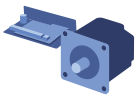


*Motor temperature at continuous speed (500rpm) without load

■Application Example

Continuous operation

Suitable for products with high speed continuous operation with a duty ratio of over 50%.



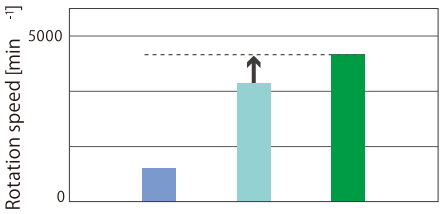
Stepping motor
(Open-loop control)

Stepping motor
(Semi closed-loop control)

COOL MUSCLE 3
(Closed-loop control)

Maximum Speed

High speed control equivalent to servo motor



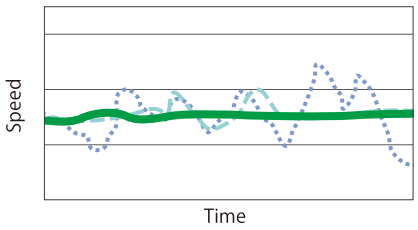
■Application Example

Improved high-speed controllability

Ideal for products that require quick and accurate positioning.

Speed Stability

Speed ripple is small at continuous speed.



*Speed stability at continuous speed (500rpm) without load

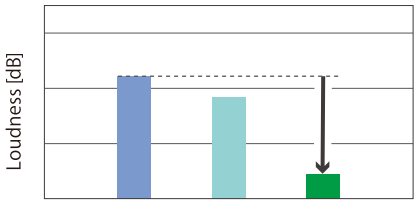
■Application Example

Improvement of measurement accuracy

Suitable for equipment that require to rotate precisely at a constant speed against command speed.

Loudness

Smooth motion by vector control makes it quieter



■Application Example

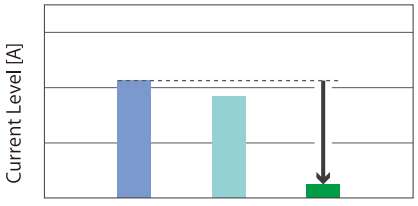
Quiet operation

Suitable for equipment used in environments where quiet operation is required.

* Motor operating sound at continuous speed (100rpm) without load

Current Level

The current is controlled according to the load situation. It keeps current consumption at minimum level.



■Application Example

Energy Saving

Suitable for AGVs, which are battery-powered and require energy savings.

*Current value at continuous speed (500rpm) without load

*Each comparison item varies depending on the operating conditions and load situation.
The motor to be compared depends on our research. The results on this page may not apply to all motors.
*All photos are sample images.

COOL MUSCLE 3 Motion Control Technology

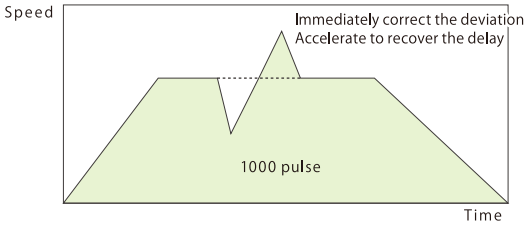
Collaboration of Three Control Technologies

Closed-loop Control

High positioning accuracy and no step-out

Closed-loop control maintains the deviation between the encoder feedback and commanded position within the specific range. Position, speed and torque are always controlled not to go out of the range by accelerating when deviation becomes bigger and decelerating when it becomes smaller.

■Control under external load



COOL MUSCLE 3 The deviation becomes bigger when goes over allowable torque and it stabilizes the speed when the deviation is small.

Features of Closed-loop control
1. Improved positioning reliability 2. No step-out occurs unlike the stepper motor with open loop control. 3. Overload alarm can be output by detecting deviation from feedback information.

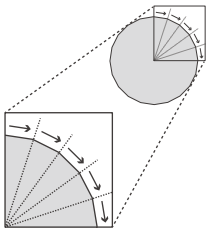
Max. resolution 12,000 ppr

Vector Control

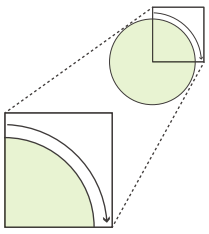
Smooth・Quiet

Due to the structure of the stepping motor, torque pulsation occurs at each step angle. On the other hand, the CM3 adopts vector control which allows smooth motion without stopping between angular steps, so vibration and noise can be reduced.

■ Driving principle



Stepping motor



COOL MUSCLE 3

Features of vector control
1. Energy saving and precise torque control 2. Efficiently controls motor from low speed to high speed 3. Improved stability of speed

Closed-loop Control

Position correction and
No step-out by constant
position monitoring

Vector Control

No stop at each step.
Smooth and quiet

COOL DRIVE Control

New drive system
to produce power
while reducing
heat generation

COOL DRIVE Control

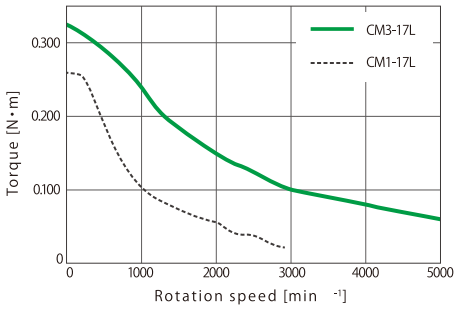
Power up・High responsiveness

Drastic torque up is achieved by reviewing the motor structure and optimizing the control while maintaining the existing product size.

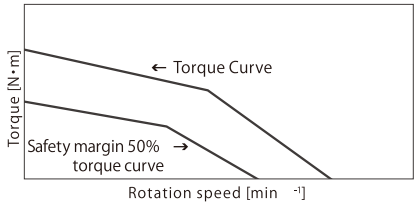
■Comparison of torque with existing product line up

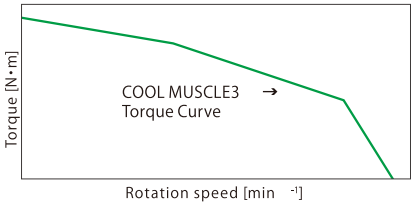
CM1-17L30

CM3-17L50A



[Instantaneous acceleration / deceleration control]





Stepping motor
(Open-loop control)

COOL MUSCLE 3

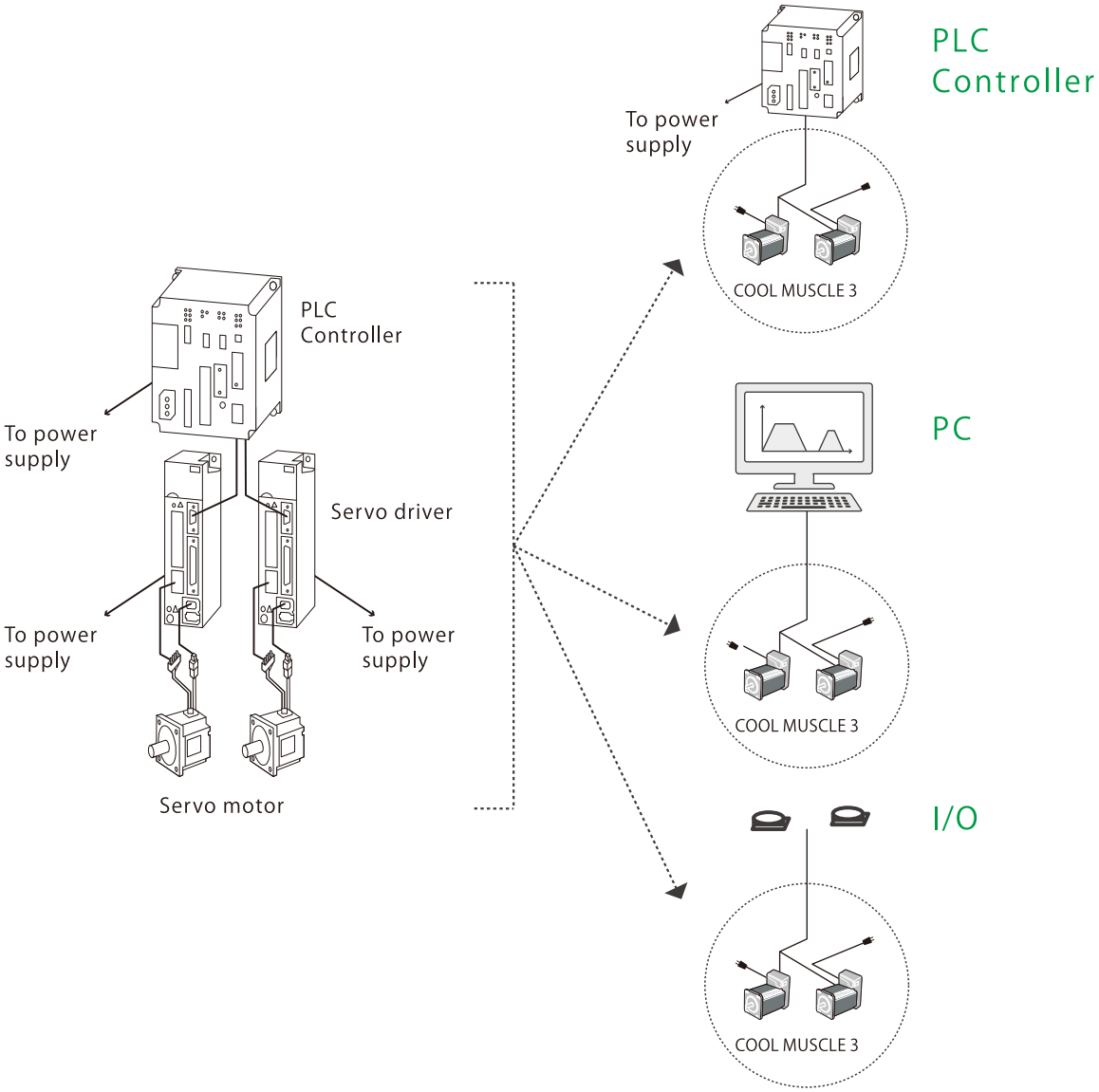
Stepper motor must be controlled with appx. 50% safety margin against its torque curve due to the risk of step-out. COOL MUSCLE 3 produces high torque at low speed range without step-out. It realizes quick acceleration and deceleration control.

For All Customers

Easier system construction

Wiring Configuration

Less wirings in a control box by direct connection to PLC•PC•I/O



The concept is “EASY"
COOL MUSCLE 3 can be controlled directly from PLC. Space can be saved by eliminating external driver.

Dedicated
PC software

COOL WORKS QUICK

Easy parameter setting

Parameters can be set just by following the display.

Motion data setting

Motion data can be set by simply entering a value in the blank.

Graph window

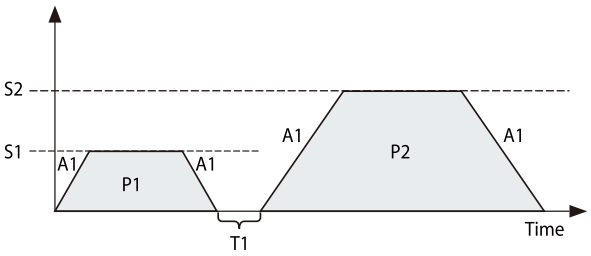
The position and speed of the motor can be monitored in a graph in real time.

Programless operability is realized by using an easy human interface.
It helps you to change the settings from machine development stage to change in operation field.

Program
Language

COOL MUSCLE Language (CML)

1. Data command	P1.1=3000	2. Program command	B1.1
	P2.1=5000		S1.1, A1.1, P1.1
	S1.1= 100		S2.1, A1.1, P2.1
	S2.1= 200		END
	A1.1= 200		
	T1.1= 100		



You can create a variety of programs using predefined data commands.
(Programing is available only on CM3+)

View "Easy Setup"

From wiring the motor and starting the software, the motor can be operated in 3 minutes.

Introduction of functions

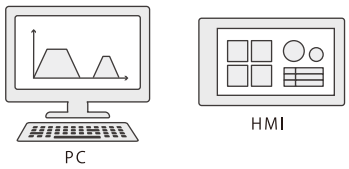
Control method

COOL MUSCLE 3 Simpler

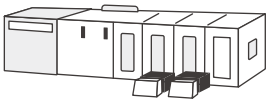
There are 3 types of direct control, I/O control, and pulse control, which can be directly connected from PLC or PC. AC servo motor control can be realized at low cost by simple function settings.

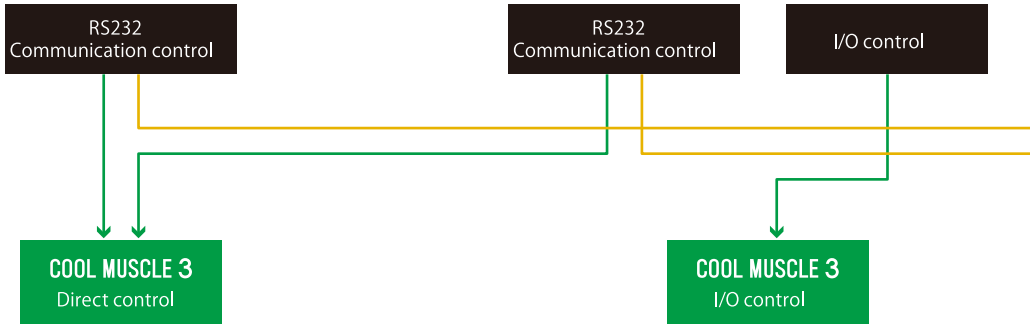
	Control method	Number of points	RS232 communication (settings and monitoring)	RS232 Communication control	I/O control
COOL MUSCLE 3	Direct	32	●	●	
	I/O	8	●		●
	Pulse	0	●		
COOL MUSCLE 3+		250	●	●	

From PC or HMI
When controlling by serial communication



When controlling from a PLC



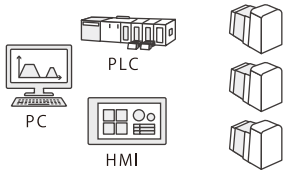


COOL MUSCLE 3+ Higher functionality

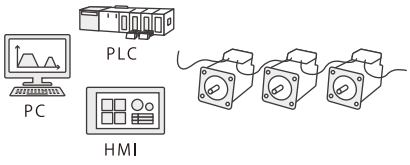
The built-in high-performance controller allows programming and system construction. Simultaneous control of multiple axes and Cyclic Logic Operation Program can be used to maximize the performance of COOL MUSCLE.

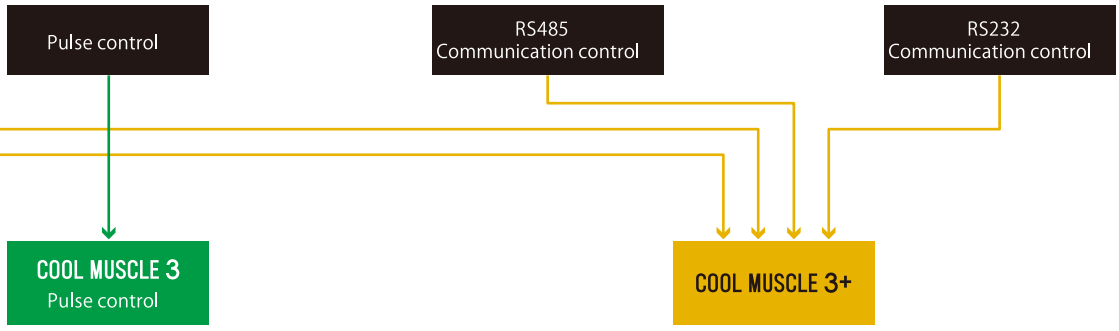
Pulse control	Program control	Daisy chain	Cyclic Logic Operation	Option ABS	Option RS485
●					
	●	●	●	●	●

When controlling by RS485 communication



When controlling a daisy chain





COOL MUSCLE 3

Control method selection

Direct control, I/O control, pulse control can be selected and changed from the dedicated software.

Supports Various operations

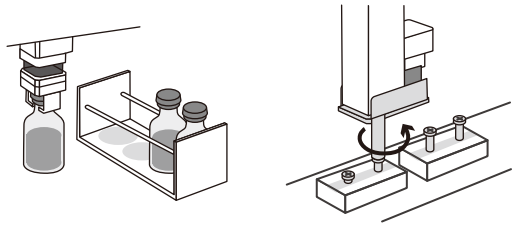
The operation pattern can be selected from PTP, incremental, and pressing operation.

Motion Data number	Operation type	Position	Speed	Acceleration	Deceleration	Torque limit	Push	zone+	zone-
0	PTP	1000	100	100	100	100			
1	PTP Push	3000	100	100	50	100	30	2000	3000
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
31	PTP	2000	300	200	200	30			

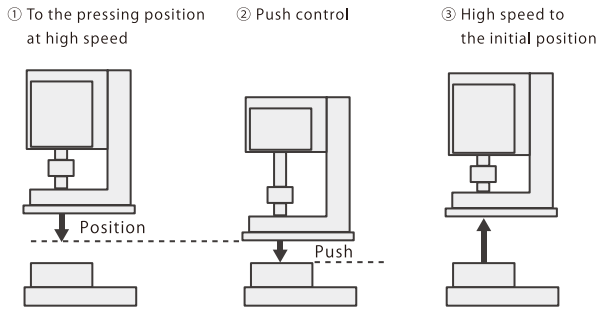
[Type of control]

1. Positioning control ... Target position, speed, acceleration, deceleration, incremental operation, continuous operation, etc.
2. Speed control ····· Speed and acceleration can be changed during operation
3. Torque control····· Torque control and torque limit are possible

Recommended for replacing the air cylinder



For press fitting, hand, tightening, etc.



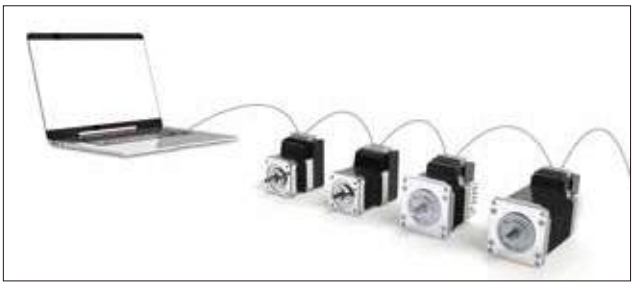
Single-turn absolute

It is possible to retain the position information within one rotation.
For applications such as cam mechanics and turntables, the origin sensor and machine origin are not required, contributing to wiring savings.

COOL MUSCLE 3+

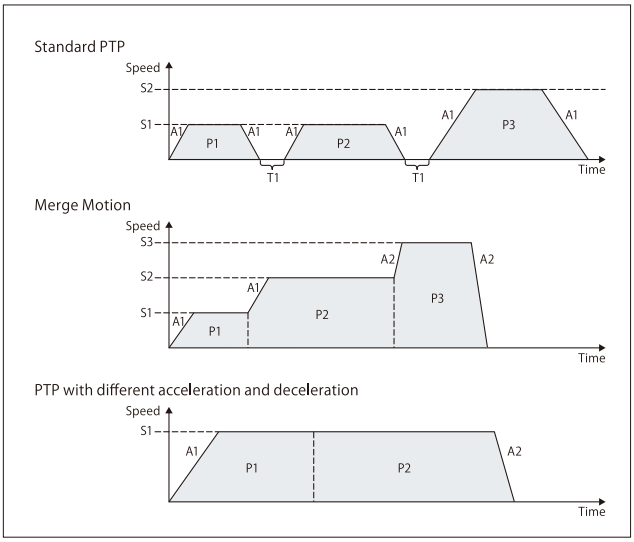
Daisy chain

Each CM3+ can execute the program independently, Linked with the operating status and I/O status of other CM3+, it is possible to operate.



Program control

Both acceleration and deceleration can be independently set.
Also various methods of PTP motion such as speed and acceleration changes during motion at passing points without stopping or jittery movement, (Merge Motion) can be realized.



Cyclic Logic Operation Program

Motor drive control, I/O control, periodic logic operation, etc. Since it is possible to process various tasks in parallel, COOL MUSCLE 3+ mastered system you can build it.

Variable	Current position, current speed, current torque, current status, Position deviation, target position, target speed
Mathematical operation	Addition, subtraction, multiplier, divisor, Sin, Cos, square root
Logical operation	AND, OR, NOT
Comparison operation	=, Not=, >, <, ≧, ≦
Input branch	Conditional branch depending on the state of the input signal

COOL MUSCLE 3+ Option

1-turn absolute (standard) + multi-turn absolute (option)

It is possible to retain multi-rotation position information. Since it has a built-in battery type absolute encoder, It is not necessary and contributes to shortening the equipment startup time. It can be used for single-axis actuators and robot arms.

Modbus RS485

A network that implements Modbus Protocol as a communication protocol, RS485 is used.
Multi-drop control is possible with Modbus RS485.

Motion

01 Torque Limit

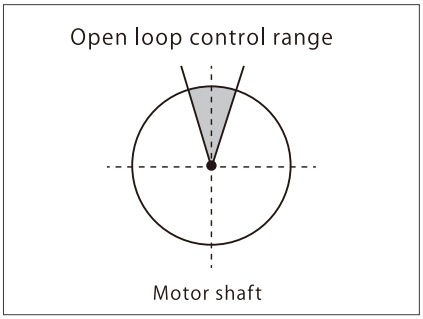
Since the motor can control the output torque, it can be used in various applications such as gripping, pressing objects, and limiting force.
Push motion: Motor can limit the torque with the specified push force.
Torque limiting motion: The maximum torque during positioning operation can be limited.

02 Software Limit

Since the movable range can be set to the motor, the limit sensor can be omitted.

03 Open holding function

Closed-loop control if there is no operation command for a certain period after positioning is completed. Automatically switches to open-loop control.
The difference between the current position and the target position due to external force is less than the set value (0.1 to 7.2 degrees) When it gets bigger, it returns to closed-loop again and returns to the previous position.



04 Resolution setting

The resolution can be set by parameters.
The default setting is 1,000, and one rotation is divided into 1,000 (0.36°).

[Parameters]

0 : 300	5 : 3000
1 : 600	6 : 5000
2 : 1000	7 : 6000
3 : 1200	8 : 10000
4 : 2000	9 : 12000

05 Origin Detection

As an origin detection method, a combination of pressing, origin sensor, and Z-phase is available.

[Parameter settings]

Settings	Contents
0	Stopper Detection
1	Stopper Detection (Auto)
2	Origin Sensor
3	Origin Sensor (Auto)
4	Stopper Detection & Z Phase
5	Stopper Detection & Z Phase (Auto)
6	Origin Sensor & Z Phase
7	Origin Sensor & Z Phase (Auto)
8	Z Phase Signal
9	Z Phase Signal (Auto)

I/O function

06 Digital I/O

The size of the main body is kept compact and I/O port is equipped as standard.
COOL MUSCLE 3 : Input 6 ports, Output 4 ports
COOL MUSCLE 3+ : Input 4 ports, Output 4 ports

■Input Function Example

【Functions by type】

COOL MUSCLE 3

- Common to each type ・・・ Limit sensor
- Direct type ・・・・・・・・・・・・ Origin sensor, Manual jog, Inching, Jog, Servo on/ Alarm reset
- I/O type ・・・・・・・・・・・・・・・ Origin sensor, Motion data selection, Motion Execution / Stop
- Pulse type ・・・・・・・・・・・・・ Servo on/Alarm reset, Torque limit on/off

COOL MUSCLE 3+ ・・・・・・・・・・・・ Origin sensor, Limit sensor, Manual jog, Inching, Servo on/ Alarm reset, Teaching, Motion Execution / Stop

■Output Function Example

COOL MUSCLE 3

- Common to each type ・・・ General, In-position, Warning, Move, Servo on, Alarm, ABZ
- Direct type ・・・・・・・・・・・・ Zone, Individual Zone, Manual mode, Busy, End, Origin set completion
- I/O type ・・・・・・・・・・・・・・・ Zone, Individual Zone, Manual mode, Busy, End, Origin set completion
- Pulse type ・・・・・・・・・・・・・ Torque limit

COOL MUSCLE 3+ ・・・・・・・・・・・・ General, In-position, Warning, Move, Servo on, Alarm, Busy, End, Torque limit, Origin set completion

07 ZONE output function

The signal can be output within the specified range.

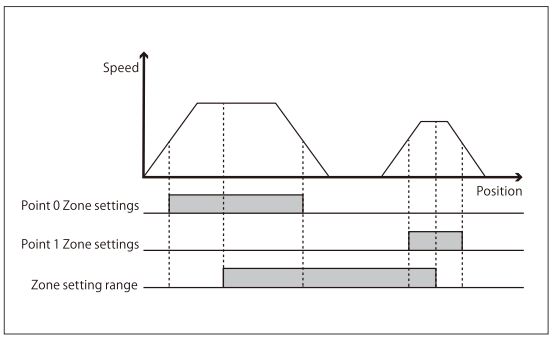
Individual ZONE output:

The signal is output only within the range set by each motion data.

ZONE output:

The signal is always output within the range set by the parameter regardless of the motion data.

[ZONE output range]



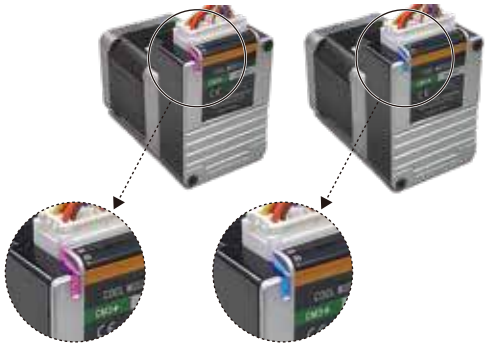
08 Motor Status

Motor status, such as position, speed, torque, alarm, and temperature, can be acquired.

[Status Check by Communication]
For example, if you want to check the motor status when the motor stops in an alarm, you can send a command to the motor to check the motor status.

Name	Description
Position Error overflow alarm	Position deviation exceed the set value
Overvoltage alarm	Main power supply exceed the set value
Overload alarm	Load factor 100% exceed the set time of overload detection time
In-position	In in-position range while the motion is stopped
Servo-off	Servo off by command/input signal
Push motion	Push motion (torque limit)
Overcurrent alarm	Excessive current flowed
Temperature alarm	The internal temperature exceed the specified value
Operating warning	Operation warning occur
Low voltage alarm	The power supply voltage has dropped below the specified value
STO Activated	STO function is enabled
Status warning	Status warning occur

[Status LED]
The 7-color LED displays the motor status such as power ON/OFF and alarm contents.



09 Warning function

If motor temperature or load factor exceeds a set value, a warning can be output before the motor stops in alarm. Detecting device malfunctions in advance helps reduce downtime.

10 STO function

Safe Torque Off (STO) built into CM3 is defined in IEC61800-5-2 and is a safety function to shut off the motor drive off the motor
drive power and stop the motor by the input signal from the safety controller.
※Not certified by a third party organaization.

Setup Time Reduction

11 Tuningless function

Muscle's original tuningless function enables large inertia drive and belt mechanism drive without gain adjustment. You can stabilize. In addition, if you select PPI control that can be set in detail, you can operate under more severe load conditions.

12 Streaming Data Output function

Up to four sorts of motor data can be cyclically streamed at once. By comparing the target and current, setup time can be reduced.

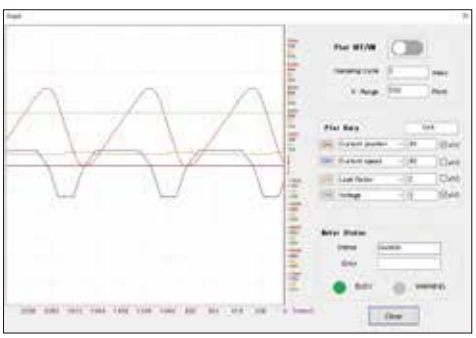
[Streaming data]

0: Disable	4: Current speed	8: Voltage
1: Target Position	5: Target current Level	9: Temperature
2: Current Position	6: Current current Level	10: Input status
3: Target speed	7: Load factor	11: Output status

13 COOL WORKS QUICK

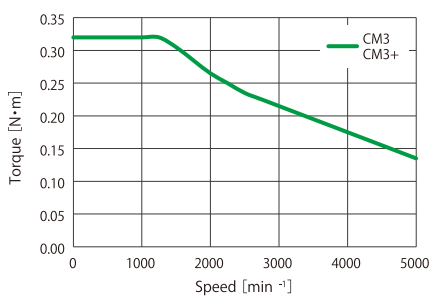
COOL WORKS QUICK is a support software exclusively for COOL MUSCLE 3 / 3+. Easy parameter setting and positioning data setting is available.

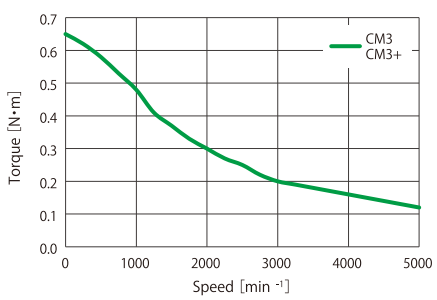
By using the graph window, you can check the motor position, speed, and torque data with the command value and the waveform of the actual operation, which can greatly reduce the adjustment time.



Specifications

		CM3-17S50A	CM3+-17S50A	CM3-17L50A	CM3+-17L50A
Input supply Voltage		DC24V±10%			
Rated Current / Peak Current		3.5 [A] / 4.8 [A]		4 [A] / 5 [A]	
Motor Output		60 [W]		60 [W]	
Max. Speed		5000 [min^{-1}]			
Rated Torque		0.25 [N·m]		0.52 [N·m]	
Max. Torque		0.32 [N·m]		0.65 [N·m]	
Rotor Inertia Moment		0.036 × 10^{-4} [kg·m^2]		0.074 × 10^{-4} [kg·m^2]	
Allowable Inertia Moment of Load		Less than 10 times of Rotor Inertia			
Allowable Radial Load		37 [N]		32 [N]	
Allowable Thrust Load		10 [N]		10 [N]	
Encoder		High-precision incremental magnetic rotation angle sensor			
Resolution		From 300~12,000 [ppr] set by parameter			
Control Method		Closed Loop Vector Control			
I/O	Control Input	Digital Input:6 (Includes 2 pulse inputs)	Digital Input:4	Digital Input:6 (Includes 2 pulse inputs)	Digital Input:4
	Control Output	Digital Output:4 (Includes 1 error output)			
	STO Input	1			
Communication Port		RS-232C	RS-232C 2port	RS-232C	RS-232C 2port
Mass		295 [g]		435 [g]	
Operating/Storage Temperature		0℃~40℃(non-freezing) / −20℃~60℃ (non-freezing))			
Operating/Storage Humidity		5~95%RH／20~90%RH			

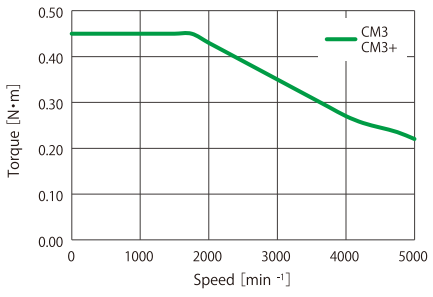


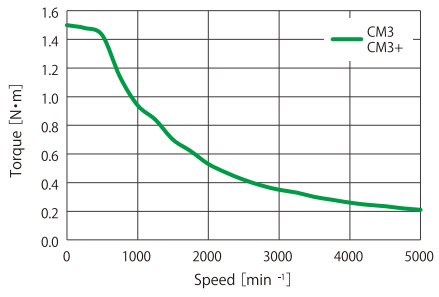


Model Name CM3 + - 17L50A(-A)

Model	Motor Size	Motor Length	Max. Speed	Hardware Revision	Option
CM3 CM3+	17…42□ 23…56□	S…Short L…Long	50…5000rpm	A	A…Absolute encoder M…RS485

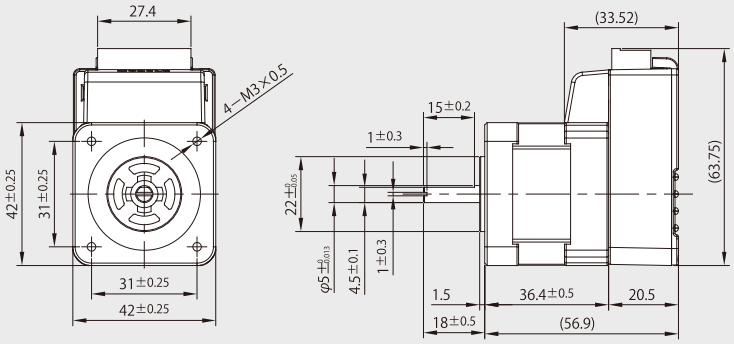
		CM3-23S50A	CM3+-23S50A	CM3-23L50A	CM3+-23L50A
Input supply Voltage		DC24V±10%			
Rated Current / Peak Current		4[A] / 5[A]		5[A] / 6[A]	
Motor Output		80 [W]		100 [W]	
Max. Speed		5000 [min^{-1}]			
Rated Torque		0.3 [N•m]		1.05 [N•m]	
Max. Torque		0.45 [N•m]		1.50 [N•m]	
Rotor Inertia Moment		0.1×10^{-4} [kg•m^2]		0.36×10^{-4} [kg•m^2]	
Allowable Inertia Moment of Load		Less than 10 times of Rotor Inertia			
Allowable Radial Load		77[N]		70[N]	
Allowable Thrust Load		15[N]		15[N]	
Encoder		High-precision incremental magnetic rotation angle sensor			
Resolution		From 300~12,000 [ppr] set by parameter			
Control Method		Closed Loop Vector Control			
I/O	Control Input	Digital Input:6 (Includes 2 pulse inputs)	Digital Input:4	Digital Input:6 (Includes 2 pulse inputs)	Digital Input:4
	Control Output	Digital Output:4 (Includes 1 error output)			
	STO Input	1			
Communication Port		RS-232C	RS-232C 2port	RS-232C	RS-232C 2port
Mass		525 [g]		1050 [g]	
Operating/Storage Temperature		0℃~40℃(non-freezing) / −20℃~60℃ (non-freezing)			
Operating/Storage Humidity		5~95%RH / 20~90%RH			



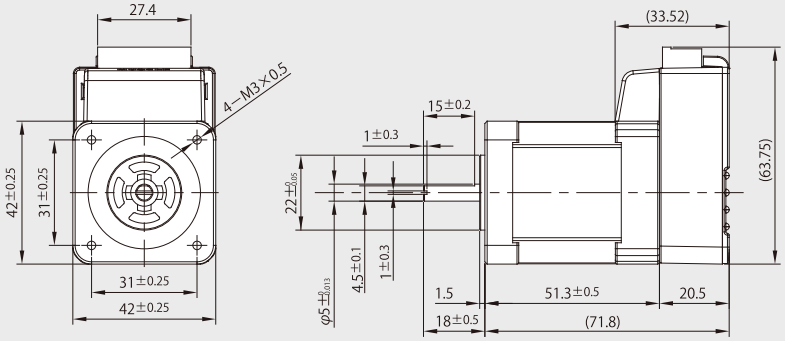


Dimension

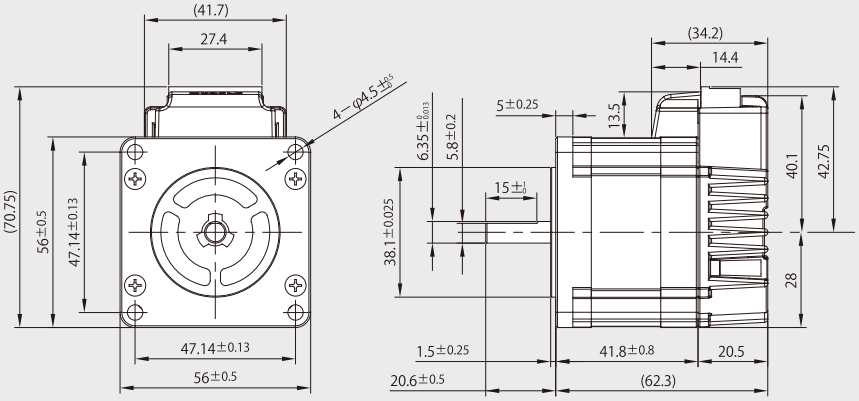
CM3-17S
CM3+-17S



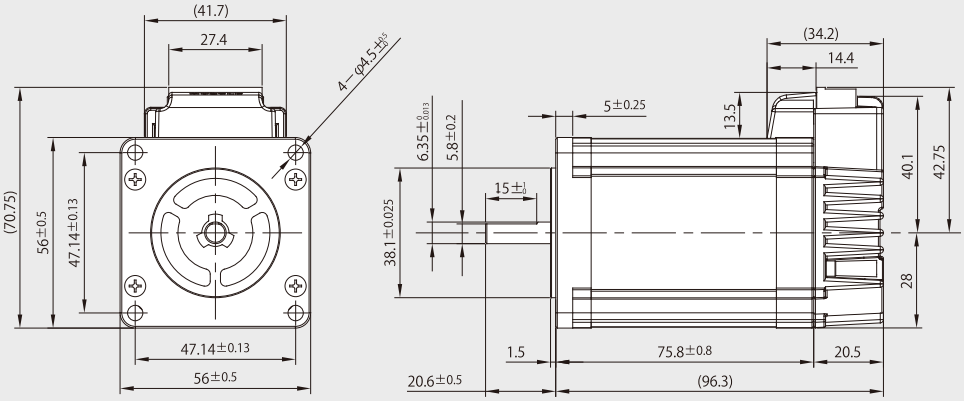
CM3-17L
CM3+-17L



CM3-23S
CM3+-23S

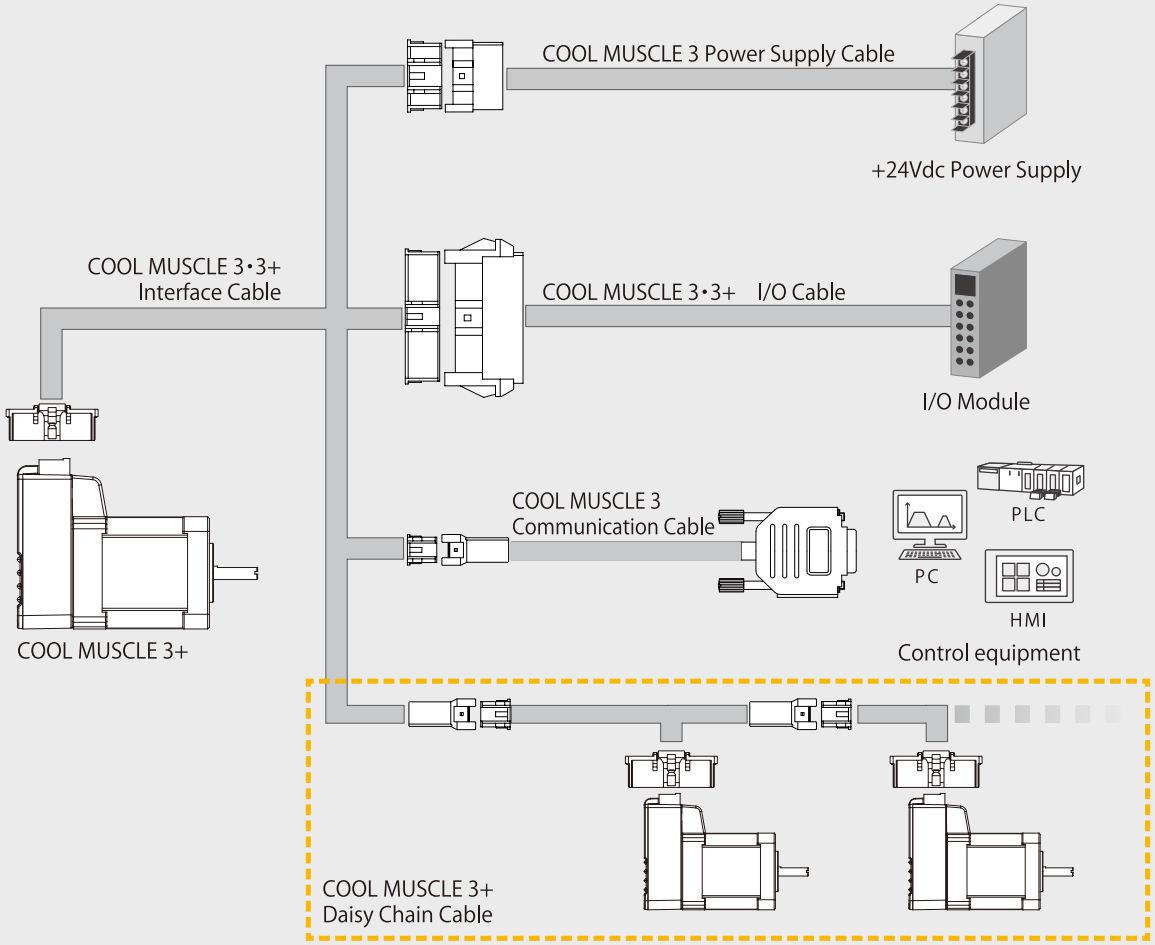


CM3-23L
CM3+-23L



Connection

The wiring of COOL MUSCLE 3 / 3+ is as follows.



Main Connector

Features a 24-pin connector at the top of the COOL MUSCLE 3 / 3+.
The pins are arranged and named as follows:

■CM3 Main Connector

NAME	Pin No	Pin No	NAME
GND	2	1	FG
ERROR	4	3	GND
OUT3 / Z Phase	6	5	RXD0
OUT2 / B Phase	8	7	TXD0
OUT1 / A Phase	10	9	STO_IN-
STO_IN+	12	11	INPUT6+ / PULSE B+
INPUT6- / PULSE B-	14	13	INPUT5+ / PULSE A+
INPUT5- / PULSE A-	16	15	IN_COM
INPUT4	18	17	INPUT3
INPUT2	20	19	INPUT1
P-GND	22	21	P-GND
POWER	24	23	POWER

Molex 55959-2430

■CM3+ Main Connector

NAME	Pin No	Pin No	NAME
+5Vdc	2	1	FG
D_GND	4	3	D_GND
RXD1	6	5	RXD0
TXD1	8	7	TXD0
OUT3	10	9	ERROR
OUT1	12	11	OUT2
D_GND	14	13	STO_IN-
STO_IN+	16	15	INPUT4
INPUT3	18	17	INPUT2
INPUT1	20	19	IN_COM
P-GND	22	21	P-GND
POWER	24	23	POWER

Molex 55959-2430

*The cables and pinouts used depend on the series. For more information, please refer to the user's guide.

Accessories

For COOL MUSCLE 3

Interface Cable A

CMIFA1-0400WR
CMIFA1-1000WR
CMIFA1-2000WR

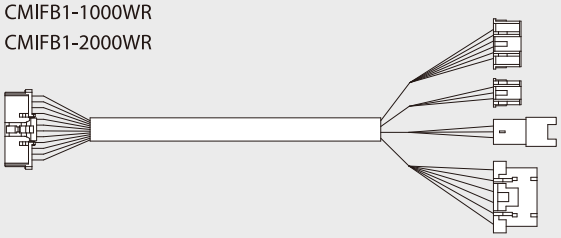
I/O Cable A

CMIOA1-1000S
CMIOA1-3000S

For COOL MUSCLE 3+

Interface Cable B

CMIFB1-0400WR
CMIFB1-1000WR
CMIFB1-2000WR



I/O Cable B

CMIOB1-1000S
CMIOB1-3000S

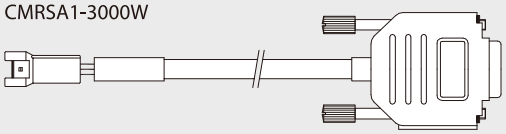
Daisy Chain Cable A

CMDCA1-0500W
CMDCA1-1000W

COOL MUSCLE 3 ・ COOL MUSCLE 3+ Common

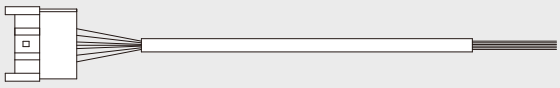
Communication Cable A

CMRSA1-1000W
CMRSA1-2000W
CMRSA1-3000W



Power Supply Cable A

CMPWA1-1000S
CMPWA1-3000S



COOL MUSCLE Other Series

More detail

COOL MUSCLE 1

Driver, Controller, Encoder Integrated Servo System

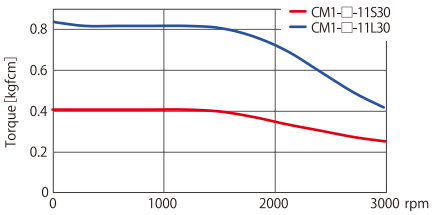
28□ Series

CM1-□-11S30

Output：9W
Max. Speed：3000rpm
Rated Continuous Torque ：0.027[N･m]

CM1-□-11L30

Output：18W
Max. Speed：3000rpm
Rated Continuous Torque ：0.055[N･m]



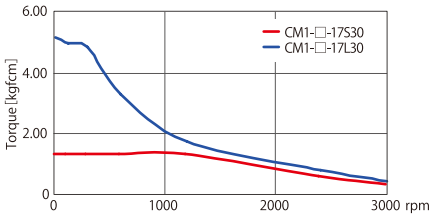
42□ Series

CM1-□-17S30

Output：18W
Max. Speed：3000rpm
Rated Continuous Torque ：0.082[N･m]

CM1-□-17L30

Output：18W
Max. Speed：3000rpm
Rated Continuous Torque ：0.36[N･m]



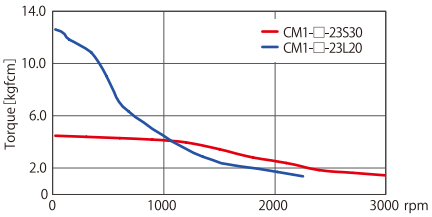
56□ Series

CM1-□-23S30

Output：45W
Max. Speed：3000rpm
Rated Continuous Torque ：0.294[N･m]

CM1-□-23L20

Output：30W
Max. Speed：2000rpm
Rated Continuous Torque ：0.87[N･m]



COOL MUSCLE 2

Driver, Controller, Encoder, Power Supply, PLC function Integrated Servo System

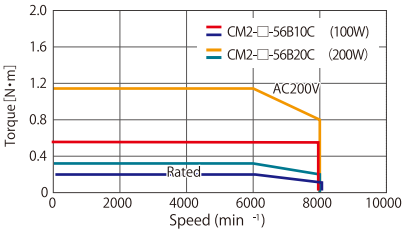
56□ Series

CM2-□-56B10

Output：100W
Max. Speed：8000rpm
Rated Continuous Torque ：0.19[N･m]

CM2-□-56B20

Output：200W
Max. Speed：8000rpm
Rated Continuous Torque ：0.32[N･m]



60□ Series

CM2-□-60A10

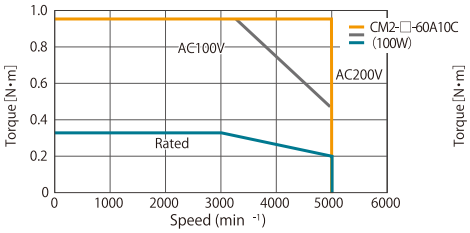
Output：100W
Max. Speed：5000rpm
Rated Continuous Torque ：0.32[N･m]

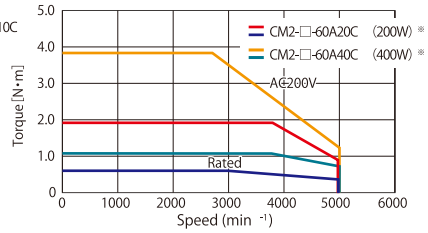
CM2-□-60A20

Output：200W
Max. Speed：5000rpm
Rated Continuous Torque ：0.64[N･m]

CM2-□-60A40

Output：400W
Max. Speed：5000rpm
Rated Continuous Torque ：1.09[N･m]





※Input Voltage is AC200-240V

EtherCAT COOL MUSCLE Bridge

EB01 (CM1) /EB02 (CM2) /EB12 (CM1-2)

EtherCAT COOL MUSCLE Bridge that adapts / connects COOL MUSCLE to EtherCAT network. * Separately CM* communication cable, power cable and LAN cable required.

COOL MUSCLE Actuator Series

Servo Actuator
Integrated actuator with COOL MUSCLE.
It allows you to build a low cost and very precise network system with Max.15-axis over daisy chain.

COOL MUSCLE Gear Series

Gearbox
A wide range of high quality gearboxes are available to suit your application needs
Low backlash, zero maintenance, durable gearbox with a COOL MUSCLE to maximize performance.

musclecorp.com

MUSCLE CORPORATION

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OSAKA, 541-0042, JAPAN
Tel.06-6229-9550 **E-Mail.motion@musclecorp.com**

*Specifications subject to change without notice.