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-1 High	Organization
0 High	Organization
1 High	Packaging
2 High	Packaging
3 High	Packaging
4 High	Connectors
Medium	Power
5 High	Connectors
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11 High	Measurement
12 High	Measurement
13 High	Measurement
14 High	Measurement
15 High	Measurement
16 High	Measurement
17 High	Measurement
18 Medium	Measurement
19 Medium	Measurement
20 High	Measurement
21 High	Measurement
22 High	Measurement
23 High	Measurement
24 Low	Measurement
25 Low	Measurement

26 Medium	Measurement
27 High	Measurement
28 High	Measurement
29 High	Measurement
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31 Low	Measurement
32 High	Parts
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34 Low	Tuning
35 High	Profiles
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39 High	Profiles
40 Medium	Profiles
41 High	Output
42 Low	Output

Description

The project shall be open source. All artifacts shall be publicly available.

There shall be a commercial model that shall return value to the project's participants.

Shall be attractively and robustly packaged in a fixture.

There shall be a way to firmly attach a motor to the tester while it is being tested.

There shall be a way to enclose the motor under test so that in case it malfunctions or is accidentally overdriven the tester shall not be harmed.

The tester shall have input voltage connections by which to connect a DC voltage.

The input voltage source shall be able to provide a series of fixed steps of input voltages.

Shall have output connections for U/V/W motor phases.

Connectors shall be properly and appropriately sized for mechanical and electrical loads.

Shall permit a slot car controller to be plugged in using standard banana plugs.

Shall be externally powered from a bench power supply capable of providing power similar to that available at most tracks.

Shall be optionally capable of sinking return, braking power.

Shall measure motor speed (Kv).

Shall NOT measure Kv.

Shall measure input voltage.

Shall measure input current.

Shall measure motor input current.

Shall measure motor braking current.

Shall measure motor voltage.

Shall measure eRPM.

Shall measure motor phases resistances.

Shall measure motor phases inductances.

Shall be able to measure a loaded motor.

Shall measure motors in the range 1,000Kv to 28,000Kv

Shall be able to know motor poles.

Shall be able to test 6, 8, 12 magnet motors.

Shall measure motor weight.

Shall measure motor rotational mass.

Shall measure motor thermal emissions.
Shall operate with input voltages between 1V and 18V.
Shall have a capability to limit the maximum input voltage.
Shall have the capability to limit the maximum input current.

Shall measure motor balance.
Shall measure motor shaft accuracy.
Shall contain a standard eCom.

Shall support alternative eComs.

Shall be able to tune Remora eCom parameter settings to optimize motor performance.

Shall be able to setup and run test profiles.

Shall show realtime test information.
Shall be able to persistently save the results of a test.
Shall be able to label a test to associate it with a specific motor.
Shall be able to export test results to a common file format e.g. csv
Shall be able to compare test results.
Shall be able to calculate and display various important motor parameters.
Shall be able to make gearing recommendations.

Notes

Which OS license?

Assume a 3D printed enclosure that contains the parts, exposes the connectors and mounted the motor etc.

Assume the motor might have a synthetic load attached – like a flywheel or propeller.

“the tester” is the person running the device.

Need to provide a start voltage say 2.4V, a low voltage – say 5.5V a high/medium voltage say 10V and a maximum voltage say 12.4V

Range: 0-18V, 0-40A

Range: 0-20A

Optical or hall effect or both. Hall effect is affected by (non)ferrous motor rotor (bell) materials. Note: Technically, Kv is the output voltage when the shaft is rotated.

Kv is defined as the velocity constant in rpm/V. Ke is the back emf constant. In SI units is V/(rad/s) or in hobby units V/rpm. It is an inverse measure of Kv

Kv is the back emf voltage produced when the motor shaft is rotated. The tester shall not have a capability to rotate the shaft and measure the resulting Kv.

This capability might best be provided by using an external instrument and not incorporating it into the device itself.

Ditto

Ditto

Ditto

Ditto

The eCom commutation rpm. Available from the Remora WiFi link.

Using a flywheel, propeller, fluid drag ...

Note: the upper limit may extend based on motor innovations.

Needs to be input to the device.

3, 4, 6 pole pairs.

External capability.

External capability.

To measure the stator winding, it might be necessary to bond a thermocouple which would mean opening the motor to insert it, and a thermocouple meter. Perhaps an IR thermometer can “see” the winding, if it can be positioned close enough, and it might need to have adjustable emissivity settings. See:

<https://cpc.farnell.com/duratool/d03129/digital-therm>
<https://cpc.farnell.com/unbranded/tk-610b/thermom>
<https://cpc.farnell.com/duratool/d03055/thermomete>

External capability or perhaps accelerometer on the testing fixture.
External capability.
Probably the Remora – obvious reasons.

If they can support other required capabilities. Might be out of scope. Might be best done with a controllable power supply and scope.

The motor shall be run for a specific time at a specific voltage while values are captured, before increasing the voltage in multiple steps. Means it'll need an mcu with DAC output – Pi Pico?

Probably need some sort of attached display.

Will require track input and a simulator.