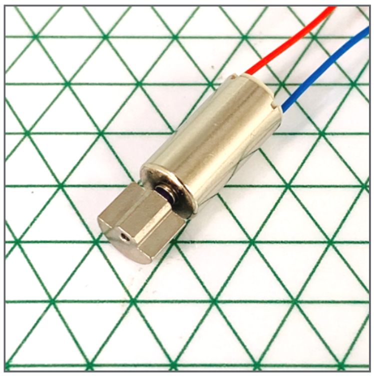
PRECISION MICRODRIVES™

Model No. 306-109

Product Data Sheet

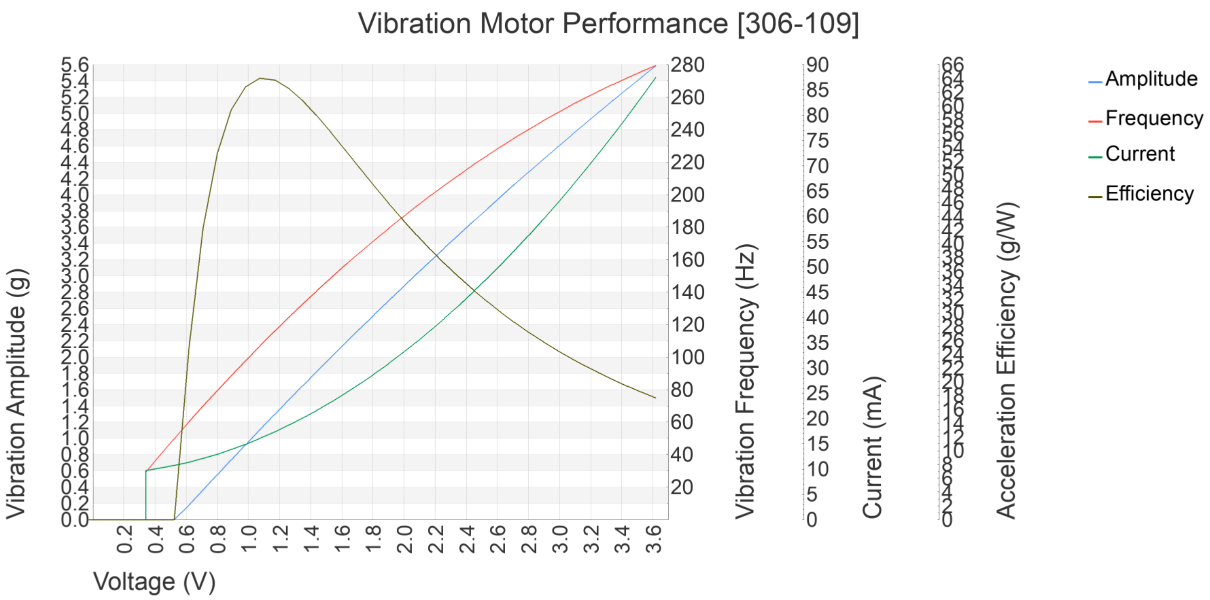
Range: Precision Haptic
Title: 6mm Vibration Motor
Type: Undefined
Model: 306-109



6mm Vibration Motor
12mm Type
Shown on 6mm Isometric Grid

KEY FEATURES	
Body Diameter	6 mm [+/- 0.1]
Body Length	12.2 mm [+/- 0.2]
Ecc. Weight Radius	2.9 mm [+/- 0.1]
Ecc. Weight Length	4.5 mm [+/- 0.1]
Rated Operating Voltage	3 V
Rated Vibration Speed	14,300 rpm [+/- 3,500]
Typical Rated Operating Current	66 mA
Typical Norm. Amplitude	4.51 G

TYPICAL DC MOTOR PERFORMANCE CHARACTERISTICS



ORDERING INFORMATION

The model number fully defines the model, variant and additional features of the product. Please quote this number when ordering. For stocked types, testing and evaluation samples can be ordered directly through our online store.

FIND OUT HOW THIS PART COULD MEET YOUR SPECIFICATIONS

Email: enquiries@precisionmicrodrives.com
Call: +44 (0) 1932 252482

Model No. 306-109

Looking for the perfect design? We can help.

Precision Microdrives is an ISO 9001:2015 trusted designer and manufacturer of miniature, cost-effective, and well engineered motors and mechanisms. We are specialists in,

- Trusted precision motor design
- Flexible motor & mechanism manufacturing
- Dependable quality control & after-sales support
- Industry leading motor testing and validation

Our UK based motor design engineers, will support you through the complex process of specifying, developing, validating, and mass manufacturing, a custom motor or mechanism. The result? A part perfect for your application.

Delivered, On-Time & To Spec.

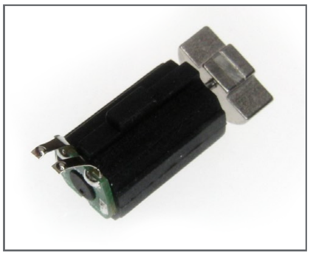
SPEAK TO OUR DESIGN ENGINEERS TODAY

Email: enquiries@precisionmicrodrives.com
Call: +44 (0) 1932 252482

DESIGN FOR APPLICATION CASE STUDIES

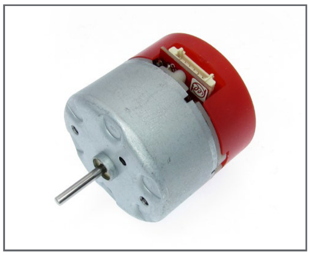
ENCAPSULATED VIBRATION MOTOR FOR A CPR TRAINING DUMMY

- Low volume, high value manufacturing
- Custom CNC machined enclosure
- Optimised haptic performance
- Custom PCB including EMI filters
- Part no. 334-401.001



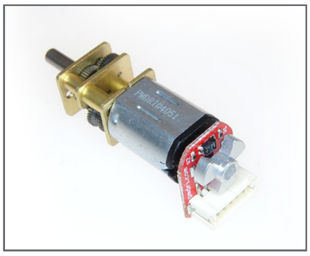
VIBRATION MOTOR HIGHLY OPTIMISED FOR RUGGEDISED FIRE AND POLICE EMERGENCY RADIOS

- High volume production
- Optimised for emergency services application
- Ruggedised design with custom rubber ‘suspension’ cover
- Custom PCB with spring legs for simplified production assembly times
- Part no. 308-104.001



PRECISION SPEED AND TORQUE CONTROLLED SERVO WITH INTEGRATED TUNABLE PID LOOP FOR SINGLE-USE SCIENTIFIC INSTRUMENT.

- Medium volume, high value assembly
- Proprietary PID controller converts cost-effective motor design into a precision servo
- Adapted control software including digital IO (to customer’s specification)
- Part no. 132-100.001



CUSTOMISED PRECISION GEAR MOTOR WITH ROBUST OPTICAL ENCODER

- High volume production
- Application specific output shaft
- Tailored motor performance curves
- Rear motor shaft with noise resistant optical encoder
- Part no. 212-116.001

PHYSICAL SPECIFICATION

PARAMETER	CONDITIONS	SPECIFICATION
Body Diameter	Max body diameter or max face dimension where non-circular	6 mm [+/- 0.1]
Body Length	Excl. shafts, leads and terminals	12.2 mm [+/- 0.2]
Unit Weight		2.7 g
No. of Output Shafts		1
Ecc. Weight Radius	Radius from shaft for non-cylindrical weights	2.9 mm [+/- 0.1]
Ecc. Weight Length		4.5 mm [+/- 0.1]

CONSTRUCTION SPECIFICATION

PARAMETER	CONDITIONS	SPECIFICATION
Motor Construction		Coreless
Commutation		Precious Metal Brush
No. of Poles		3
Bearing Type		Sintered Bronze

LEADS & CONNECTORS SPECIFICATION

PARAMETER	CONDITIONS	SPECIFICATION
Lead Length	Lead lengths defined as total length or between motor and connector	45 mm [+/- 2]
Lead Strip Length		2 mm [+/- 0.5]
Lead Wire Gauge		32 AWG
Lead Configuration		Straight

OPERATIONAL SPECIFICATION

PARAMETER	CONDITIONS	SPECIFICATION
Rated Operating Voltage		3 V
Rated Vibration Speed	At rated voltage using the inertial test load	14,300 rpm [+/- 3,500]
Max. Rated Operating Current	At rated voltage using the inertial test load	117 mA
Max. Start Voltage	With the inertial test load	1.4 V
Rated Inertial Test Load	Mass of standard test sled	100 g
Max. Operating Voltage		3.6 V
Min. Vibration Amplitude	Peak-to-peak value at rated voltage using the inertial test load	2.8 G
Max. Start Current	At rated voltage	250 mA
Min. Insulation Resistance	At 50V DC between motor terminal and case	1 MOhm

FIND OUT HOW THIS PART COULD MEET YOUR SPECIFICATIONS

Email: enquiries@precisionmicrodrives.com
Call: +44 (0) 1932 252482

Important: The characteristics of the motor is the typical operating parameters of the product. The data herein offers design guidance information only and supplied batches are validated for conformity against the specifications on the previous page.

TYPICAL PERFORMANCE CHARACTERISTICS

PARAMETER	CONDITIONS	SPECIFICATION
Typical Rated Load Power Consumption	At rated voltage and load	225 mW
Typical Rated Operating Current	At rated voltage using the inertial test load	66 mA
Typical Vibration Amplitude	Peak-to-peak value at rated voltage using the inertial test load	4.51 G
Typical Start Current	At rated voltage	170 mA
Typical Vibration Efficiency	At rated voltage using the inertial test load	22.93 G/W
Typical Norm. Amplitude	Peak-to-peak vibration amplitude normalised by the inertial test load at rated voltage	4.51 G
Typical Start Voltage	With the inertial test load	0.4 V
Typical Terminal Resistance		16 Ohm
Typical Terminal Inductance		90 uH

TYPICAL HAPTIC CHARACTERISTICS

PARAMETER	CONDITIONS	SPECIFICATION
Typical Lag Time	At rated voltage using the inertial test load	8 ms
Typical Rise Time	At rated voltage using the inertial test load	35 ms
Typical Stop Time	At rated voltage using the inertial test load	80 ms
Typical Active Brake Time	Time taken from steady-state to 0.04 G under inverse polarity at max. voltage	20 ms

TYPICAL DURABILITY CHARACTERISTICS

PARAMETER	CONDITIONS	SPECIFICATION
Typical Min. Counterweight Pullout		9.8 N
Mean Time to Failure	Typical rated lifetime. Actual operating life depends on application	216 hours

ENVIRONMENTAL CHARACTERISTICS

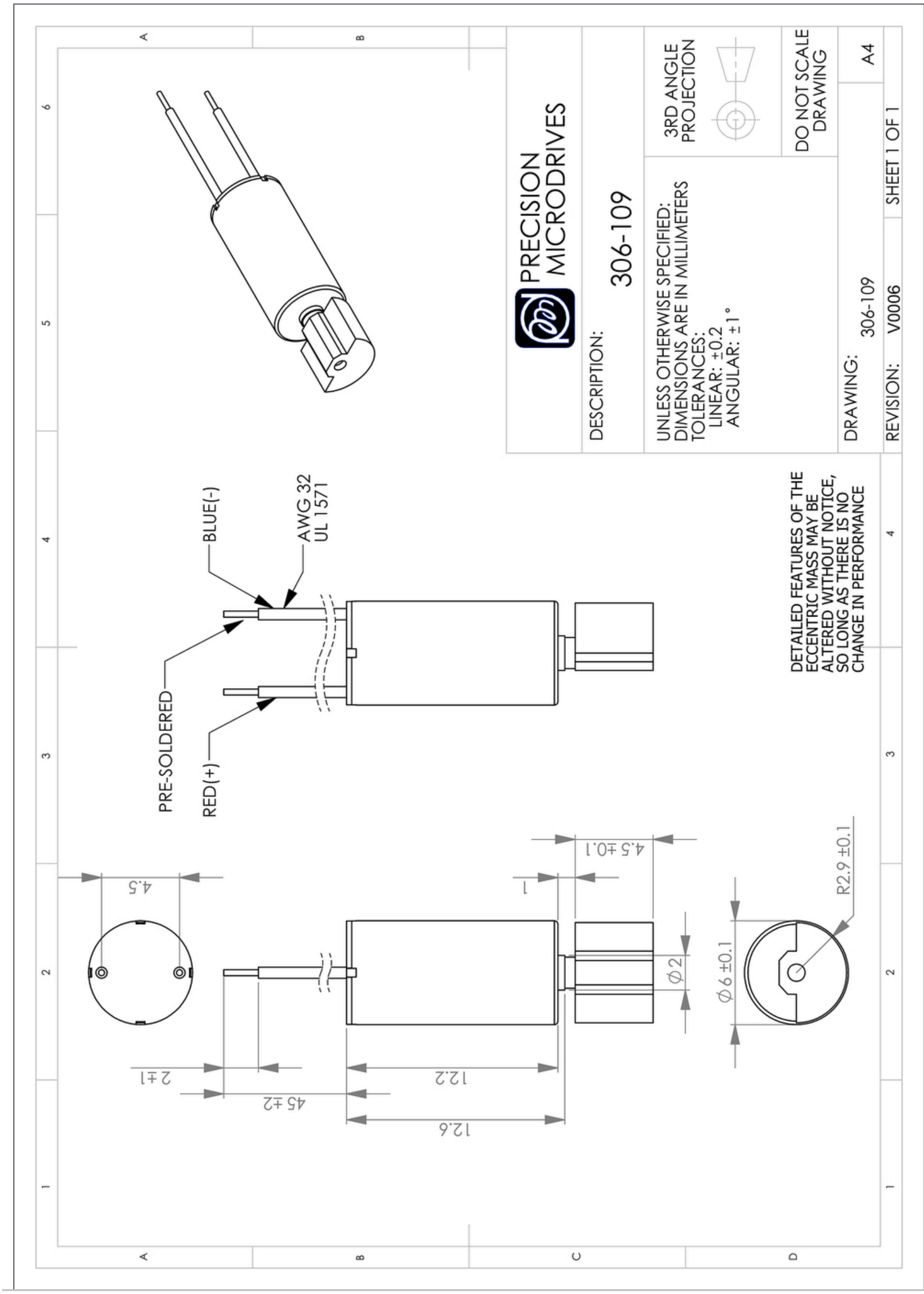
PARAMETER	CONDITIONS	SPECIFICATION
Max. Operating Temp.		60 Deg.C
Min. Operating Temp.		-20 Deg.C
Max. Storage & Transportation Temp.		80 Deg.C
Min. Storage & Transportation Temp.		-20 Deg.C

Email: enquiries@precisionmicrodrives.com
Call: +44 (0) 1932 252482

TYPICAL PACKING CONDITIONS

PARAMETER	CONDITIONS	SPECIFICATION
Carton Type		Boxed trays

PRODUCT DIMENSIONAL SPECIFICATION



FIND OUT HOW THIS PART COULD MEET YOUR SPECIFICATIONS

Email: enquiries@precisionmicrodrives.com
Call: +44 (0) 1932 252482

Haptic Characteristics

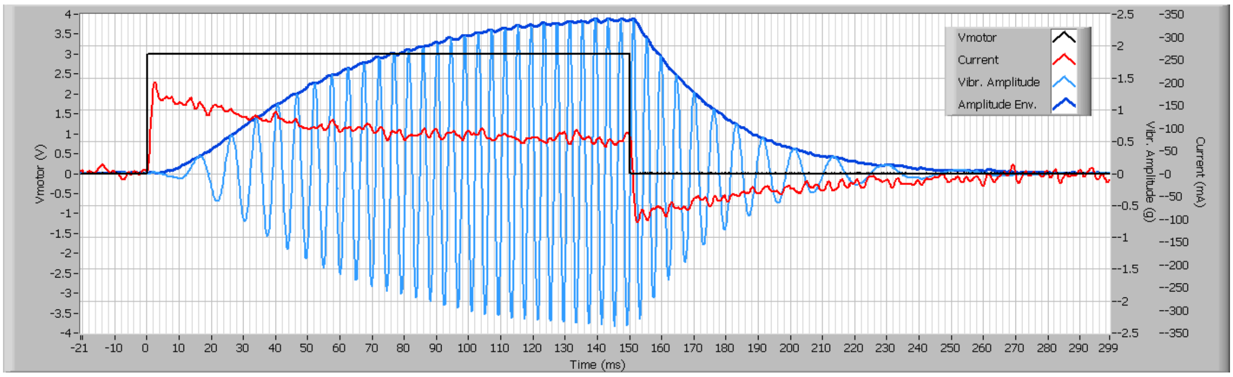
This section presents information regarding the performance of the motor for haptic feedback applications. The tests performed are equivalent to Immersion's TS2000 Actuator Performance Test for certified actuators.

Step Response applies the motor's rated voltage for set time - operating current, vibration amplitude are measured. The haptic parameters are calculated from the results. The negative current is a result of back EMF from the motor.

Overdrive Step Response is similar, but includes a period of overdrive (using the motor's maximum voltage instead of rated voltage) before falling to the rated voltage once vibration amplitude reaches 90% of rated amplitude. Concludes with active brake period where the maximum voltage is applied with reversed polarity until the vibration amplitude is less than 0.04 G.

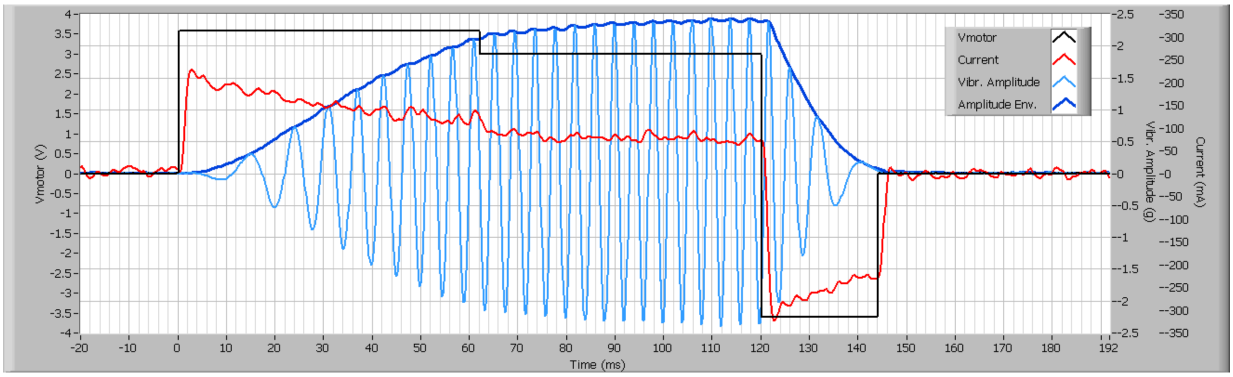
Step Response

PARAMETER	CONDITIONS	SPECIFICATION
Typical Rise Time to 50%	**Time to get to 50% of the rated amplitude at rated voltage**	**42 ms**
Typical Rise Time to 90%	**Time to get to 90% of the rated amplitude at rated voltage**	**92 ms**
Typical Stop Time	**Time to stop the motor when the voltage is removed**	**104 ms**



Overdrive Step Response

PARAMETER	CONDITIONS	SPECIFICATION
Typical Overdrive Rise Time to 50%	**Time to get to 50% of the rated amplitude at maximum voltage**	**33 ms**
Typical Overdrive Rise Time to 90%	**Time to get to 90% of the rated amplitude at maximum voltage**	**60 ms**
Typical Brake Time	**Time to stop the motor when the voltage is reversed to negative maximum voltage**	**25 ms**



Reliability Analysis

This section presents information regarding the longevity test performed on the motor. The Mean Time to Failure reported in this page should not be interpreted as a guaranteed lifetime. Please check our Application Notes for further information.

Our longevity test consists of powering the motors at their rated voltage for 2 seconds, then turning them off for 2 seconds. This cycle is repeated over the total test time.

The test is performed by our custom longevity machine which drives the motors and collects performance data. The test parameters and results can be seen below.

Test Parameters

- Motors tested: 48
- Test time: 720 hours
- Cycle period: 4 seconds
- Duty cycle: 50%
- Test voltage: 3.0 V
- Temperature: 33 °C

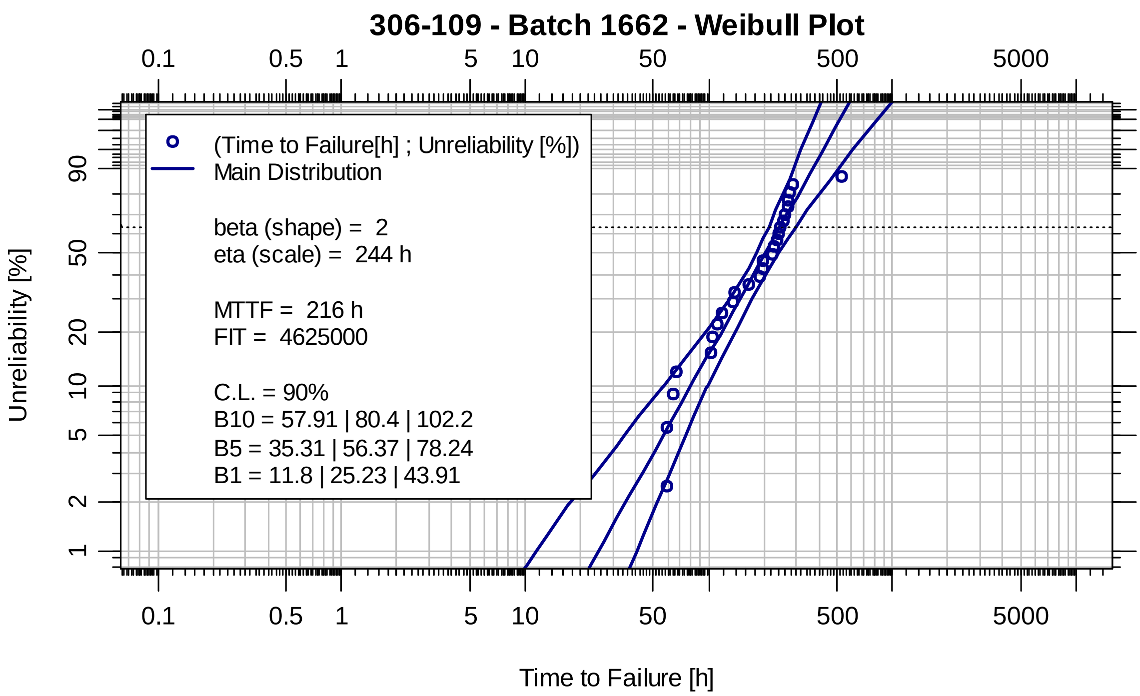
Formulas to derive the key reliability figures from a Weibull distribution:

$$MTTF = \eta * \Gamma\left(1 + \frac{1}{\beta}\right)$$

$$FIT = 10^9/MTTF$$

Test Result

The results for the longevity test are presented in a Weibull plot. From the fitting distribution it is possible to obtain an estimate of the Mean Time to Failure.



HOW TO ORDER

Call or email us with your order requirements at:
Email: **enquiries@precisionmicrodrives.com**
Phone: **+44 (0) 1932 252482**

Please quote the full part number when ordering or making an enquiry. Some products can be ordered in smaller volumes directly from our website: **www.precisionmicrodrives.com**

DATASHEET REVISION AND VERSION NUMBERING

We aim to provide ou customer with the most detailed product information available. Sometimes changes are necessary, and these will be controlled by our engineering change request and notification process. To track datasheet versions we use both a 'production revision number' and a 'document version number'. These can be found at the bottom of every page. Inc some cases, such as documentation errors, the document version number can increase without triggering a product revision.

LIFE SUPPORT AND MISSION CRITICAL APPLICATION POLICY

PRECISION MICRODRIVES PRODUCTS ARE NOT AUTHORISED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR OTHER CRITICAL APPLICATION SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF PRECISION MICRODRIVES LIMITED.

As used herein:

1. Life support devices or systems are devices or systems which,
    1.1. are intended for surgical implant into the body, or
    1.2. support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user or a third party.
2. A critical component is any component of a life support device or any other system or machine whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

BATCH NUMBERING, MANUFACTURING, TRACEABILITY AND LABELLING

Every part of manufactured by Precision Microdrives is at minimum identified and traced via a batch number. Where physically practical, we try to make each part with a batch number. In addition, some parts carry a lot code or barcode serial numbers. If traceability is a core requirement for your purchase, let us know and we'll outline the production options for you.

STANDARD QUALITY CONTROLS AND ISO 9001

Precision quality control is one of our 3 key competitive advantages. All motors that we produce undergo 100% line inspection followed by strict and detailed batch sample testing in accordance with ISO 2859. All of the processes operated at Precision Microdrives are managed within our ISO 9001 quality system.

Precision Microdrives Limited
Unit 1.07, Canterbury Court
1-3 Brixton Road
London
SW9 6DE
United Kingdom

Tel: +44 (0) 1932 252482
Fax: +44 (0) 1932 325353
Email: enquiries@precisionmicrodrives.com
Web: www.precisionmicrodrives.com
Registered in England and Wales No. 5114621
VAT Registration. GB 900 1238 84.

