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USE

This controller was designed to control the many databus based power steering assist systems.

There's the electric hydraulic pumps used in Mazda, Ford, Nissan, Dodge, which are all based on the principle of replacing the normal hydraulic engine driven pump, with an electric motor. They are the usual swap as they are the easiest to install and control, as it only requires the modification of two hydraulic hoses. They also seem to retain the most “steering feel”. Another little bonus is the price. They are generally much cheaper to get due to being installed on a number of economy cars.

Then there's the column assist. These are motors mounted on the steering column itself. These were used in a bunch of 2000’s economy cars like prius. Nowadays they find themselves on newer cars such as Nissans, Gt86/BRZ/FRS. Not many pros for this style, except for when you have very little space under the hood, or really don’t want to install an electric rack. They also have a limited amount of steering torque. That being said, cheap, but hard to install.

Finally, theoretically the best option, there's the electric racks. These are cars that have the steering assist motor directly built into the steering rack itself. They generally are barely larger than the original rack, however also require quite a bit more work to install. You’d have to find an appropriate sized rack, with the appropriate amount of turns. Installing is also quite an ordeal. They are used on almost every car nowadays, from Tesla, Audi, Bmw, Nissan, Mini, GM & etc.

The point of swapping one of these systems in your car is of generally a wide variety, but the majority is either for drift cars, where you are constantly damaging your pump due to high RPMs, high temps, and constantly living in a lock to lock position, to normal street cars, that may have a space limitation or an issue with integration of original steering system to the engine.

This controller is designed to have the ability to control any number of these systems. As of its creation, I do not have that many pumps reverse engineered, but will continue to figure them out.

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The steering systems that I know about that I will be controlling for sure are the following:

EHPAS
Volvo C30, c50, v40
2014-2015 Altima
2015-2018 Altima
2015-2018 Murano
2004-2010 Mazda 3&5
2010-2012 Mazda 3&5
2002-2005 Mini Cooper

Rack EPAS
Tesla
2007 Cobalt
2012 Camaro

Column EPAS
2000s Saturn Vue
2012-2014 Kia Soul
2007-2009 Nissan Versa
2009-2012 Nissan Cube
2018 Nissan rogue
2006-2011 Toyota yaris
2009-2013 Toyota Corolla
2004-2009 Toyota Prius

This is not an extensive list, and I am more than happy to add new vehicles when found by consumers. For that please email me at info@nmstec.ca

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HARDWARE INSTALLATION: MOUNTING

It is important that these modules are mounted in the interior of the vehicle, far from any possible water egress. The first revisions of these are not waterproof. Although it should be vibration tolerant, it’s also recommended to keep in places where a door slamming closed will not transfer too much force onto it.

Also make sure to mount that the top end of the module is not covered by any metal. There is an internal antenna on the top part of the case for settings & updates. If that is covered it may cause communication issues.

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WIRING:

WIRING REVISION 1

RED - 12v Ign (24v Tolerant, reverse polarity protected) Please use 1-3 amp fuse on it.
BLACK - Gnd
GREEN - CAN -
WHITE - CAN+
BLUE - PWM or FREQUENCY or HALL input.
ORANGE - POT+
YELLOW - POT Signal
VIOLET - POT Gnd

WIRING REVISION 2

CONNECTOR ONE (right)

RED - 12v Ign (24v Tolerant, reverse polarity protected) Please use 1-3 amp fuse on it.
BLACK - Gnd
GREEN - CAN -
WHITE - CAN+
BLUE - PWM or FREQUENCY or HALL input.
ORANGE - POT+
YELLOW - POT Signal
VIOLET - POT Gnd

CONNECTOR TWO (left)

RED - 12v output for hall sensors
BLACK - Gnd for hall sensors
GREEN - 5v/GND output 1
WHITE - 5v/GND output 2
BLUE - LIN bus
ORANGE - VR+
YELLOW - VR-
VIOLET - Gnd for hall sensors

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When purchasing PSC Rev1 please specify which revision you'd like. One with knob control or outputs. Due to an error on my part during manufacturing I only have a small amount of IO wires and thus cannot have both features at the same time. If you plan on controlling the PSC with a manual knob input, please use REVISION AUX INPUT. If you plan on controlling outputs use REVISION PWM OUTPUT.

Both features are functional in Revision 2, as well as an addition to reading VR style sensors.

HALL/PWM input is 24V tolerant, but designed for 5v. If using an ECU/PDM to control the PSC, please use a frequency between 175hz and 2khz. Anything above 2khz-7khz is susceptible to noise, but is usable. Preferred duty cycle is 5-95% duty cycle. If you'd like 0% set it to 5%, and 100% to 95%. This is mainly for reliability and noise control. You can always change the adaptation levels in the settings of the PSC controller.

If using as a VSS input, you will be required to enter a "Pulses per rotation" number. This is to get a rough idea of speed, so you can map it out in the 3D map. If you do not care about exact numbers, 5 is always a good value, but can be wildly off on speed.

Using the PSC in manual mode, will require either a potentiometer or hall sensor for input. You can calibrate the values in the settings for it. You will need to dial the knob to minimum setting, and click "Grab Low" then dial it all the way up, click "Grab High" and then click "Calibrate.

Keep the length of wire for the knob under 3 feet, otherwise you may be susceptible to interference.

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Identification of peripheral IO

For Revision 1, these style sensors are compatible with for HALL inputs:
2018_7 GS1001-GS1002_Geartooth_Speed_Sensor_Datasheet_A4_EN.pdf (farnell.com)
Speed Sensor Hall-Effect HA-M (bosch-motorsport.com)

In general any 3 wire 5-24v Hall sensor is compatible with this controller.

For AUX input, any POT with resistance of up to 5k, is compatible with this controller.
Any Hall sensor knob/slider that is 5v based is also compatible. Analog input is 12v tolerant but does not read above 12v. Please keep that in consideration.

The two outputs available are 5v push/pull style. They are meant to drive an output into a ECU to show confirmed pump speed, show problems, drive LED, or control a neopixel for output.

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If the sticker on your wiring harness says “PSC-00001”, then your wifi password is 12345678. If your sticker number shows your serial number, then the password will be recorded on there, as well as in an instruction sheet, and emailed as well. If you ever forget it, or lose it, contact us. We were planning on allowing user to change password however that would lead to people losing it, and adding a firmware reset on the device will cause more issues than it would solve. If you have any issues, we would always be happy to help.

SW SETUP

You will need a wifi capable device (phone/laptop). Please connect by wifi to the device, as its WiFi ssid will always be either PSC-00001 or the Serial number starting in “PSC”.

Upon connection, browse to http//:psc.local

In vehicles please select the pump that you have installed in your vehicle.
In mode, please select what style of control you’d like:

In “Single value” you will enter a number from 5-95, which indicated in percent at what speed the pump should operate at.

In “Full Manual”, this will enable the control of the pump with the pot input only. For this to work, you must first enter “Analog calibration”, turn the dial to the minimum position, click “Grab low”, then turn the dial to maximum, click “Grab high”, then save settings. This will restart the controller, and will require you to reconnect to it.

In “PWM” mode, this will require no configuration, and will simply be looking for a duty cycle between 0-100%. Note: due to the way electronics are magical smoke machines, 0 & 100 are not actually valid values, and will generally represent 1 & 99% respectively. Please use a frequency between 175hz and 2khz.

TODO: add rest of modes

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In “Pump limits” select what the minimum and maximum pump speed you’ll ever need.
This is done for a simple reason of in theory anything below 30% is generally never used depending on the pump/steering assist. At that point the pressure is so low, its the same as no power steering. However, that is not always the case with full electric power steering, where even 10% is a decent value. This is meant mostly for people using Hydraulic Electric pumps.