



Reliance[®]

Precision Mechatronics



**Standard and Customised
Components and Assemblies**

A complete source for precise motion control



Motors

A selected range of both standard and intelligent motors. Sizes range from NEMA 8 - 23.



Reliance Cool Muscle

Integrated, intelligent motion control with closed loop feedback and zero step loss. NEMA sizes 11, 17 and 23



Stepper Motors

2 phase, 6 wires for unipolar and bipolar drives
NEMA sizes 8, 11, and 17

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Stepper Motors

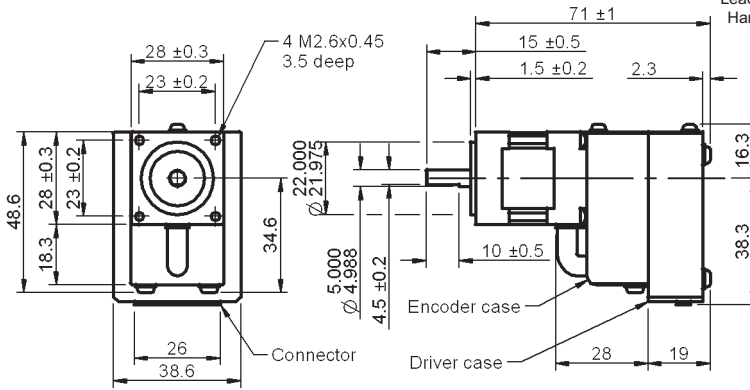
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For Technical Information
please see [Page T2-1](#)

All dimensions in mm

Associated Products

Couplings: [page 8-1](#)
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 Hardware: [page 13-1](#)



RCM1 - P - 11 S 30 - RT3

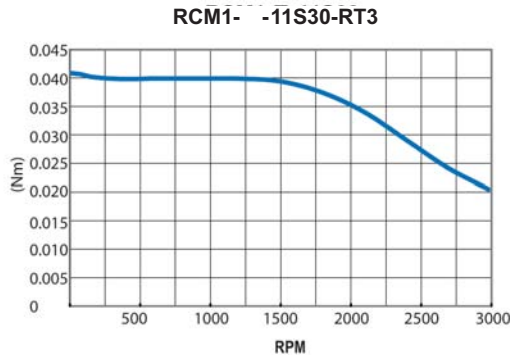
Generation
 Interface
 P = Pulse
 C = Computer
 Speed
 30 = 3000rpm

Specification table

	RCM1- -11S30-RT3
Motor output power	9W
Maximum speed	3,000rpm
Continuous torque	0.027Nm
Peak torque	0.039Nm
Load inertia allowance	80g-cm ²
Motor inertia	8g-cm ²
Input supply current rated (Continuous torque/rated peak torque)	0.8A/1.0A
Weight	246g

Note: See [page T2-1](#) for technical information

Torque curve

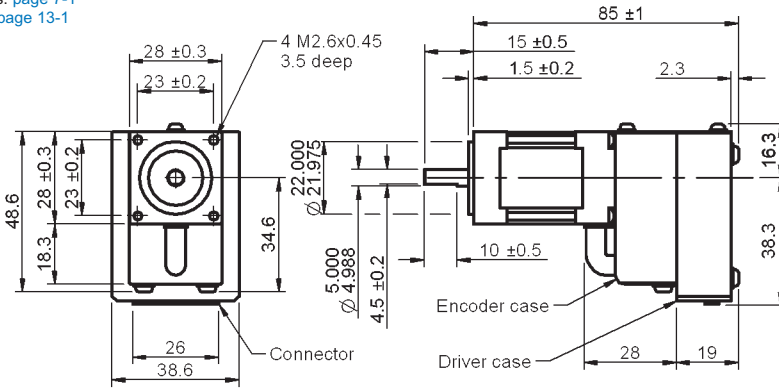




Associated Products

Couplings: [page 8-1](#)
 Leadscrews: [page 7-1](#)
 Hardware: [page 13-1](#)

All dimensions in mm



RCM1 - P - 11 L 30 - RT3

Generation ———
 Interface
 P = Pulse
 C = Computer
 Speed
 30 = 3000rpm

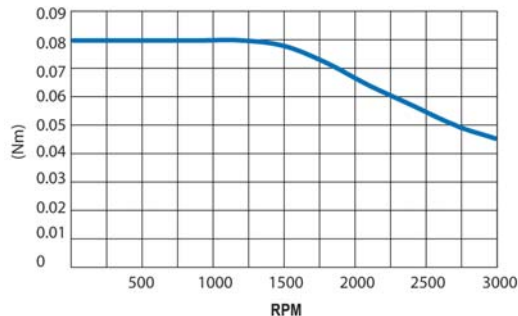
Specification table

	RCM1- -11L30-RT3
Motor output power	18W
Maximum speed	3,000rpm
Continuous torque	0.055Nm
Peak torque	0.078Nm
Load inertia allowance	180g-cm ²
Motor inertia	18g-cm ²
Input supply current rated (Continuous torque/rated peak torque)	1.2A/1.5A
Weight	300g

Note: See [page T2-1](#) for technical information

Torque curve

RCM1- -11L30-RT3

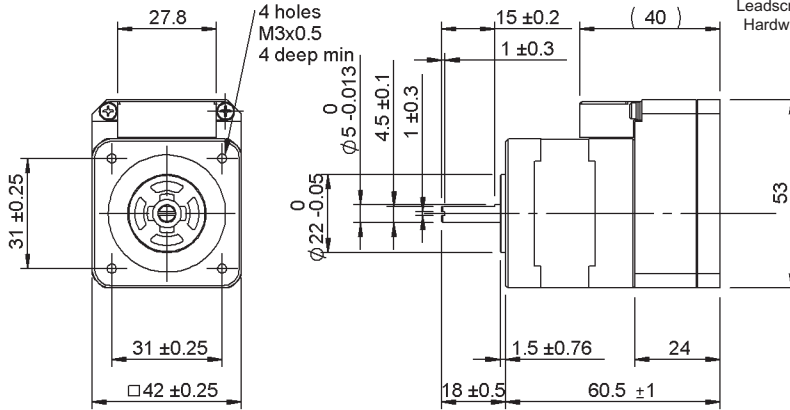




All dimensions in mm

Associated Products

Couplings: [page 8-1](#)
Leadscrews: [page 7-1](#)
Hardware: [page 13-1](#)



RCM1 - P - 17 S 30C - RT3

Generation ———
 Interface ——— P = Pulse
 C = Computer
 Speed ——— 30 = 3000rpm

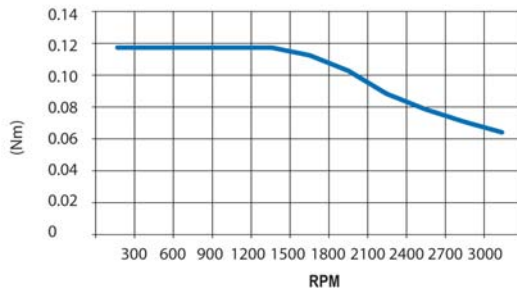
Specification table

	RCM1- -17S30C-RT3
Motor output power	18W
Maximum speed	3,000rpm
Continuous torque	0.082Nm
Peak torque	0.117Nm
Load inertia allowance	380g-cm ²
Motor inertia	36g-cm ²
Input supply current rated (Continuous torque/rated peak torque)	0.8A/1.0A
Weight	325g

Note: See [page T2-1](#) for technical information

Torque curve

RCM1- -17S30C-RT3

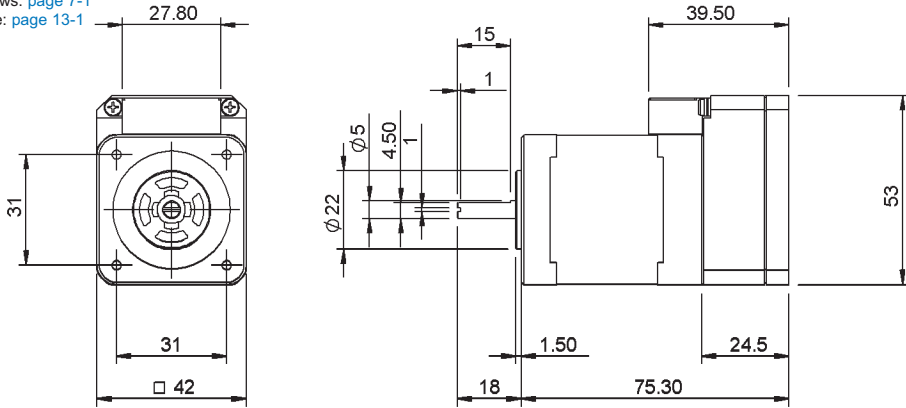




Associated Products

Couplings: [page 8-1](#)
Leadscrews: [page 7-1](#)
Hardware: [page 13-1](#)

All dimensions in mm



RCM1 - P - 17 L 30C - RT3

Generation _____
 Interface _____
 P = Pulse
 C = Computer
 Speed _____
 30 = 3000rpm

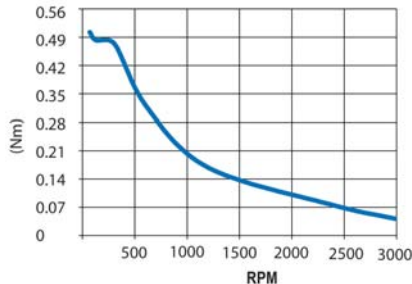
Specification table

	RCM1- -17L30C-RT3
Motor output power	18W
Maximum speed	3,000rpm
Continuous torque	0.36Nm
Peak torque	0.518Nm
Load inertia allowance	760g-cm ²
Motor inertia	74g-cm ²
Input supply current rated (Continuous torque/rated peak torque)	1.5A/1.8A
Weight	470g

Note: See [page T2-1](#) for technical information

Torque curve

RCM1- -17L30C-RT3





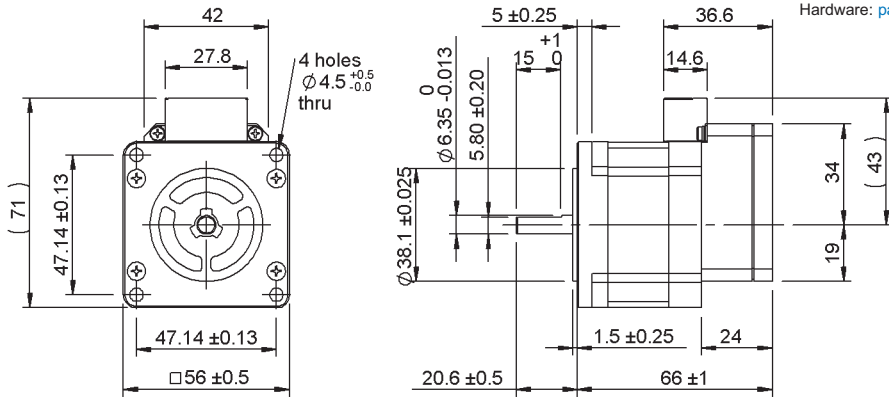
All dimensions in mm

Associated Products

Couplings: [page 8-1](#)

Leadscrews: [page 7-1](#)

Hardware: [page 13-1](#)



RCM1 - P - 23 S 30C - RT3

Generation
 Interface
 P = Pulse
 C = Computer
 Speed
 30 = 3000rpm

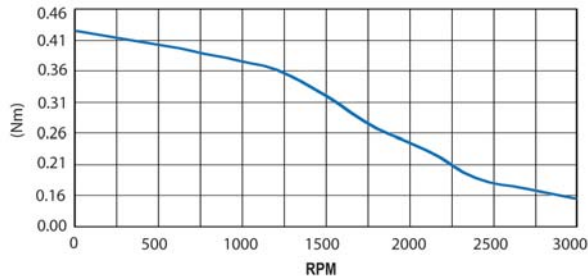
Specification table

	RCM1- -23S30C-RT3
Motor output power	45W
Maximum speed	3,000rpm
Continuous torque	0.29Nm
Peak torque	0.42Nm
Load inertia allowance	1.0x10 ³ g-cm ²
Motor inertia	1.0x10 ² g-cm ²
Input supply current rated (Continuous torque/rated peak torque)	3.9A/5.1A
Weight	580g

Note: See [page T2-1](#) for technical information

Torque curve

RCM1- -23S30C-RT3

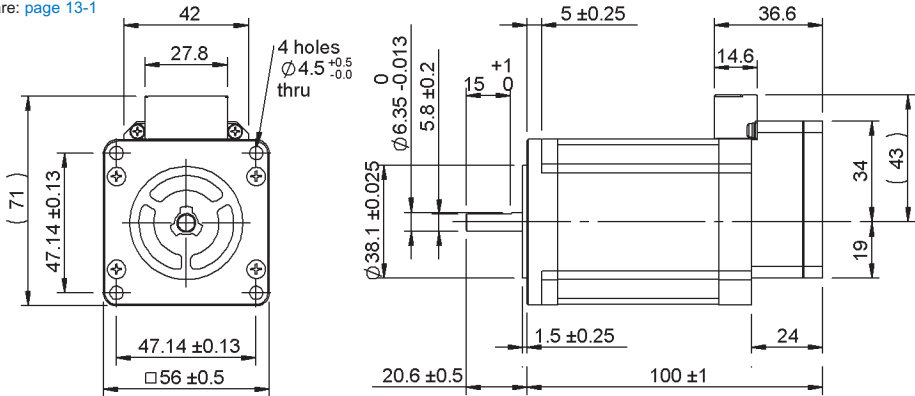




Associated Products

Couplings: [page 8-1](#)
 Leadscrews: [page 7-1](#)
 Hardware: [page 13-1](#)

All dimensions in mm



RCM1 - P - 23 L 20C - RT3

Generation
 Interface
 P = Pulse
 C = Computer
 Speed
 20 = 2000rpm

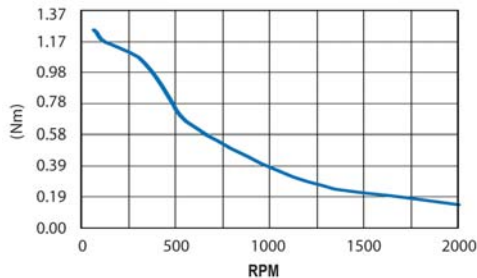
Specification table

	RCM1- -23L20C-RT3
Motor output power	30W
Maximum speed	2,000rpm
Continuous torque	0.87Nm
Peak torque	1.24Nm
Load inertia allowance	$3.6 \times 10^3 \text{g-cm}^2$
Motor inertia	$3.6 \times 10^2 \text{g-cm}^2$
Input supply current rated (Continuous torque/rated peak torque)	2.6A/3.4A
Weight	1100g

Note: See [page T2-1](#) for technical information

Torque curve

RCM1- -23L20C-RT3





Encoder	Incremental magnetic encoder (50,000 pulses per rotation)
Control Method	Closed loop vector control
Input Supply Voltage	DC24V±10%
Resolution Pulse Rotation (Pulse/Rotation)	200, 400, 500, 1000(default), 2000, 2500,5000, 10000, 25000,50000 Select by parameter
Environmental Conditions (Operating/Storage Temperature)	Between 0°C and 40°C/between -20°C and +60°C
Operating Humidity	Less than 90%RH
Shock/Vibration	Less than 10G/Less than 1G

Pin Layout

Pin #			CW/CCW	Step/Dir	V-Type	C-Type
1	+24VDC IN	Motor Power				
2	GROUND 1					
3	INPUT 2-	Return for pin 9	CCW-	Direction-		
4	OUTPUT 2+	Digital output, Analogue output, Serial TX				Serial ⁽¹⁾
5	OUTPUT 1+	Digital output, Analogue output, Serial TX				Serial ⁽¹⁾
6	INPUT 4+	Digital input, Analogue input			V+	Serial
7	INPUT 3+	Digital input				
8	INPUT 1-	Return for pin 10	CW-	Step-		
9	INPUT 2+	Digital input, Pulse counter, Serial RX	CCW+	Direction+		Serial ⁽²⁾
10	INPUT 1+	Digital input, Pulse counter, Serial RX	CW+	Step+		Serial ⁽²⁾
11	GROUND 2				V-	Serial
12	+5VDC OUT	Power out for LEDs switches, etc				

⁽¹⁾Open collector output. ⁽²⁾Anode connection, circuit diagram available ref Pin 3 and Pin 8

Input/Output Signal

Pulse Interface	CW/CCW	Step/Direction
Input Signal Pulse Input P	CW/CCW Pulse Maximum Frequency: 500 Kpps Minimum Pulse Width: 0.8µsec Voltage Level H (with pulse) > +3.0V (+24Vmax) 7mA-15mA Voltage Level L (no pulse) < +0.8V	Step Pulse Maximum Frequency: 500 Kpps Minimum Pulse Width: 0.8µsec Voltage Level H (with pulse) > +3.0V (+24Vmax) 7mA-15mA Voltage Level L (no pulse) < +0.8V

Variable Voltage Interface - Now integrated into the C-Type motor

Input Signal Analogue Input V	Speed Control Setting Increase the voltage from 2.6V to 4.8VDC to increase speed in the CW direction Decrease the voltage from 2.4v to 0Vdc, to increase speed in the CCW direction Use OP AMP for maximum resolution Position Control Setting Travel distance is proportionate to voltage input (between 0V and 4.8VDC) Maximum travel distance is set by a parameter
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Computer Control Interface

Input Signal Control C	Via supplied cabling - motor interface is TTL, please specify RS232 or RS485 interface option
Input Signal Level	Voltage level high> 3V (minimum 7mA) Voltage level low< 0.8V



RT3 Real Time Interface	
Co-ordinated Motion	Allows 2 axes to work together to create accurate complex motion
Logic Banks	Embedded PLC up to 200 steps for mathematical calculation of motion
Quadrature	Simulated AB outputs from the magnetic encoder. Maximum frequency 20kHz
Shared I/O	Inputs or outputs are available to be read and accessed by all motors running programs and logic banks

'Y' Cable for Reliance Cool Muscle Motor

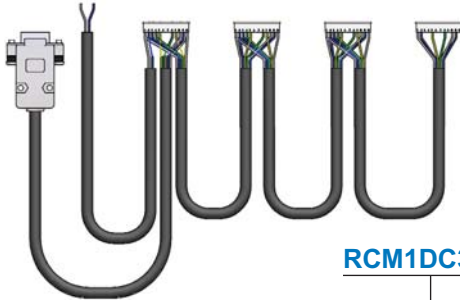


RCM1C3 - xx

Length of wires to first connector
(xx-xx if the two lengths are different)

Generic part number

Standard and Customised Daisy Chain Cables for Reliance Cool Muscle Motor



RCM1DC3A - xx - N - xx - xx - xx

Length of wire between connectors
(Only one number required if the lengths are all the same)

Number of connectors

Length of wires to first connector
(xx-xx if the two lengths are different)

Generic part number

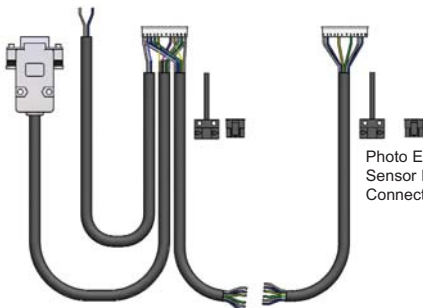


Photo Electric Sensor Molex Connector 2 way

- Customised cables are available with photosensors option

For further information about customising cables, please contact our sales team

RELIANCE COOL MUSCLE (RCM) ACCESSORIES

Our RCM accessories work perfectly with the RCM to enhance its performance. Accessories include couplings, gears, linear motion components, protocol cards, power supplies and cables.



Reli-a-Flex® Flexible Shaft Couplings

The Reli-a-Flex® range of one piece slit couplings has been specially designed to provide accurate transfer of motion between two rotating shafts while at the same time catering for parallel and angular misalignment as well as protecting the bearing systems. See [page 8-4](#) for more information on the Reli-a-Flex® range.



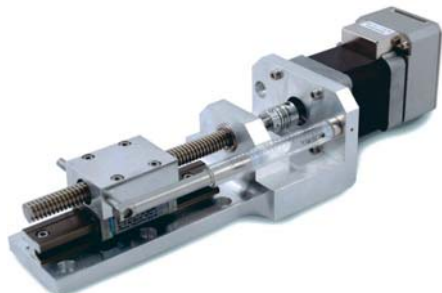
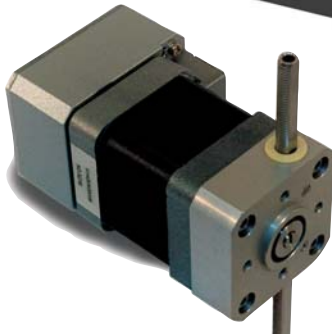
Planetary Gearboxes

A range of high quality planetary gearboxes are available to suit your application needs. Combine a low backlash, zero maintenance and high durability gearhead with the RCM to maximize performance. Available in NEMA 17 and 23, ratios 3:1 to 512:1. See [page 3-11](#) for more information.



Intelligent Actuator Systems

A range of intelligent actuators is available to support your precision motion control needs. These include rack actuators, syringe drives and positioning stages all suited to be used with the RCM. Please contact our sales team or visit the website for more information. See [page 1-1](#) for more information.





Communication Cards

RS485, CANopen, DEVICENET, Profibus and Ethernet cards are available as options for the RCM servo systems. Our engineers provide technical support based on extensive experience integrating the Cool Muscle with third party controllers, HMI's, and PLCs.



Power Supply

Designed specifically for the RCM, this power supply is built to withstand the current draw spikes which the hard stops or starts often require. Specification of the power supply is 150W/300W, 6A/10A.

2



Cables

A standard motor cable (40cm) is supplied with every motor. Longer motor cables are available as an option.

A Y-cable is required to connect the RCM to a USB or serial port. See [page 2-9](#)

Multi motor custom cables can be made to suit your application.



CoolWorks Lite

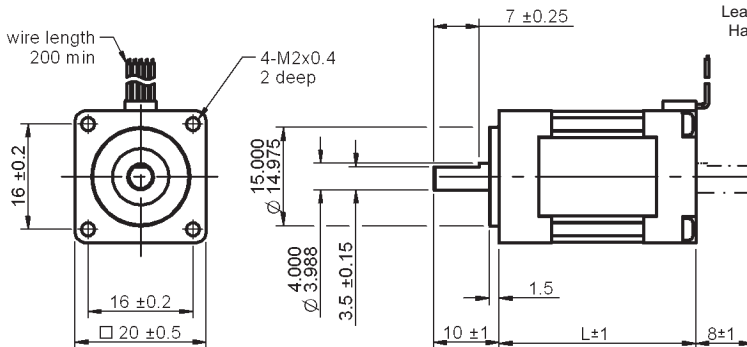
CoolWorks Lite is a free application which gives you basic tools for setting parameters and creating motion profiles. A user friendly interface makes it easy to work with the RCM.



All dimensions in mm

Associated Products

Couplings: [page 8-1](#)
Leadscrews: [page 7-1](#)
Hardware: [page 13-1](#)



Motor	L1	Mass
RSM08N1-LC RSM08N11-LC	30	50g
RSM08N2-LC RSM08N12-LC	46.5	85g

Part number selection table

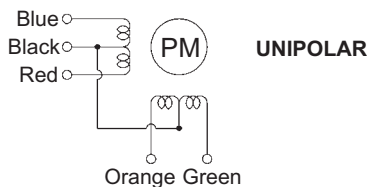
Part Number	Number of Shafts	Step Angle Deg.	Rated Voltage V/Phase	Rated Current A/Phase	Winding Resistance Ω/Phase	Inductance mH/Phase	Holding Torque Nm	Rotor Inertia x10 ⁻⁷ kg.m ²
RSM08N1-LC RSM08N11-LC	1 2	1.8	3.5	0.35	10	2.4	0.013	1.9
RSM08N2-LC RSM08N12-LC	1 2	1.8	7	0.35	20	4.6	0.024	4

Technical specification

Shaft end play	0.075mm max. at load 9.8N
Shaft radial play	0.025mm max. at load 4.9N
Insulation resistance	100MΩ min. (at 500V DC)
Dielectric strength	500V AC (1 minute)
Operating temperature range	-20°C to +50°C
Permissible temperature rise	80°C max. (resistance method)

Note: Do not allow the surface temperature of the motor case to rise above 90°C during operation.

Wiring diagram



CW rotation mounting end

Step	Blue	Orange	Red	Green	Black
0	ON	ON			+V
1		ON	ON		+V
2			ON	ON	+V
3	ON			ON	+V
0	ON	ON			+V

Note: See [page T2-5](#) for technical information

Stepper Motors

2 Phase Unipolar, 1.8° Step Angle

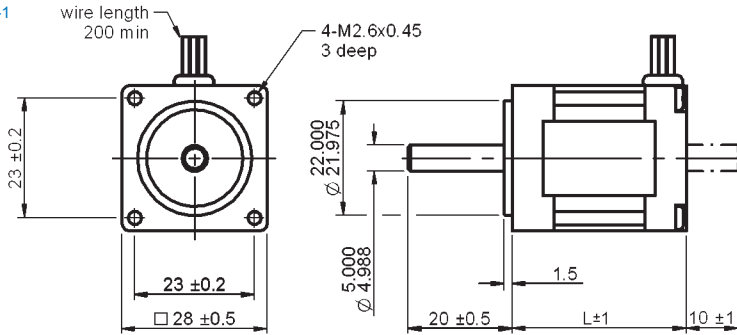
Size 11



Associated Products

Couplings: [page 8-1](#)
 Leadscrews: [page 7-1](#)
 Hardware: [page 13-1](#)

All dimensions in mm



Motor	L1	Mass
RSM11N1E2-LC RSM11N11E2-LC	33.5	150g
RSM11N2E3-LC RSM11N12E3-LC	47.5	250g

Part number selection table

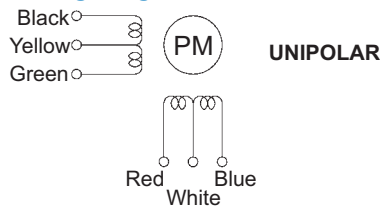
Part Number	Number of Shafts	Step Angle Deg.	Rated Voltage V/Phase	Rated Current A/Phase	Winding Resistance Ω/Phase	Inductance mH/Phase	Holding Torque Nm	Rotor Inertia x10 ⁻⁷ kg.m ²
RSM11N1E2-LC RSM11N11E2-LC	1 2	1.8	2.6	0.95	2.7	1.2	0.06	8
RSM11N2E3-LC RSM11N12E3-LC	1 2	1.8	1.4	1.4	1.0	0.55	0.09	18

Technical specification

Shaft end play	0.075mm max. at load 4.9N
Shaft radial play	0.025mm max. at load 4.9N
Insulation resistance	100MΩ min. (at 500V DC)
Dielectric strength	500V AC (1 minute)
Operating temperature range	-20°C to +50°C
Permissible temperature rise	80°C max. (resistance method)

Note: Do not allow the surface temperature of the motor case to rise above 90°C during operation.

Wiring diagram



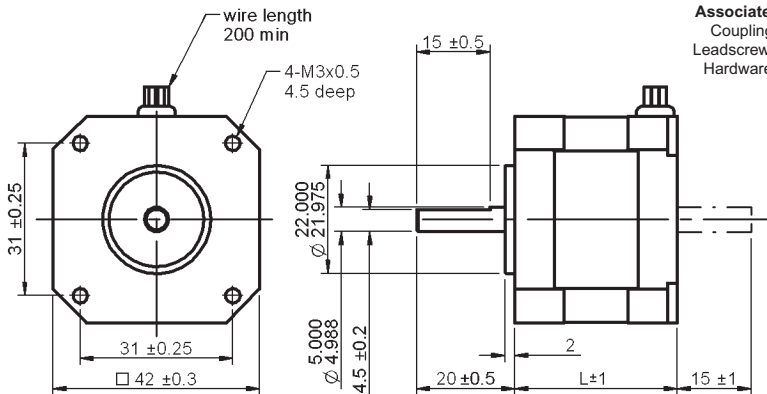
CW rotation mounting end

Step	Black	Red	Green	Blue	Yellow	White
0	ON	ON			COM	COM
1		ON	ON		COM	COM
2			ON	ON	COM	COM
3	ON			ON	COM	COM
0	ON	ON			COM	COM

Note: See [page T2-5](#) for technical information



All dimensions in mm



Associated Products

Couplings: [page 8-1](#)
Leadscrews: [page 7-1](#)
Hardware: [page 13-1](#)

2

Motor	L1	Mass
RSM17N1E1-LC	33	200g
RSM17N1E3-LC		
RSM17N2E4-LC	39	240g
RSM17N3E8-LC		

Part number selection table

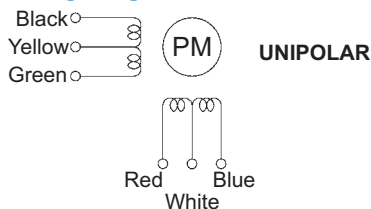
Part Number	Shafts	Step Angle Deg.	Rated Voltage V/Phase	Rated Current A/Phase	Winding Resistance Ω/Phase	Inductance mH/Phase	Holding Torque Nm	Rotor Inertia x10 ⁻⁷ kg.m ²
RSM17N1E1-LC	Single	1.8	4.0	0.95	4.2	2.8	0.16	35
RSM17N1E3-LC			12.0	0.3	40	22	0.16	35
RSM17N2E4-LC			4.0	1.2	3.3	3.6	0.26	54
RSM17N3E8-LC			4.0	1.2	3.3	3.0	0.32	68

Technical specification

Shaft end play	0.075mm max. at load 9.8N
Shaft radial play	0.025mm max. at load 4.9N
Insulation resistance	100MΩ min. (at 500V DC)
Dielectric strength	500V AC (1 minute)
Operating temperature range	-20°C to +50°C
Permissible temperature rise	80°C max. (resistance method)

Note: Do not allow the surface temperature of the motor case to rise above 90°C during operation.

Wiring diagram



CW rotation mounting end

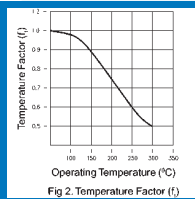
Step	Black	Red	Green	Blue	Yellow	White
0	ON	ON			COM	COM
1		ON	ON		COM	COM
2			ON	ON	COM	COM
3	ON			ON	COM	COM
0	ON	ON			COM	COM

Note: See [page T2-5](#) for technical information





Conversion Factors and Technical Contents



Technical Information by Product

Fig 2. Temperature Factor (f)



Standard Conversion Factors			
Length	1mm = 0.03937in	1in = 25.4mm	
Area	1mm ² = 0.00155in ²	1in ² = 645.16mm ²	
Volume	1mm ³ = 61.02 x 10 ⁻⁶ in ³ 1 litre = 1 x 10 ⁶ mm ³	1in ³ = 16387mm ³ 1ml = 1cm ³	
Force and mass	1N = 0.101972kgf 1kgf = 9.80665N 1kg = 2.2046lb	1lbf = 4.4482N 1N = 0.2248lbf 1lb = 0.4536kg	
Torque	1Nm = 8.8507lbf·in 1Nm = 141.612oz·in 1Nm = 10197.16gf·cm	1lbf·in = 0.1130Nm 1oz·in = 0.00706Nm	
Power	1kW = 1.360PS (metric hp) 1kW = 1.341hp	1hp = 0.7457kW	
Moment of inertia	1kgm ² = 54674.75ozin ² 1gcm ² = 5.467 x 10 ⁻³ ozin ² 1kgm ² = 23.73lbf·ft ²	1ozin ² = 18.29 x 10 ⁻⁶ kgm ² 1ozin ² = 182.9gcm ² 1lb·ft ² = 0.0421kgm ²	
Pressure and stress	1N/m ² = 145 x 10 ⁻⁶ lbf/in ² 1N/m ² = 64.75 x 10 ⁻⁶ tonf/in ²	1lbf/in ² = 6.895 x 10 ³ N/m ² 1tonf/in ² = 15.44 x 10 ⁶ N/m ²	
Temperature	°C = (°F-32)*5/9 K = °C+273.15	°F = (°C*9/5)+32 °R = °F+459.67	
Angles	1rad = 180/π degrees 1mrad = 10.8/π arcmins	1 degree = π/180 rad 1 arcmin = π/10.8 mrad	

S.I. Multiples

Prefix name	Symbol	Factor
tera	T	10 ¹²
giga	G	10 ⁹
mega	M	10 ⁶
kilo	k	10 ³
hecto	h	10 ²
deca	da	10 ¹
deci	d	10 ⁻¹
centi	c	10 ⁻²
milli	m	10 ⁻³
micro	μ	10 ⁻⁶
nano	n	10 ⁻⁹
pico	p	10 ⁻¹²
femto	f	10 ⁻¹⁵
atto	a	10 ⁻¹⁸

Angular Resolution

Bits	Counts	arcmins	mrads
7	128	168.75	49.087
8	256	84.375	24.544
9	512	42.188	12.272
10	1024	21.094	6.1359
11	2048	10.547	3.0680
12	4096	5.2734	1.5340
13	8192	2.6367	0.76699
14	16384	1.3184	0.38350
15	32768	0.65918	0.19175
16	65536	0.32959	0.095874
17	131072	0.16479	0.047937
18	262144	0.082397	0.023968
19	524288	0.041199	0.011984
20	1048576	0.020599	0.0059921

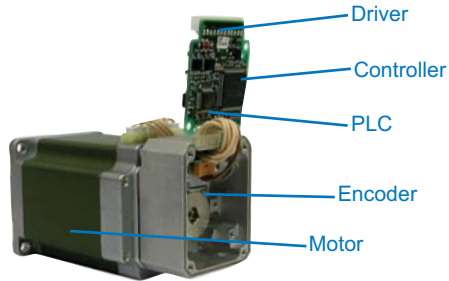


RELIANCE COOL MUSCLE FEATURES

The Reliance Cool Muscle (RCM) is packed with features that help you reduce the size and cost of your machine while reducing development time.

Simple and Compact

An intelligent driver with a 32 bit CPU based motion controller, driver amplifier, magnetic encoder and power management are all built on to the motor.

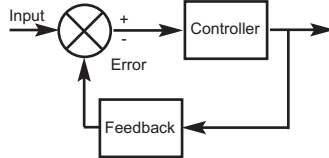


FULL CLOSED LOOP SYSTEM

RCM is a fully closed loop system. With a high resolution magnetic encoder and the intelligent driver board mounted on the back, RCM constantly monitors every aspect of its operation, eliminating any missed steps.

Closed Loop System

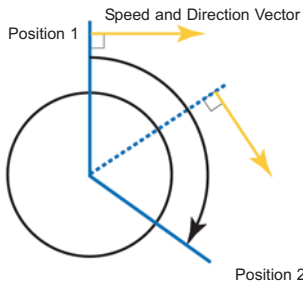
By receiving position input from the sensor, the RCM knows its position and can correct itself.



H ∞
Using the newest control technology, the RCM goes beyond static PID control by utilising the robust H ∞ control system. H ∞ responds to dynamic loads across the entire speed range, reduces the need to tune gains and increases the allowable inertia mismatch.

SMOOTH AND ACCURATE MOVEMENTS

The RCM's high resolution encoder gives you exceptionally fine positioning of 50,000 units per rotation. The RCM uses Vector Drive Control to produce incredibly smooth motion, even at low speeds, not possible with micro-stepping drivers.



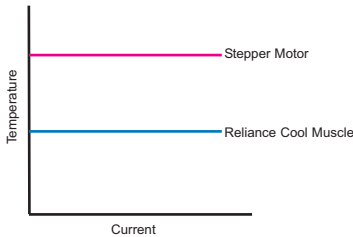
Vector Drive Control

Vector Drive is a control technique used in servo systems, it is a completely different technique from micro-stepping. Unlike micro-stepping, Vector Drive Control is not subject to resonance problems, produces smooth movements, increases torque and increases efficiency.



COOL OPERATION

RCM's power management monitors and provides the optimum current based on load, keeping the motor cool. In addition, the RCM generates high torque at low speeds.



RCM applies optimum current to produce motion, whereas an open loop stepper always uses maximum current.

RCM has high torque even at low speeds and excels at both smooth motion and slow speeds.



RCM only draws power for what it needs, making the RCM power efficient and increasing motor life.

Energy efficient

CONTROL

P-type RCM is a drop-in step loss free replacement for a step/direction or CW/CCW pulse drive.

C-type RCM takes ASCII commands or MODBUS RTU from your PC, PLC or use analogue (joystick) control.

	Control	Variations
 P Type	Pulses	CW/CCW Step/Direction
 C Type	PC Embedded Computer PLC Switch Analogue Input	Pre-programmed Dynamic Command Position Speed

FULLY USER PROGRAMMABLE

Program the RCM to create the motion you need. Define motion profiles and create programs using easy-to-understand RCM Language (RCML). Motion programs you create can be downloaded to the RCM. The programs can be executed via PC, embedded computer or simply using hardware inputs.

RCML

Reliance Cool Muscle Language allows easy creation of motion programs. Programs can be downloaded to the RCM using free CoolWorks software available from:

www.rpmechatronics.co.uk

P1=1000
P2=2000
S1=200
S2=300
A1=50
A2=150
T1=20

Define motion profiles such as speed, acceleration position and timer.

B1
A1,S1,P1
S2,P2,P1
C2
B2
A2,S1,P3

Define motion programs using the motion parameters defined above.



USER DEFINABLE PARAMETERS

Define the character of your RCM to suit your needs. The RCM gives you over 60 parameters which can easily be set using RCML.

K48=10000	••• Origin offset distance set to 10000 pulses.
K58=200000	••• Software limit + side set to 200000 pulses.
K37=3	••• Motor resolution set to 1000.
K46=1	••• Automatic home routine using mechanical stopper.
K38=0	••• Sets analogue interface to speed control mode.

PARAMETER EXAMPLES:

Home Search Method

The home search parameter lets you select a home search method. Home position can be determined using a hard-stop/bumper instead of a home switch. The RCM hits a bumper at low speed and torque and keeps pushing until it reaches a specified current level at which the motor determines that it has reached home. This method eliminates the need for a home switch and wiring.

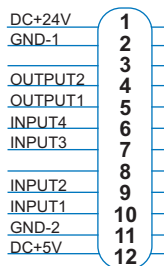
Software Limit

Set software limits using RCM parameters. Set limits on both CW and CCW sides, to eliminate switches.

These two software features will save you the cost of three sensors and the time needed to install wiring and calibrate them.

PROGRAMMABLE I/Os

Configure and assign multiple functions to I/Os on the RCM. The RCM has 4 inputs and 2 outputs that can be used as digital, analogue, serial or pulse counter (input only). RCM lets you assign a function to each point of a signal.



Input Function examples:

- Origin Sensor
- Manual Feed
- Manual Jog
- Execute Bank 1,2,3
- Origin Search
- Motor Free
- Enable Motor
- Execute Next Step
- Execute Previous Step

Output Function examples:

- Alarm
- In-position
- Analogue Output for Monitoring

ADVANCED MOTION

Speeds and accelerations can be changed whilst the motor is in operation. RCM supports a range of advanced motion features such as PTP motion incorporating varied accelerations and torque control. The powerful push mode is also standard allowing for electric emulation of common pneumatic operations.



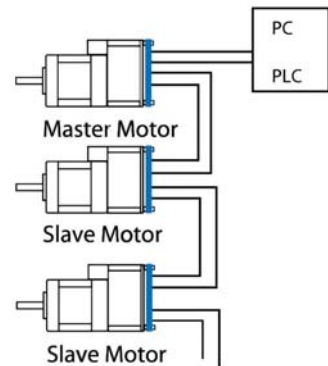
Continuous PTP: There are no stops in motion between origin and P3. Speed and acceleration are changed at each point.



Push Mode: Mimics a typical pneumatic motion. It keeps pushing for a given time and at a set current level when a motor encounters a resistance such as a bumper or stopper.

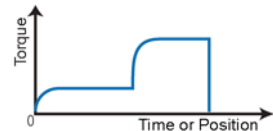
NETWORK

RCM provides you with different networking solutions to suit your needs. When multiple RCMs are connected in a daisy chain network, any RCM can tell other motors to activate programs as well as receive commands from a computer or embedded controller. In fact, after programming, RCMs can operate without any PC, PLC or HMI control.



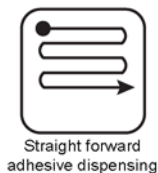
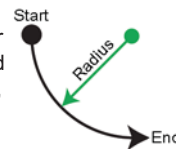
TORQUE CONTROL AND FEEDBACK

The RCM controller uses the integrated current and position sensors to maintain sophisticated torque control during operation. Peak running torque can be easily set within motion programs, or the built in Push Mode function can be quickly implemented to mimic pneumatic cylinder operations.



2-AXIS CO-ORDINATED MOTION

The RCM servo provides 2 axes contouring utilizing a 2+ motor daisy chain network. Additional linear axes can be implemented on the same motor for applications such as dispensing, cutting, or inspection. Programs can be run directly from the motor without the need for a host controller, or can be streamed from a PC for greater flexibility.



LOGIC PROGRAMMING AND PLC FUNCTIONALITY

The RCM real time operating system precisely controls I/O timing allowing for PLC style I/O operation. Logic banks provide a flexible logical and mathematical capability analogous to that offered by traditional ladder logic. User defined actions can be triggered by external inputs or by internal motor conditions such as speed, torque, or position.



INTRODUCTION

Stepper motors operate by rotating the motor shaft at discrete intervals (1.8° for our steppers) as they receive electrical input pulses. This basic characteristic distinguishes stepper motors from other motors and makes them ideal for applications where accurate positioning and control is required, without the need for expensive feedback hardware.

FEATURES OF STEPPER MOTORS

- Position holding - (Detent torque) Even with no power applied to the windings, stepper motors will resist rotation, which may be useful in applications that would normally experience 'drift'. If power is applied, this holding torque is significant.
- High acceleration - They have excellent acceleration performance that allows a start, stop and reverse to be performed at relatively high speed.
- Good reliability - The only components subject to wear are the bearings, as there are no brushes or commutators.
- Low component count - Stepper motors permit open-loop, high precision positioning control, therefore feedback hardware for control is not required, which leads to low cost system design.

DRIVE METHODS

There are three main modes of driving a stepper motor - Full Step, Half Step and Micro Step. With Full Step, the angular movement is the basic step angle, ie 1.8° . By manipulating the energisation sequence applied to the motor, it is possible to reduce the basic step angle by half. By manipulating the shape of the pulses applied to the motor, as well as the energisation sequence, the basic step angle can be split into several hundred micro steps. This large increase in resolution can only be achieved by using more complex drive electronics.

There are a number of methods of driving stepper motors, that basically divide into two groups; unipolar and bipolar drives. In unipolar drives the current always travels through the windings in the same direction. This is often achieved by attaching one end of each winding to a fixed voltage supply rail. With bipolar drives the current travels in both directions, which can give benefits in performance, although it usually requires more switching components. In both cases additional components such as resistors are often used to adapt a drive to a specific motor or to modify the characteristics of the motor-load system.

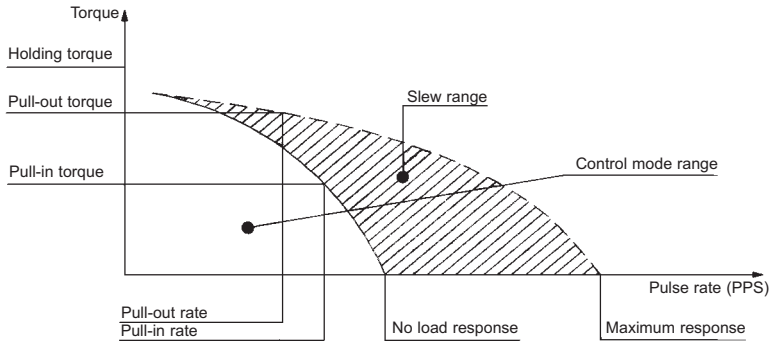
Our stepper motors have 6 wires, which allow the user to chose between unipolar and bipolar drives. Steppers with less wires do not.

The design and implementation of a suitable drive for a specific application can be quite an involved process and is outside the scope of this technical section. For further advice please contact Reliance Technical Sales.

Insulation parameters: Dielectric Strength: 500VAC
Insulation Class: Class B
Insulation Resistance: 100M Ω (500 VAC)

DEFINITIONS AND CHARACTERISTICS

The following definitions are frequently used in stepper motor drive systems. By considering these and the typical performance graph below an appreciation of the overall expected performance can be achieved. However, it is important to realise that any performance graph is a combination of drive, motor and load characteristics applied to a specific application duty cycle.



- Pull-out torque - Maximum torque that can be applied to a motor, running at a given stepping rate, without losing synchronism.
- Pull-in torque - Maximum torque against which a motor will start at a given pulse rate, and reach synchronism without losing a step.
- Detent torque - Maximum torque that can be applied to the shaft of an unexcited motor without causing rotation.
- Holding torque - Maximum torque that can be applied to the shaft of a motor with one or more phases energised without causing rotation.
- Pull-out rate - Maximum switching rate at which a loaded motor will remain in synchronism for a given load.
- Pull-in rate - Maximum rate at which a motor will start and run in synchronism for a given load.
- No load response - Maximum switching rate at which an unloaded motor can start and achieve synchronism, or stop without losing step position.
- Control mode range - Range of speeds and torques within which the motor will start, stop or reverse without losing synchronism.
- Slew range - Range of switching rates between pull-in and pull-out in which a motor will run in synchronism but can not start or reverse.

INSTALLATION

- Connections - Size 17 steppers have 200mm cables with a EHR-6 connector (JST). Mating parts are available from RS components; top entry (stock no 515-1434) or side entry (stock no 515-1349).



In addition to these conditions of sale, our standard Conditions of Sale also apply. A copy of these is available on request and from our website www.rpmechatronics.co.uk/en/help

Minimum order charge - Orders are subject to a minimum order charge of £25.00 unless they have been placed on our website at www.rpmechatronics.co.uk

Carriage and packing - Additional charges are made for carriage and packing.

Payment - Payment terms are 30 days. New customers are requested to complete an application form for a credit account. Customers who do not have a credit account with Reliance are requested to supply cheque with order. In addition, orders may be paid for by Visa and Mastercard.

Telephone orders - An order number must be quoted by customers and a written confirmatory order, clearly marked "CONFIRMATION", sent within 7 days. We reserve the right to supply parts against a telephone order. All telephone orders are accepted subject to these conditions of sale and those detailed on the acknowledgement of order. An acknowledgement will normally be sent by Reliance on receipt of order and goods will be supplied in accordance with the order acknowledgement.

Certificates of Conformance - Reliance's quality management system is certified to AS9100 and ISO 9001. A Certificate of Conformance can be supplied at an additional charge of £10.00 per delivery. Alternatively, a Certificate with full material traceability can be supplied at a charge of £20.00 per delivery.

Confirmation - All orders, other than telephone orders with a value of less than £500 and orders placed through our website, are subject to acceptance in writing by Reliance Precision Mechatronics.

Order amendments - Order amendments are subject to our approval and a charge will be made for reasonable compensation for any costs incurred.

Returns - Unused items may, solely at our discretion, be accepted for credit within 90 days of delivery. Any parts so accepted will be subject to a 20% service charge for re-inspection and handling. No credit can be allowed after the above period, or for any used or modified part, or for parts manufactured to a customer's specification.

Additional charges - Reliance reserves the right to charge for all additional expenses and taxes incurred over and above published prices (including without limitation duty, VAT, exchange rate fluctuations etc.)

Alterations - As a result of continuous product development, Reliance reserves the right to alter prices and other details without prior notice and to change dimensions where this does not affect the function of the item.

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