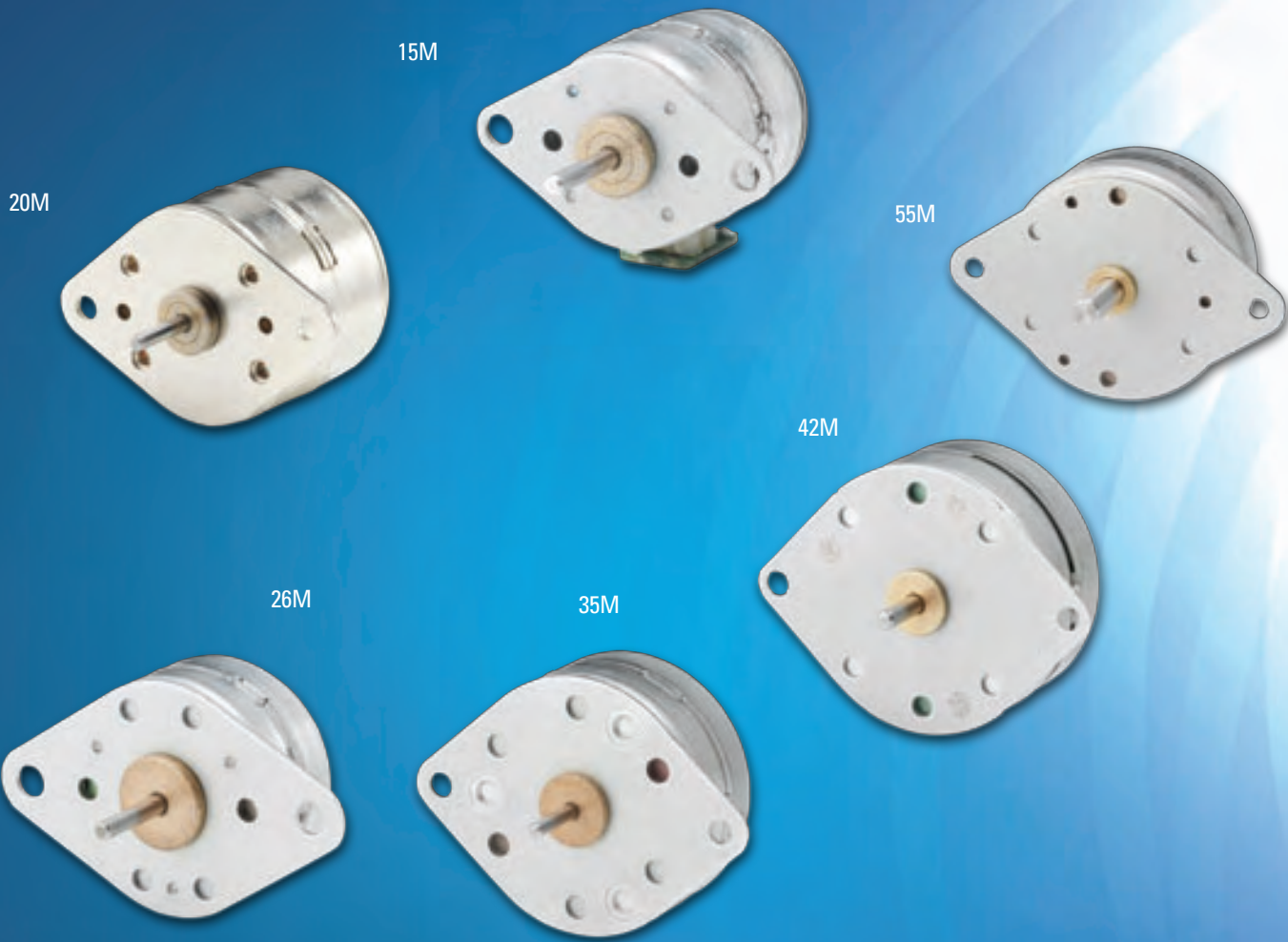


CANSTACK STEPPER MOTORS



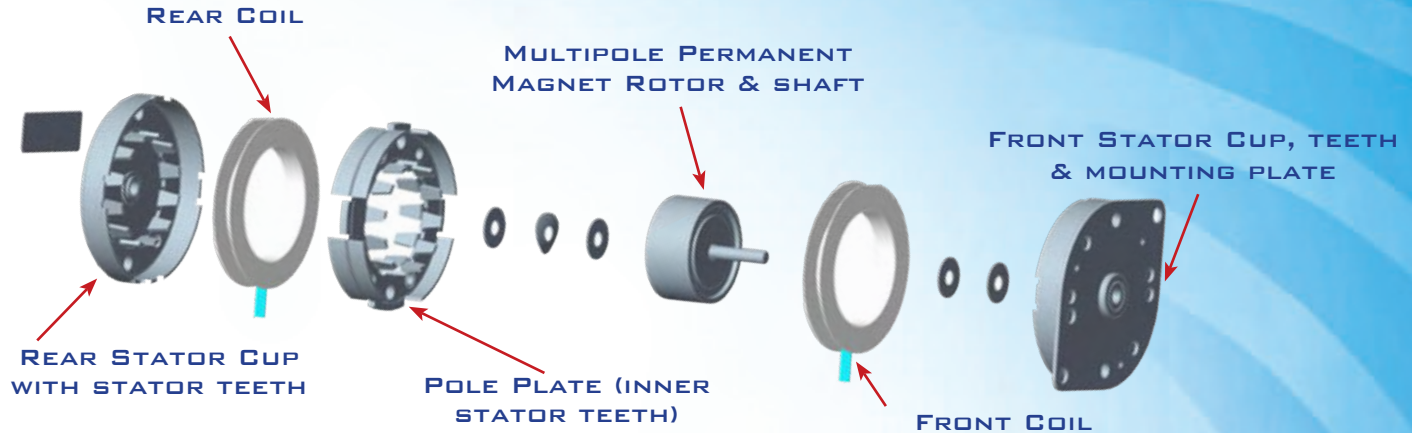
Portescap

Portescap can trace its roots back to the design team who invented the Permanent Magnet Stepper and AC Synchronous Motor. Today, this technology is found in a wide variety of applications for good reason – they have the accuracy and torque to match the needs of our customers. Portescap has one of the broadest range of CanStack solutions on the market today. Portescap’s CanStack motors are intentionally basic to deliver a simple and effective motion solution for your application.

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WHY A CANSTACK MOTOR



INNOVATION & PERFORMANCE

Can Stack motion technology focuses on simplicity. This permanent magnet stepper motor uses the simplest of techniques and designs to create an effective solution for many applications, where reasonable accuracy and moderate torque are required. Portescap can trace its stepper heritage back to the invention of the can stack step motor. This is one reason why we offer one of the widest ranges of motors in the industry today, ranging from 15 mm to 55 mm in both the permanent magnet and AC families.

In today's business environment, there is often a critical need to customize the motors to allow for easier integration into the machine and to reduce the overall assembly time of the design.

For example, a motor with a custom pinion, a connector on the end or flying leads of a specified length and fitted to a plastic moulded assembly can easily be provided by Portescap's design engineering team. We can also help you explore even more complex designs to further improve the integration and total assembly time of your entire motion system.

Our experienced team of design engineers can customize to your needs to simplify your design and develop a "plug and play" integrated motion solution for your machine. For this reason, Portescap is often chosen by many of today's leading device manufacturers in the Medical, HVAC&R, and Office Automation industries.

STANDARD FEATURES

PERMANENT MAGNET MOTOR

- Holding torques from 0.5 - 26 oz. in (3 - 180 mNm)
- Market standard frame sizes - 15, 20, 26, 35, 42, 55
- Step angles from 3.6, 7.5, 15, 18 deg (100, 48, 24 or 20 ppr)
- Sintered bearings

AC SYNCHRONOUS MOTOR

- Running torques from 0.3 - 16 oz. in (0.38 - 115 mNm)
- AC supply voltages typically 24, 120 or 230VAC
- Synchronous speeds from 250 rpm (300) to 500 rpm (600) (50 or 60Hz)
- Sintered bearings
- Reversible
- RoHS compliant

YOUR CUSTOM MOTOR

- **Coil modifications – resistance & inductance**
- **Magnets – to yield higher torque or reduced detent levels**
- **Reduced or increased detent torque**
- **Shaft modifications, including hollow shafts**
- **Special flanges**
- **Threaded shaft to make external linear actuators**
- **Connectors**
- **Lead variations, shrink tubing**
- **Clutch magnets**
- **Pinions & gears**
- **Complete sub-assemblies & drive trains**
- **Dampers**
- **Ball bearings**

CANSTACK MOTOR OPERATION

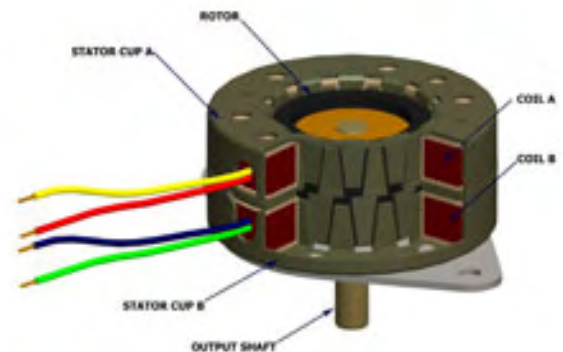
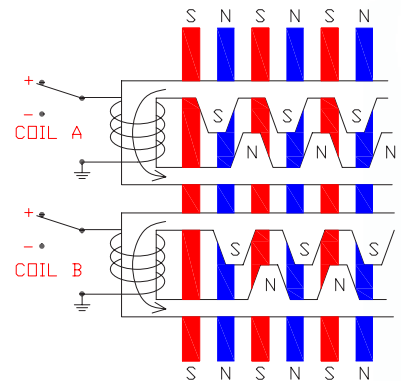
WHAT IS A PERMANENT MAGNET STEPPER MOTOR

CanStack motors are usually 2 phase in construction. They consist of two stator cups with claw tooth poles formed around a winding creating the front of the motor and the same applies to form the rear. The rotor has the same number of pole pairs as the stator. The poles on each stator cup are constructed to be a half a pole pitch apart and with two coils this means there can be 4 discrete positions per pole pitch. A 2 phase motor, for example, with 12 pole pairs in each stator / coil sector will therefore have 48 steps per revolution or 7.5 degrees per step.

The stepper motor is an electromechanical device that converts electrical pulses into discrete mechanical movements, and therefore can be operated directly from a pulse train or a microprocessor. The shaft of a stepper motor rotates in discrete step increments when electrical command pulses are applied to it in the proper sequence. The motor's rotation has several direct relationships to these applied input pulses.

The sequence of the applied pulses is directly related to the direction of motor shaft's rotation. The speed of the motor shaft rotation is directly related to the frequency of the input pulses and the length of rotation is directly related to the number of input pulses applied. Error is non cumulative as long as step integrity remains.

Step angles for CanStack motors are usually 3.6 degree to 18 degree (or 100 steps per revolutions to 20 steps per revolutions).



ADVANTAGES

As the step error is non-cumulative, good accuracies are achieved across both long and short travel distances meaning costly positional feedback such as encoders can be eliminated. Motors can be operated in single step, half step or micro stepping device modes leading to improved accuracies, more torque and quieter operation. As well, the inherent detent torque can be used as holding torque.

- Excellent open loop control, no encoders necessary
- High continuous torque output per in³
- Digitally controlled, easy to use with a micro processor
- Cost effective
- Motors driven from same source maintain synchronism
- Maintenance free – motor is brushless
- Closed loop complications avoided with reasonable positional accuracy
- Unipolar and bipolar winding possibilities

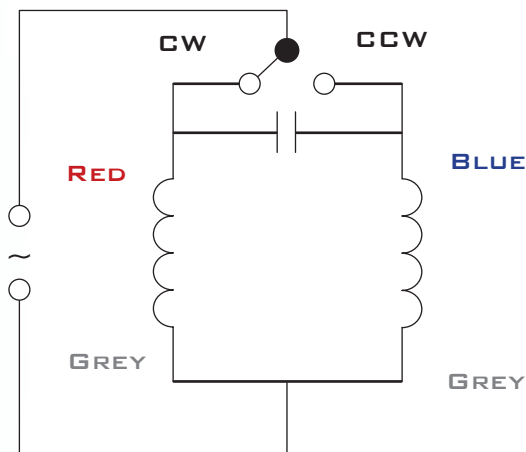


CANSTACK MOTOR OPERATION

WHAT IS AN AC SYNCHRONOUS MOTOR?

The AC Synchronous motors provided by Portescap are constructed in the same basic way as the permanent magnet motor except that each coil is supplied with AC voltage with a phase shifting capacitor across the coils. These motors run at fixed speed and are for continuous rather than intermittent duty (as is the case with step motors).

For example, the speed of a 12 pole pair design run operated using a 50Hz supply will deliver $60 \times 50 / 12 = 250\text{rpm}$. At 60Hz the speed would therefore be 300 rpm.



ADVANTAGES

- Operated from AC main supply
- Bi-directional operation simply by changing the connection of the capacitor
- Cost effective and long lasting
- Easy operation without special electronics or converters

HOW TO SELECT YOUR CANSTACK MOTOR

SELECTION CRITERIA

- The Torque – Speed Curves are essential for selecting the right motor and control drive method for a specific application.
- Define your application load – speed required, load inertia, torque and accuracy needed.
- If the application requires no acceleration, then use the pull out torque.
- If the load is inertial (acceleration is required), it is advisable to use pull in torque.
- Motor temperature rise is important – so ambient temperature and duty cycle are important selection factors
- It is advisable to use 1.5 to 2 times the margin over the maximum torque required.
- Choosing the correct drive is important – for example micro-stepping drives will provide quieter operation.
- Our engineering team is capable of designing a special coil with resistance and inductances to suit your needs.
- Remember – if it is not in the catalog – it does not mean that we cannot provide a solution for you - Portescap may still be able to design a product for your needs as our team can draw from a wealth of customized designs created over the past 40 years.



CANSTACK MOTOR DESIGNATION

26M048D2B

26

Motor
Diameter
(mm)
15
20
26
35
42
55

M

Rotor Dia
S = Small
M = Medium
L = Large

048

Steps per
Rev
020: 20 ppr
024: 24 ppr
048: 48 ppr
100: 100 ppr

D

Magnet Type
B = Ferrite
C = He Ferrite
D = Neodymium

2

Voltage
1 = 5 V
2 = 12 V

B

Coil
U = Unipolar
B = Bipolar



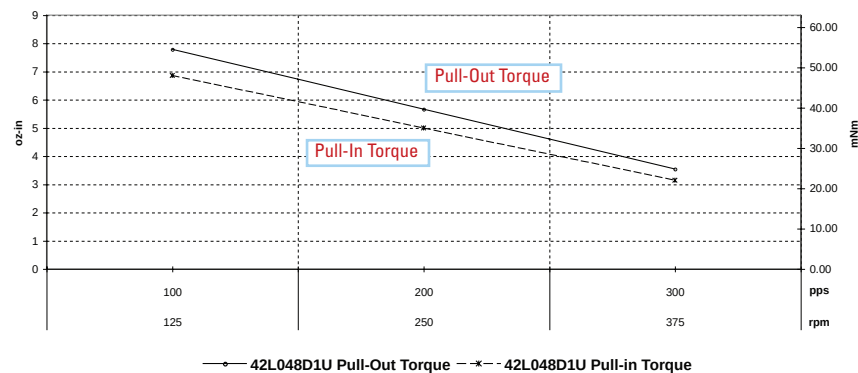
EXPLANATION OF SPECIFICATIONS

MOTOR PART NUMBER		42L048D1U		ADVANTAGES FOR THE APPLICATION
RATED VOLTAGE		vdc	5.00	Voltage rating of motor - motor can be run continuously at this voltage
RESISTANCE PER PHASE, $\pm 10\%$		ohms	5.20	Winding resistance dictated by magnet wire diameter and # of turns
INDUCTANCE PER PHASE, TYP		mH	2.10	Winding inductance dictated by magnet wire diameter and # of turns
RATED CURRENT PER PHASE *		amps	1.0	Current rating of motor - motor can be run continuously at this current
HOLDING TORQUE, MIN *		oz-in / mNm	15.1 / 106	When energized, the amount of torque to move from one mechanical step to the next
STEP ANGLE, $\pm 0.5^\circ$ *		degrees	7.5	360 deg / number of mechanical steps of the motor
STEPS PER REVOLUTION *		-	48	Number of mechanical steps of the motor
DETENT TORQUE, MAX		oz-in / mNm	4.2 / 29.7	When un-energized, the amount of torque to move from one mechanical step to the next
THERMAL RESISTANCE		$^\circ\text{C}/\text{watt}$	N.A	
ROTOR MOMENT OF INERTIA		oz-in-s ² / g-cm ²	0.1066 / 19.5	Inertia of the rotor
AMBIENT TEMPERATURE RANGE	OPERATING	$^\circ\text{C}$	-20 ~ +70	
	STORAGE	$^\circ\text{C}$	-40 ~ +85	
BEARING TYPE		-	SINTERED BRONZE SLEEVE	Bearings on front and rear of the motor
INSULATION RESISTANCE AT 500VDC		Mohms	100 MEGOHMS	
DIELECTRIC WITHSTANDING VOLTAGE		vac	650 FOR 2 SECONDS	
WEIGHT		lbs / g	0.2563 / 116.4	
SHAFT LOAD RATINGS, MAX AT 1500 RPM	RADIAL	lbs / kg	1.124 / 0.509	Maximum load that can be applied against the shaft
	AXIAL		0.337 / 0.153	Maximum load that can be applied directly down the shaft
LEADWIRES		-	AWG 26, UL 1430	
TEMPERATURE CLASS, MAX		-	B (130 $^\circ\text{C}$)	
RoHS		-	COMPLIANT	

ALL MOTOR DATA VALUES AT 25 $^\circ\text{C}$ UNLESS OTHERWISE SPECIFIED

* ENERGIZE AT RATED CURRENT, 2 PHASE ON

42L048D1U • TORQUE VS SPEED 5 VDC, FULL STEP, UNIPOLAR VOLTAGE DRIVE



DEFINITIONS

Pull-Out Torque	The amount of torque that the motor can produce at speed without stalling
Pull-In Torque	The amount of torque that the motor can produce from zero speed without stalling
Speed	# of pulses per second provided to the motor, also stated in revolutions per minute
Voltage	Voltage applied to the drive
Current	Current applied to the drive
Drive	voltage applied to drive and current dictated by motor resistance

WHERE TO APPLY YOUR CANSTACK MOTOR



MEDICAL & LAB AUTOMATION

- Pill dispensing
- Infusion & dosing pumps
- Portable analysers & printers
- Automated pharmacy systems
- Blood & plasma analyzers
- Kidney / dialysis pumps



HEATING, VENTILATION, AIR-CONDITIONING & REFRIGERATION (HVAC&R)

- Variable air valve
- Flap & damper actuators
- Use photo refrigeration
- Heating valve actuation systems
- Gas valve actuation systems
- Refrigeration valve actuation systems



OFFICE AUTOMATION

- Printers
- Copiers
- Data storage units
- Plotters
- Paper feed / sorting machines & devices



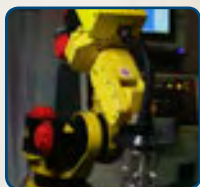
TEXTILE MACHINERY

- Autoconers
- Winders
- Yarn guides
- Stitching machines & cutting tables
- Sewing machines



TELECOMMUNICATION

- Antenna positioning
- Cellular phone masts & arrays
- Satellite dish radomes
- Radar arrays
- Antenna drives



OTHER INDUSTRIES & APPLICATIONS

- Robotics
- Factory automation
- Scientific measurement equipment & analyzers
- Timers & counter
- Locking mechanisms
- Vending & gaming machines

