

# Diagnosis for FL03

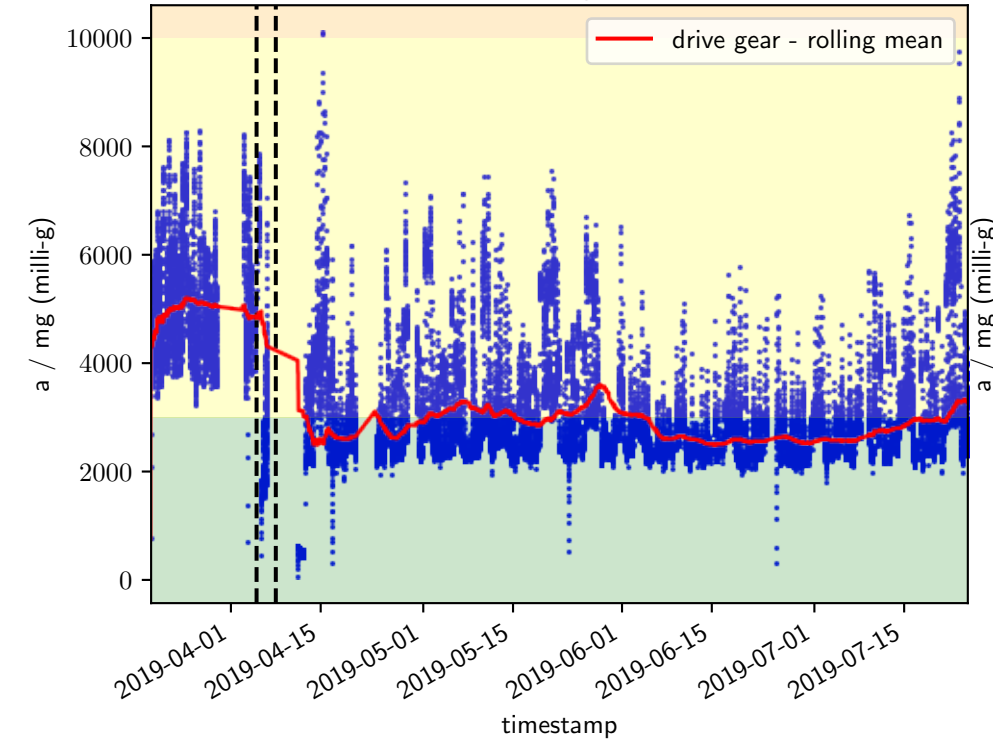
# Categorization of measurements

Acceleration sensors

Time interval: all data

# Acceleration sensors all data

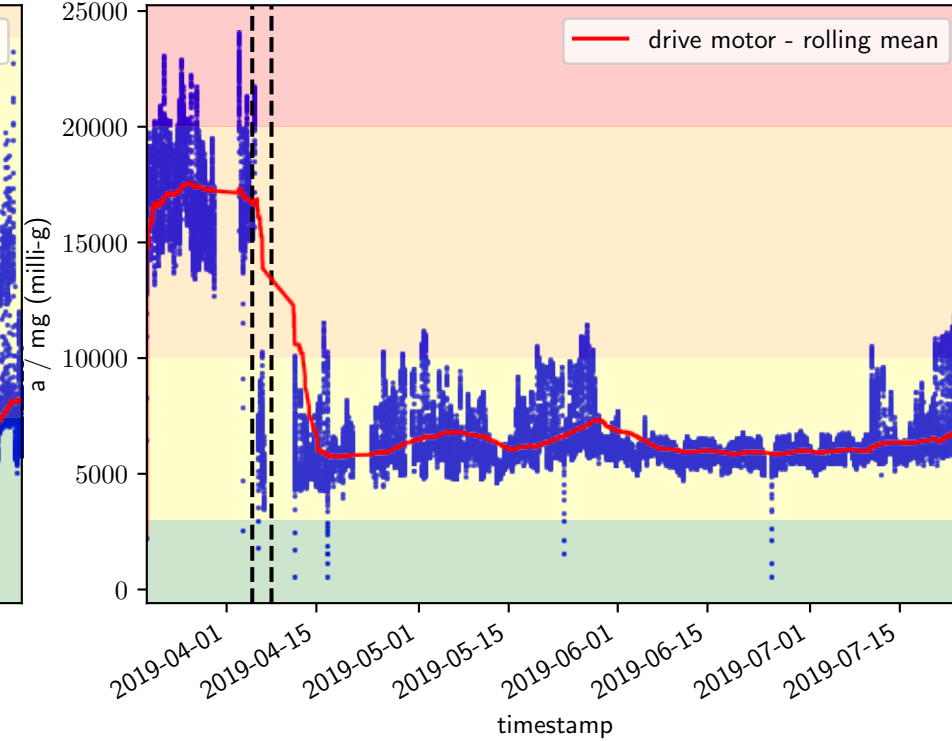
## drive gear



Good: 20027/30390 = 66%  
 Satisfactory: 10361/30390 = 34%  
 Unsatisfactory: 2/30390 = 0%  
 Unacceptable: 0/30390 = 0%

Unsatisfactory

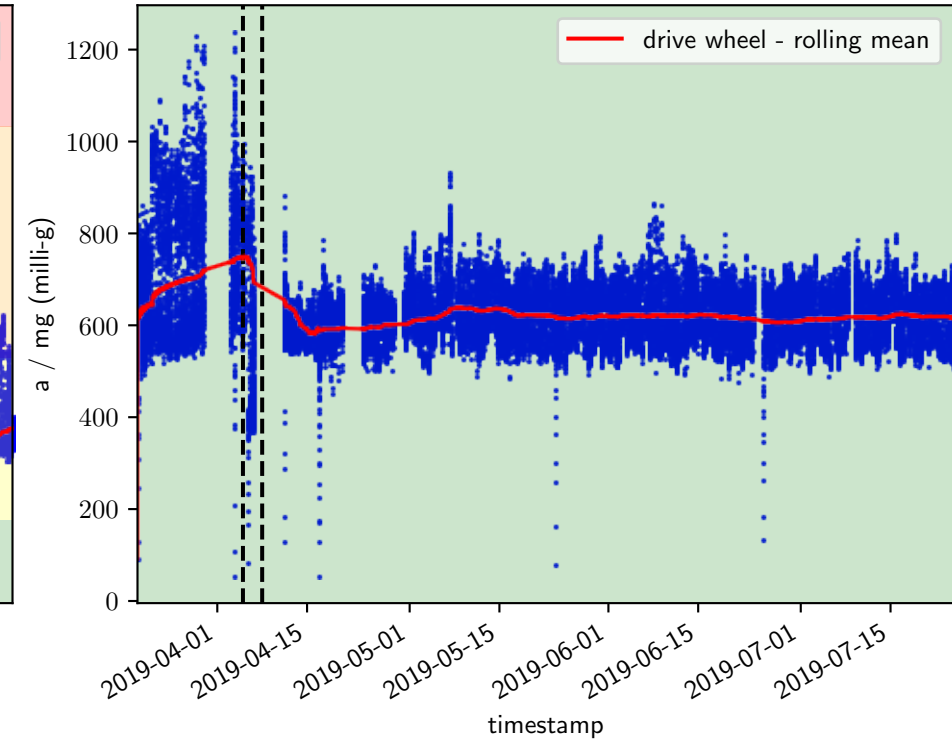
## drive motor



Good: 22/30395 = 0%  
 Satisfactory: 26355/30395 = 87%  
 Unsatisfactory: 3637/30395 = 12%  
 Unacceptable: 381/30395 = 1%

Unacceptable

## drive wheel

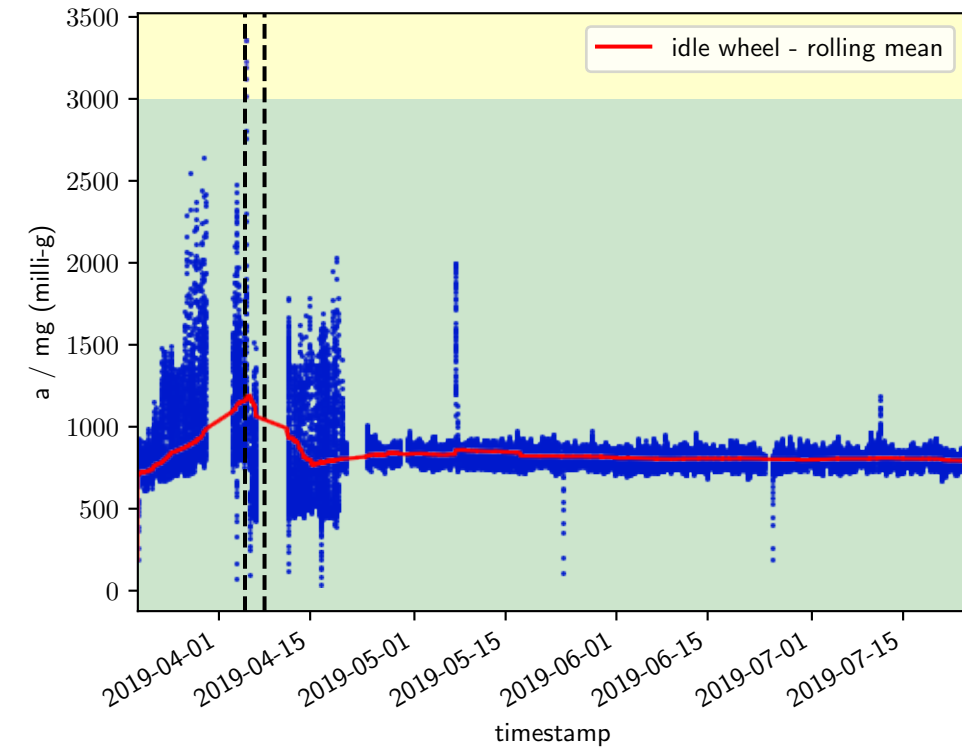


Good: 30588/30588 = 100%  
 Satisfactory: 0/30588 = 0%  
 Unsatisfactory: 0/30588 = 0%  
 Unacceptable: 0/30588 = 0%

Good

# Acceleration sensors all data

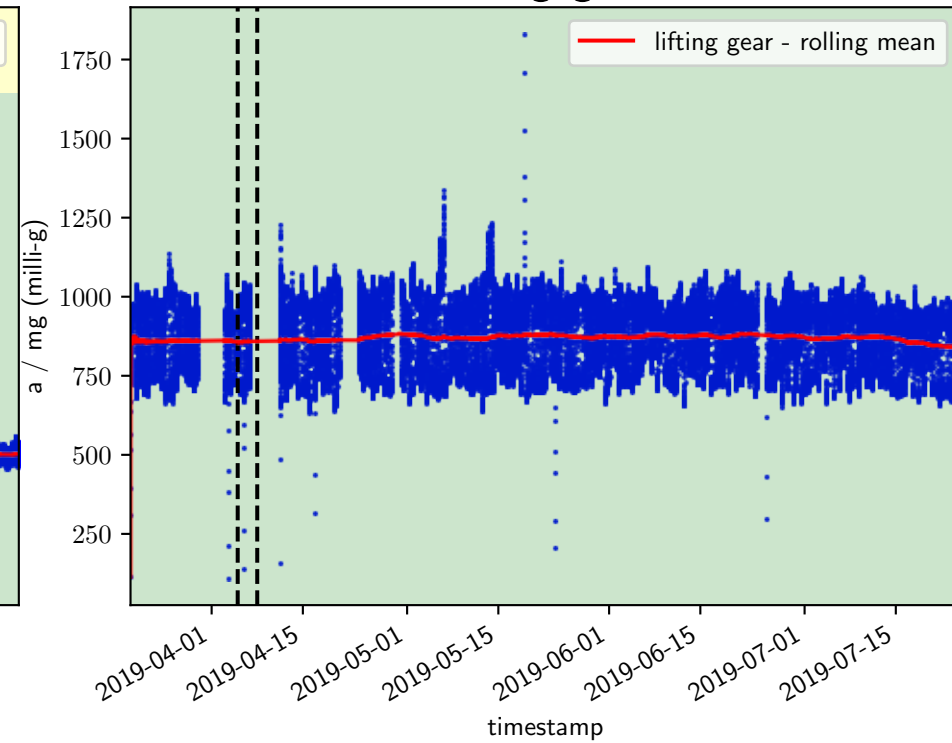
## idle wheel



Good: 30585/30591 = 100%  
Satisfactory: 6/30591 = 0%  
Unsatisfactory: 0/30591 = 0%  
Unacceptable: 0/30591 = 0%

Satisfactory

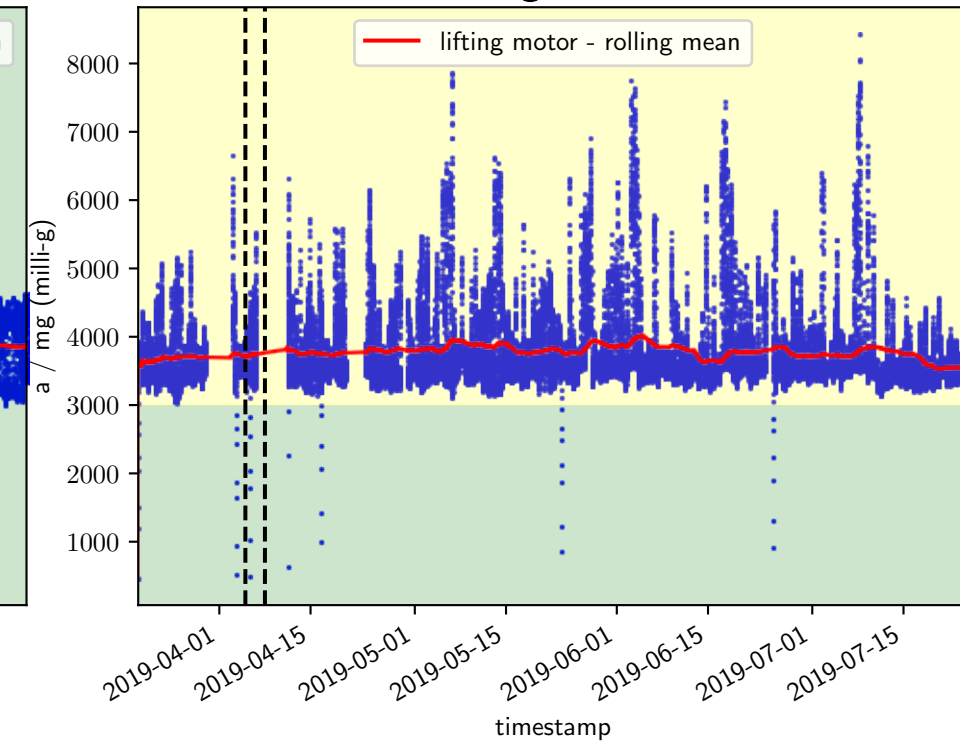
## lifting gear



Good: 39099/39099 = 100%  
Satisfactory: 0/39099 = 0%  
Unsatisfactory: 0/39099 = 0%  
Unacceptable: 0/39099 = 0%

Good

## lifting motor



Good: 42/39101 = 0%  
Satisfactory: 39059/39101 = 100%  
Unsatisfactory: 0/39101 = 0%  
Unacceptable: 0/39101 = 0%

Satisfactory

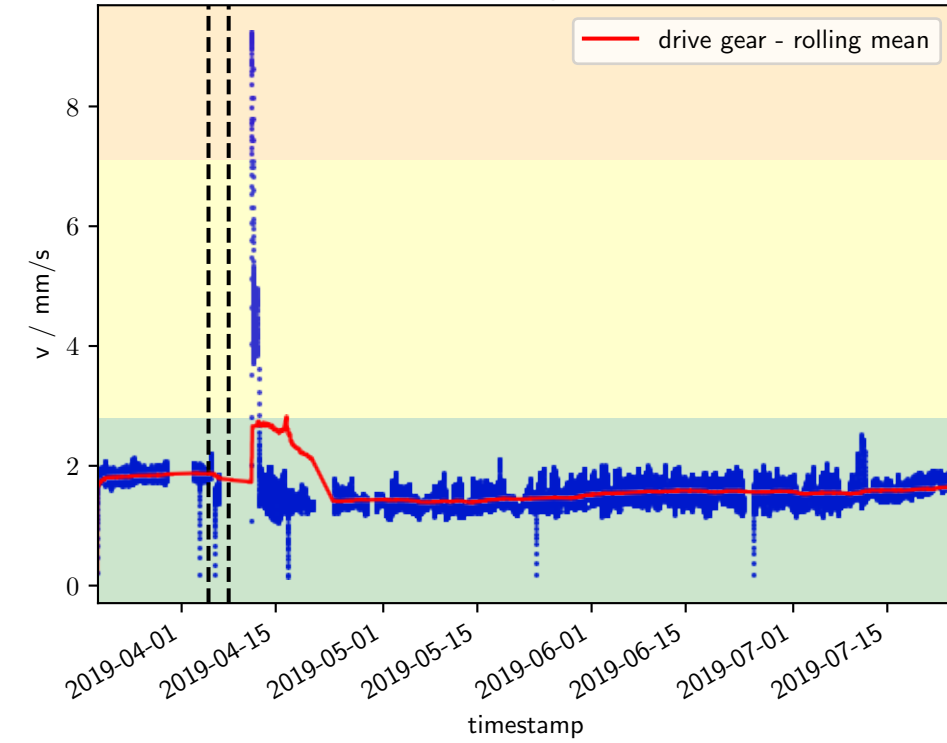
# Categorization of measurements

Velocity sensors

Time interval: all data

# Velocity sensors all data

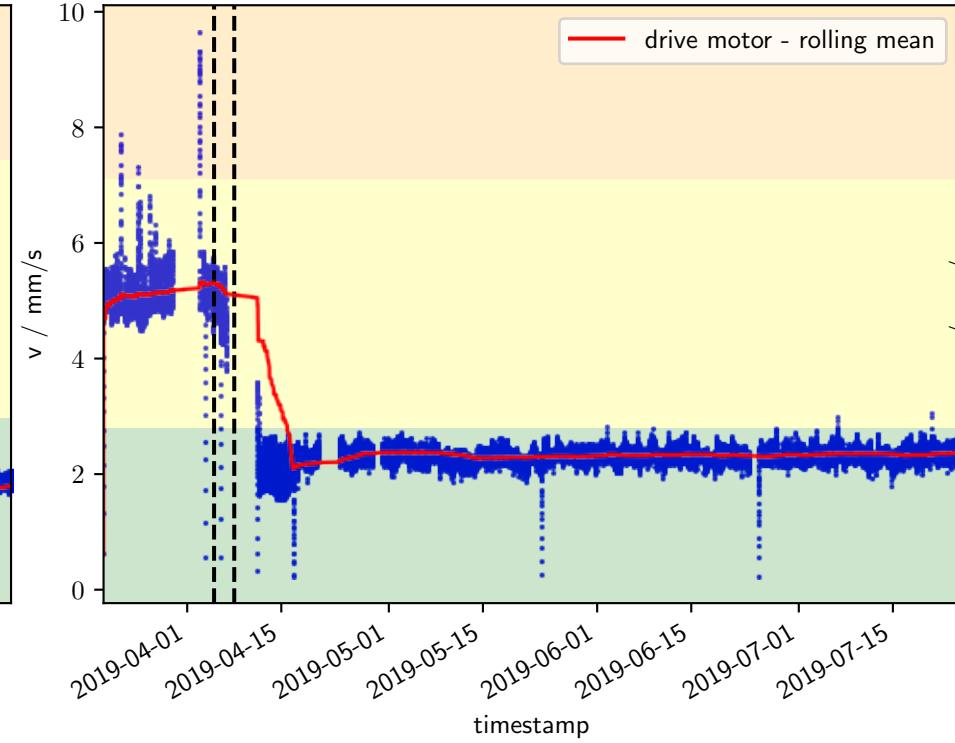
## drive gear



Good: 20725/21084 = 98%  
 Satisfactory: 313/21084 = 1%  
 Unsatisfactory: 46/21084 = 0%  
 Unacceptable: 0/21084 = 0%

Unsatisfactory

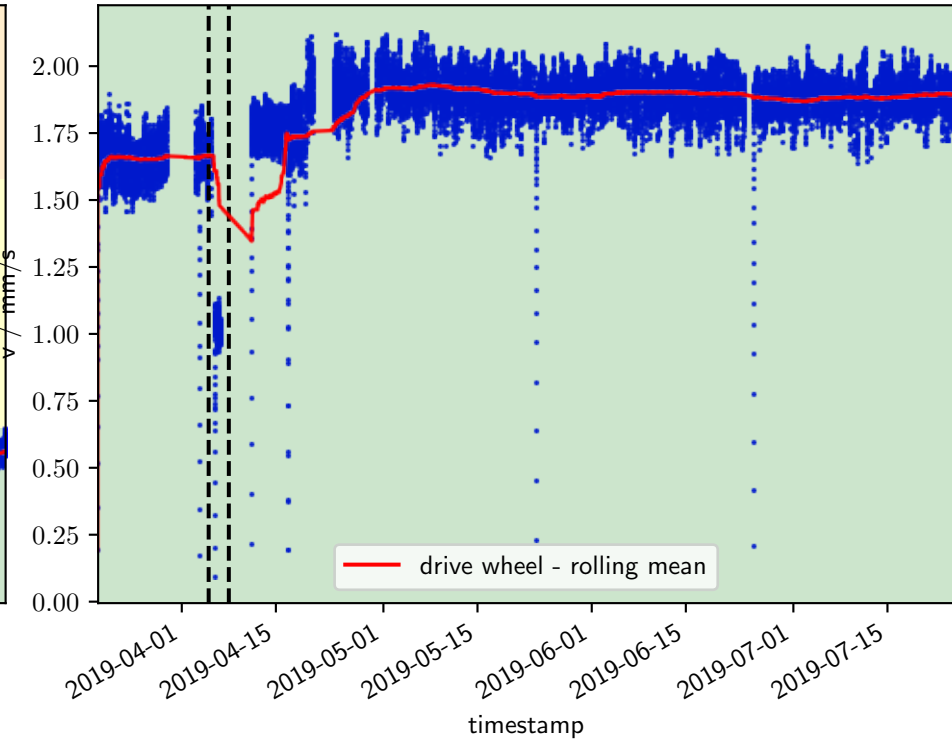
## drive motor



Good: 18570/21561 = 86%  
 Satisfactory: 2949/21561 = 14%  
 Unsatisfactory: 42/21561 = 0%  
 Unacceptable: 0/21561 = 0%

Unsatisfactory

## drive wheel

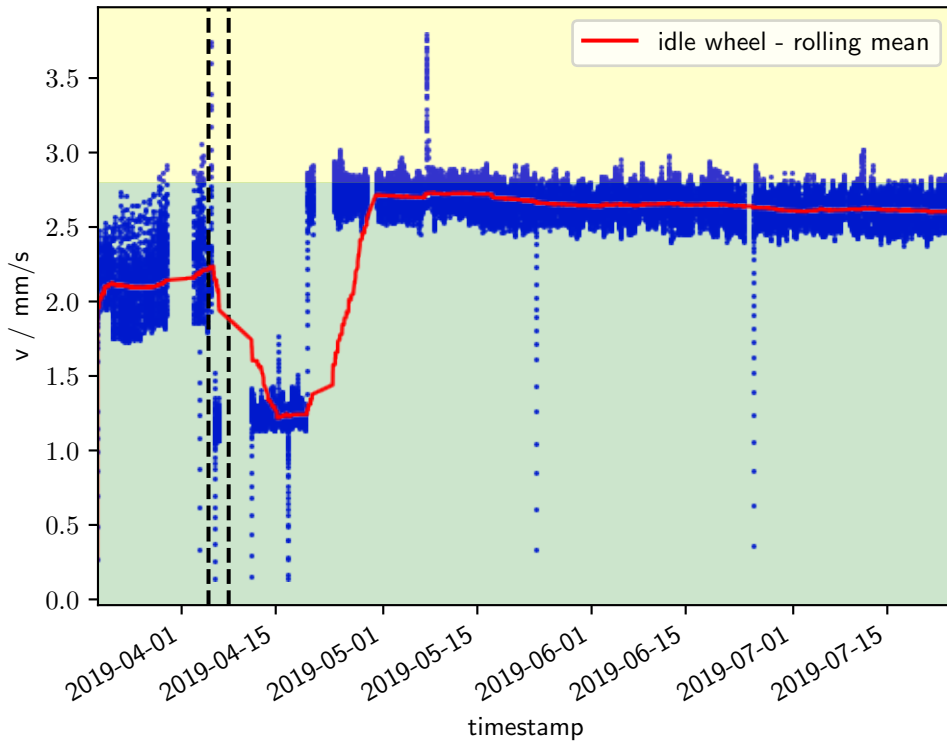


Good: 21384/21384 = 100%  
 Satisfactory: 0/21384 = 0%  
 Unsatisfactory: 0/21384 = 0%  
 Unacceptable: 0/21384 = 0%

Good

# Velocity sensors all data

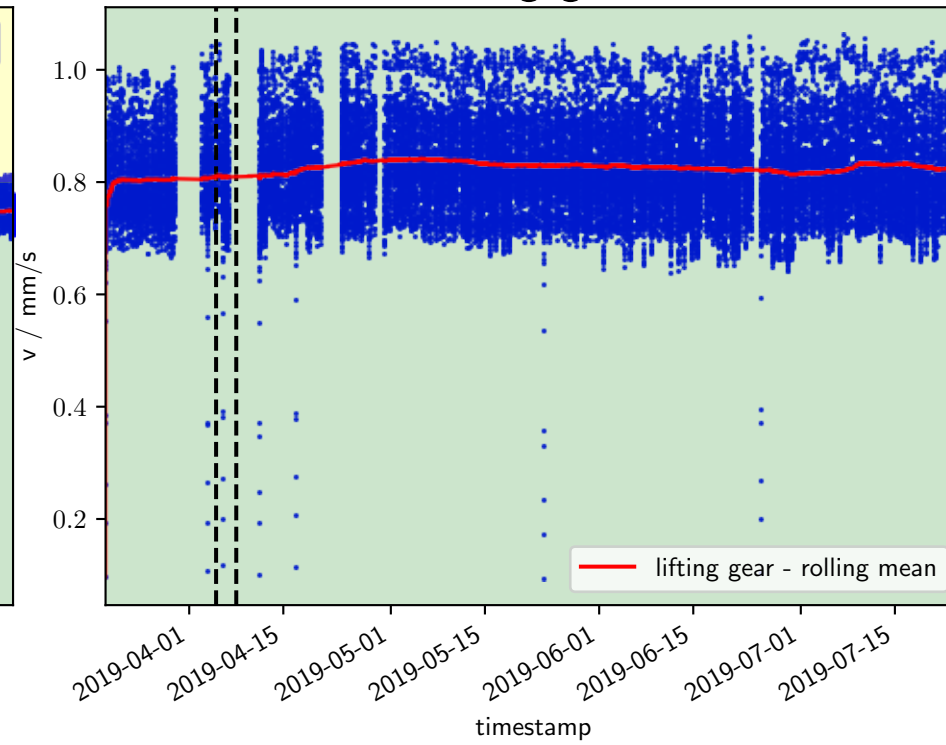
## idle wheel



Good: 20027/21252 = 94%  
Satisfactory: 1225/21252 = 6%  
Unsatisfactory: 0/21252 = 0%  
Unacceptable: 0/21252 = 0%

Satisfactory

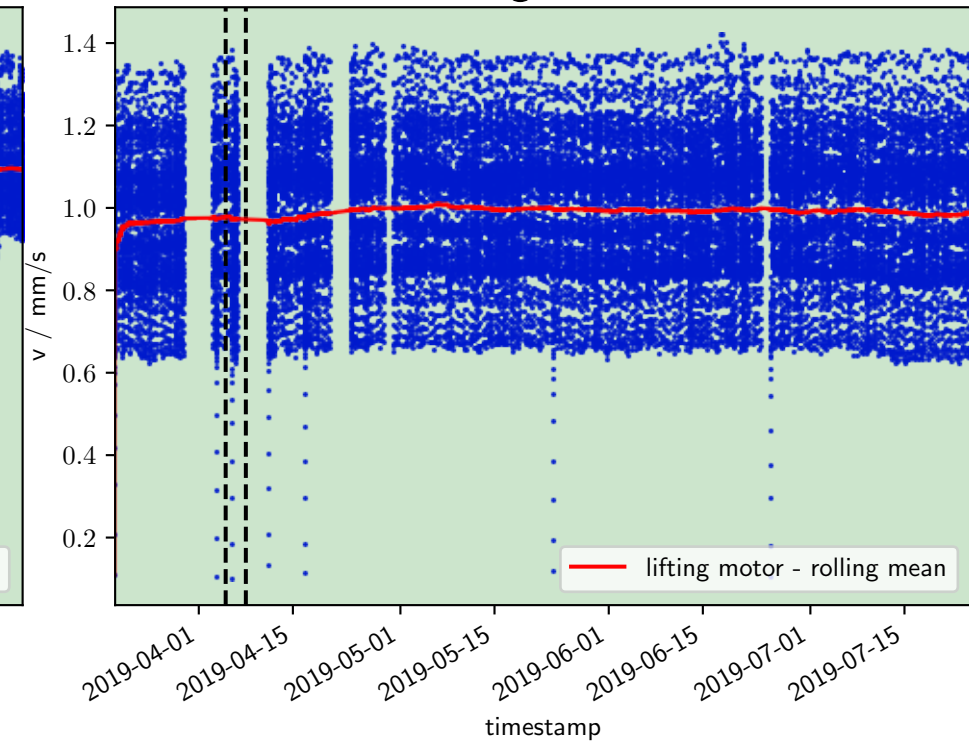
## lifting gear



Good: 27360/27360 = 100%  
Satisfactory: 0/27360 = 0%  
Unsatisfactory: 0/27360 = 0%  
Unacceptable: 0/27360 = 0%

Good

## lifting motor



Good: 27599/27599 = 100%  
Satisfactory: 0/27599 = 0%  
Unsatisfactory: 0/27599 = 0%  
Unacceptable: 0/27599 = 0%

Good

# Compatibility check for velocity sensors

New data: from 2019-03-01 until 2019-04-01

Referent data: recommended distribution (from .config)



## Velocity sensors

drive gear

$$\begin{aligned}\mu_{ref} &= 1.57 \\ \sigma_{ref} &= 0.14 \\ \sigma_{ref}^2 &= 0.02\end{aligned}$$

$$\begin{aligned}\mu_{new} &= 1.85 \\ \sigma_{new} &= 0.1 \\ \sigma_{new}^2 &= 0.01\end{aligned}$$

$$\begin{aligned}good_{cnt}/all_{cnt} \\ 1986 / 2067 = 96\%\end{aligned}$$

GOOD FIT

drive motor

$$\begin{aligned}\mu_{ref} &= 2.33 \\ \sigma_{ref} &= 0.14 \\ \sigma_{ref}^2 &= 0.02\end{aligned}$$

$$\begin{aligned}\mu_{new} &= 5.15 \\ \sigma_{new} &= 0.44 \\ \sigma_{new}^2 &= 0.2\end{aligned}$$

$$\begin{aligned}good_{cnt}/all_{cnt} \\ 2 / 2111 = 0\%\end{aligned}$$

BAD FIT

drive wheel

$$\begin{aligned}\mu_{ref} &= 1.89 \\ \sigma_{ref} &= 0.14 \\ \sigma_{ref}^2 &= 0.02\end{aligned}$$

$$\begin{aligned}\mu_{new} &= 1.66 \\ \sigma_{new} &= 0.1 \\ \sigma_{new}^2 &= 0.01\end{aligned}$$

$$\begin{aligned}good_{cnt}/all_{cnt} \\ 2116 / 2136 = 99\%\end{aligned}$$

GOOD FIT

idle wheel

$$\begin{aligned}\mu_{ref} &= 2.64 \\ \sigma_{ref} &= 0.14 \\ \sigma_{ref}^2 &= 0.02\end{aligned}$$

$$\begin{aligned}\mu_{new} &= 2.13 \\ \sigma_{new} &= 0.22 \\ \sigma_{new}^2 &= 0.05\end{aligned}$$

$$\begin{aligned}good_{cnt}/all_{cnt} \\ 685 / 2121 = 32\%\end{aligned}$$

BAD FIT

lifting gear

$$\begin{aligned}\mu_{ref} &= 0.82 \\ \sigma_{ref} &= 0.14 \\ \sigma_{ref}^2 &= 0.02\end{aligned}$$

$$\begin{aligned}\mu_{new} &= 0.8 \\ \sigma_{new} &= 0.07 \\ \sigma_{new}^2 &= 0.01\end{aligned}$$

$$\begin{aligned}good_{cnt}/all_{cnt} \\ 2583 / 2588 = 100\%\end{aligned}$$

GOOD FIT

lifting motor

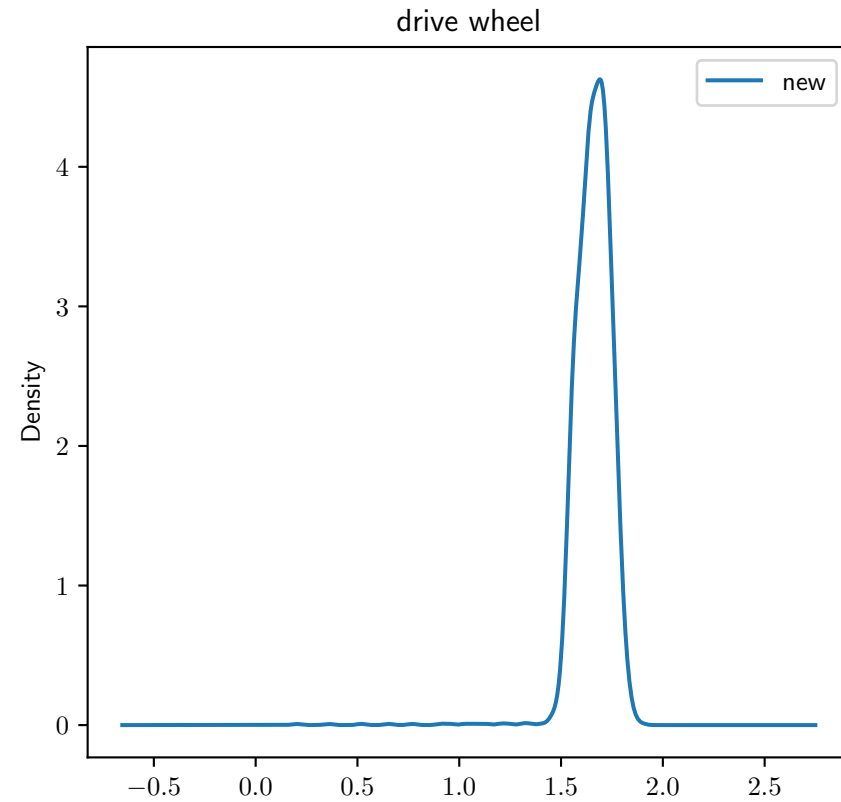
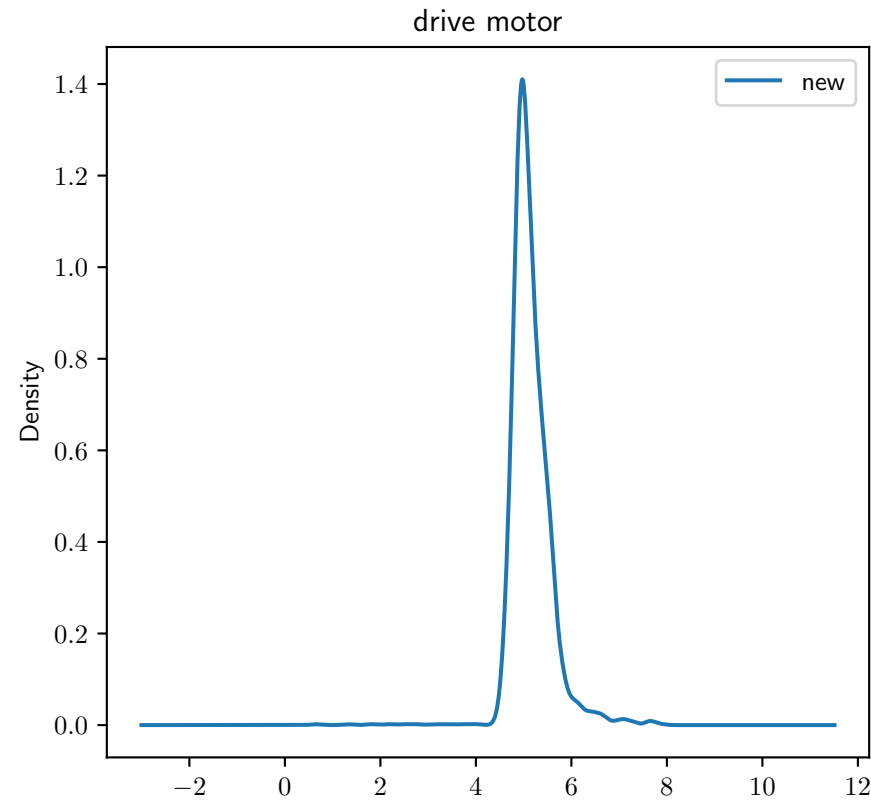
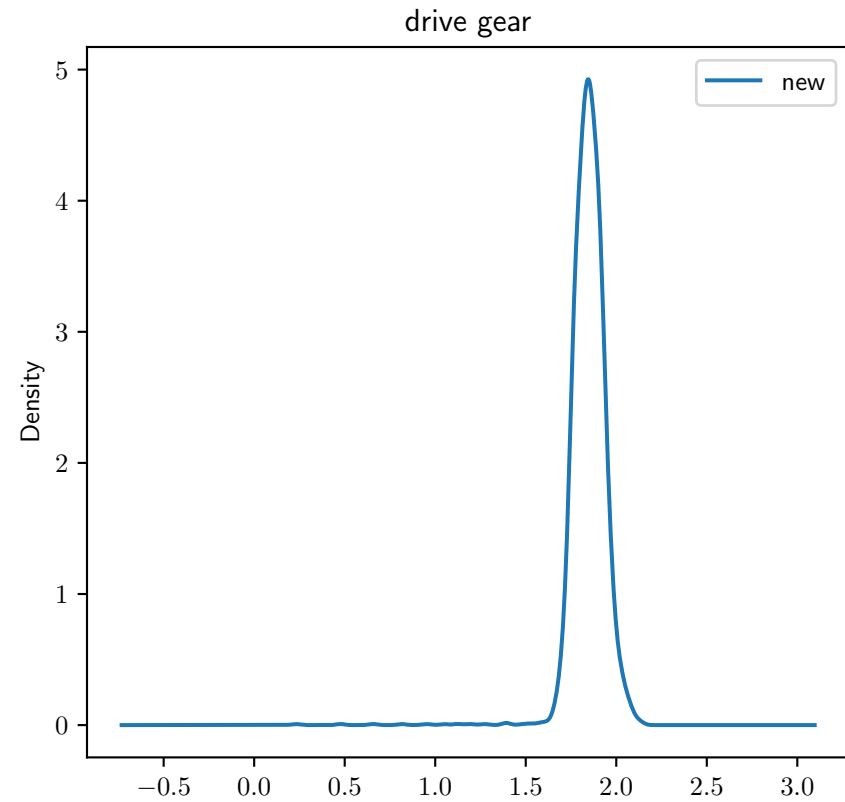
$$\begin{aligned}\mu_{ref} &= 0.99 \\ \sigma_{ref} &= 0.14 \\ \sigma_{ref}^2 &= 0.02\end{aligned}$$

$$\begin{aligned}\mu_{new} &= 0.97 \\ \sigma_{new} &= 0.16 \\ \sigma_{new}^2 &= 0.03\end{aligned}$$

$$\begin{aligned}good_{cnt}/all_{cnt} \\ 2623 / 2628 = 100\%\end{aligned}$$

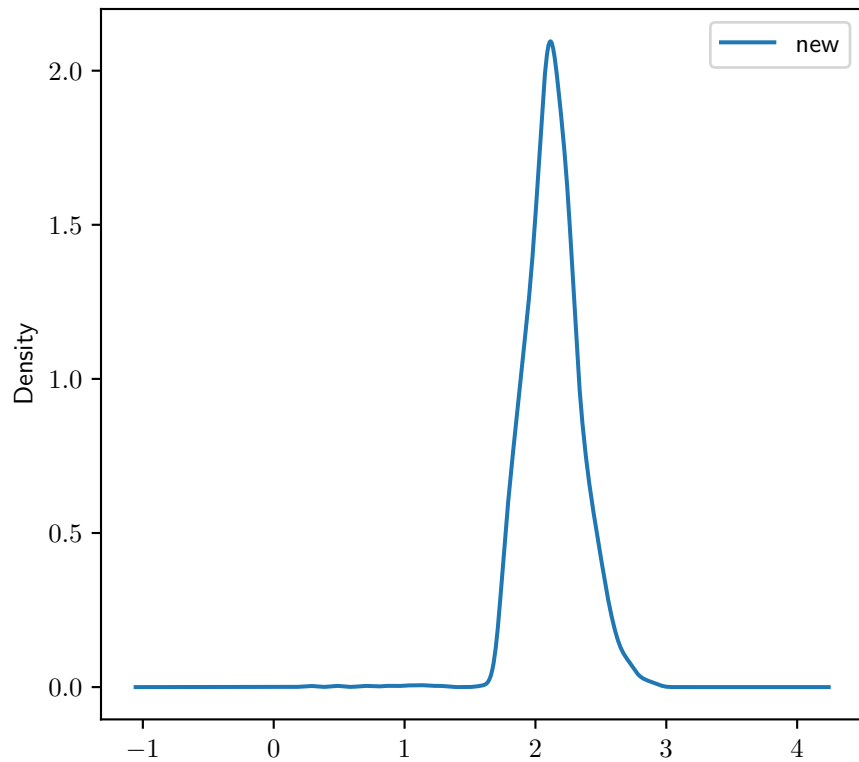
GOOD FIT

Distribution for drive sensors (velocity)

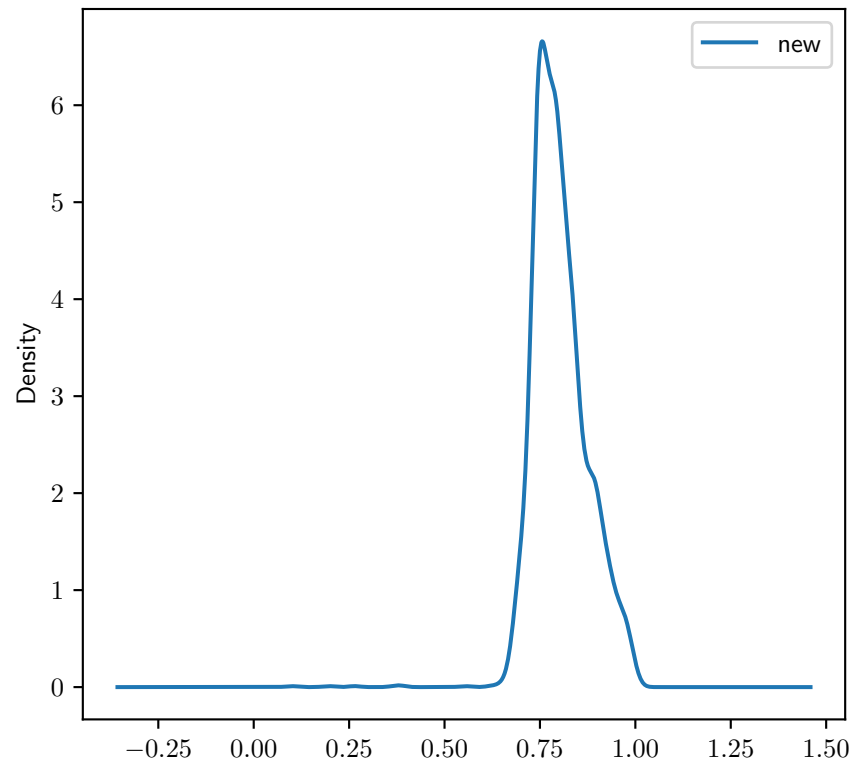


Distribution for other sensors (velocity)

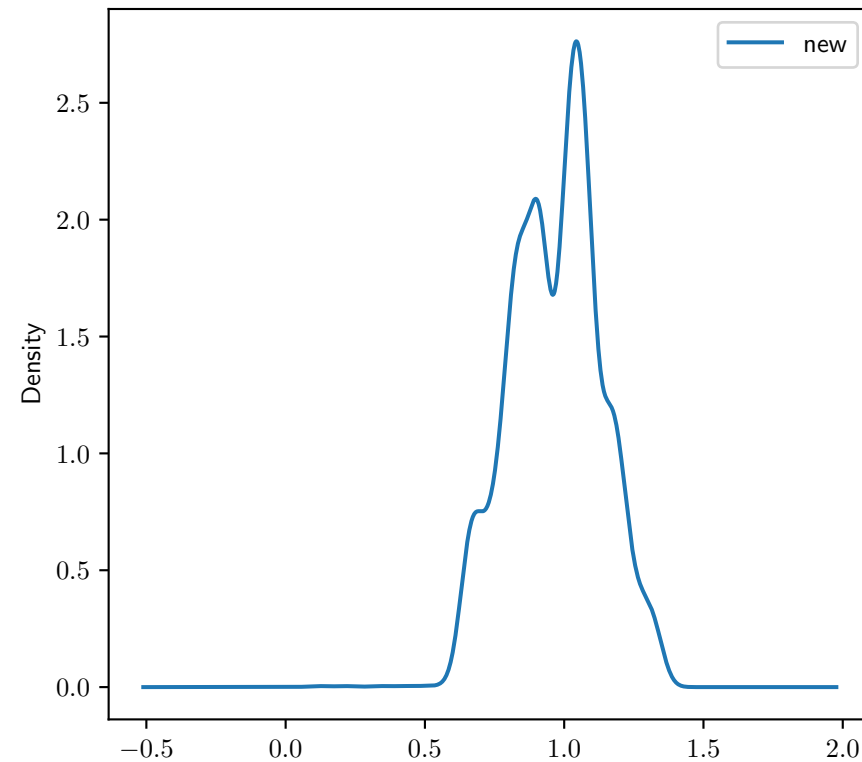
idle wheel



lifting gear



lifting motor



# Compatibility check for acceleration sensors

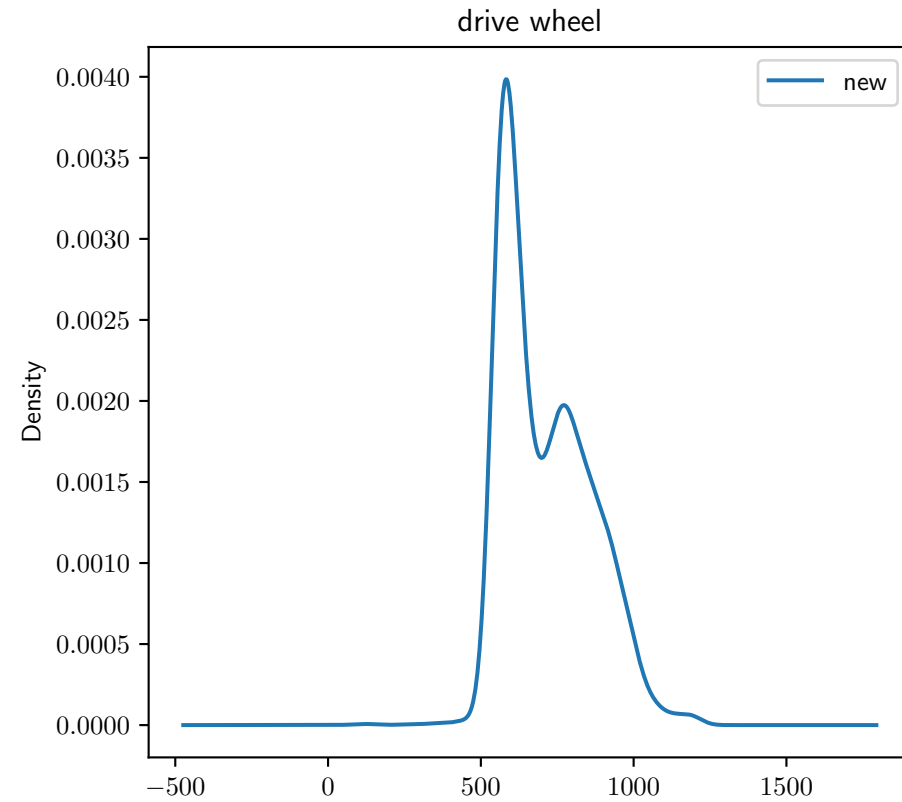
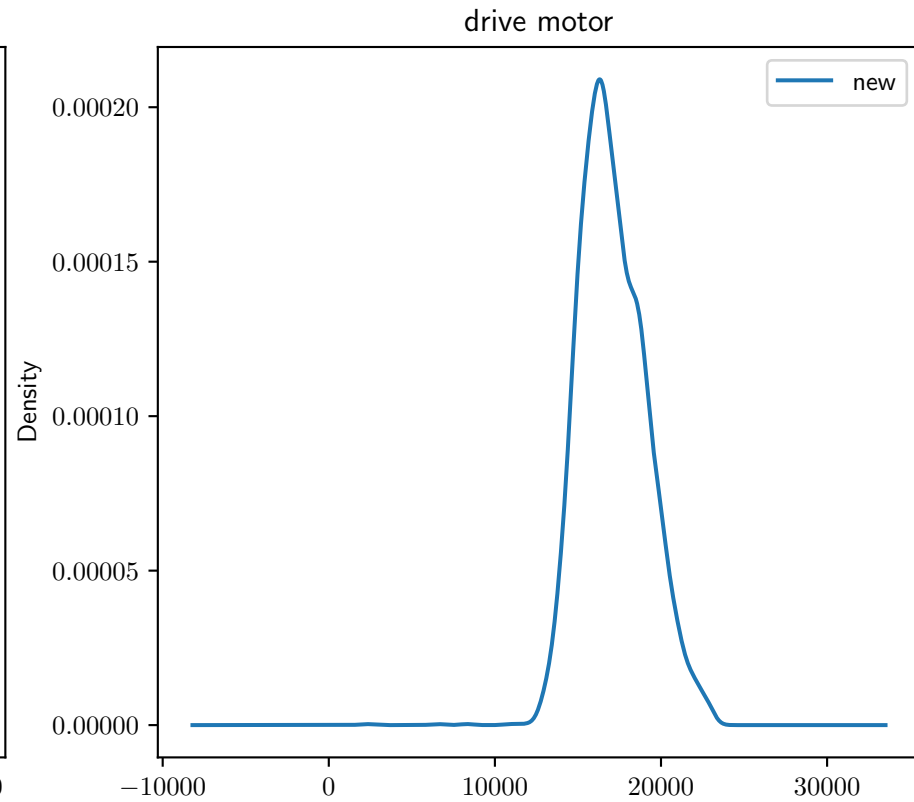
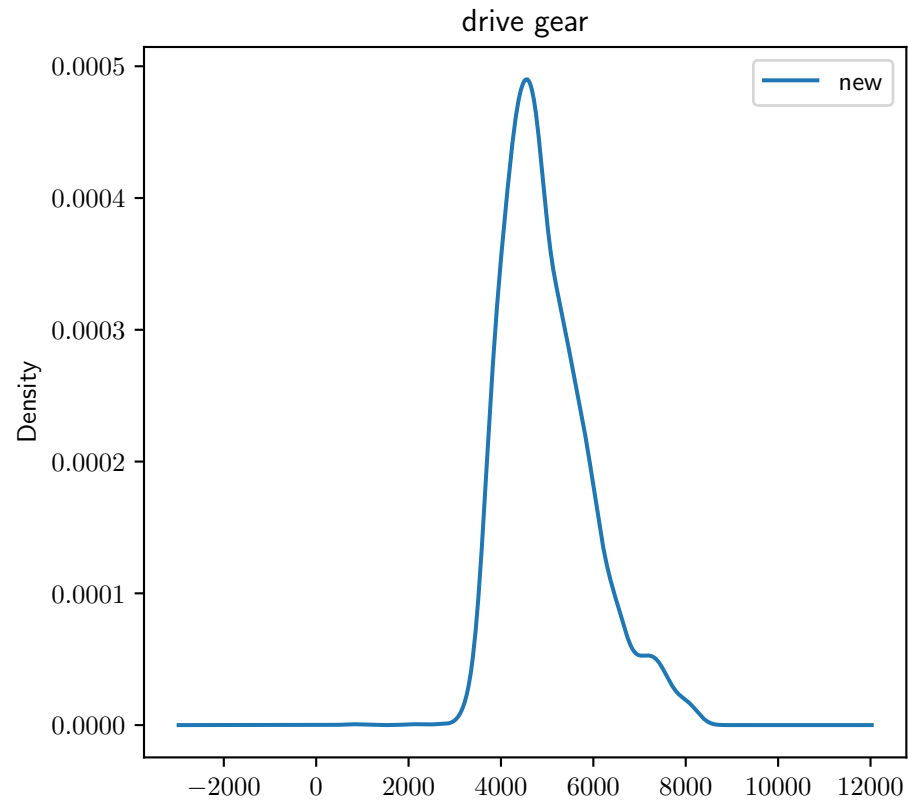
New data: from 2019-03-01 until 2019-04-01

Referent data: recommended distribution (from .config)

Acceleration sensors

<div>drive gear</div> <div><math>\mu_{ref} = 2566.14</math> <math>\sigma_{ref} = 678.43</math> <math>\sigma^2_{ref} = 460270.33</math> <math>\mu_{new} = 4991.93</math> <math>\sigma_{new} = 945.66</math> <math>\sigma^2_{new} = 894282.18</math> <math>good_{cnt}/all_{cnt}</math> 1173 / 2944 = 40%</div> <div>BAD FIT</div>	<div>drive motor</div> <div><math>\mu_{ref} = 5964.43</math> <math>\sigma_{ref} = 414.3</math> <math>\sigma^2_{ref} = 171644.21</math> <math>\mu_{new} = 17098.52</math> <math>\sigma_{new} = 1971.71</math> <math>\sigma^2_{new} = 3887646.45</math> <math>good_{cnt}/all_{cnt}</math> 1 / 2944 = 0%</div> <div>BAD FIT</div>	<div>drive wheel</div> <div><math>\mu_{ref} = 614.77</math> <math>\sigma_{ref} = 63.55</math> <math>\sigma^2_{ref} = 4039.09</math> <math>\mu_{new} = 713.21</math> <math>\sigma_{new} = 144.87</math> <math>\sigma^2_{new} = 20985.9</math> <math>good_{cnt}/all_{cnt}</math> 2181 / 3010 = 72%</div> <div>PARTIAL FIT</div>	<div>idle wheel</div> <div><math>\mu_{ref} = 805.41</math> <math>\sigma_{ref} = 67.64</math> <math>\sigma^2_{ref} = 4574.82</math> <math>\mu_{new} = 966.75</math> <math>\sigma_{new} = 288.92</math> <math>\sigma^2_{new} = 83472.57</math> <math>good_{cnt}/all_{cnt}</math> 1994 / 3010 = 66%</div> <div>PARTIAL FIT</div>	<div>lifting gear</div> <div><math>\mu_{ref} = 874.18</math> <math>\sigma_{ref} = 583.87</math> <math>\sigma^2_{ref} = 340904.0</math> <math>\mu_{new} = 858.59</math> <math>\sigma_{new} = 101.98</math> <math>\sigma^2_{new} = 10400.11</math> <math>good_{cnt}/all_{cnt}</math> 3688 / 3688 = 100%</div> <div>GOOD FIT</div>	<div>lifting motor</div> <div><math>\mu_{ref} = 3765.38</math> <math>\sigma_{ref} = 1160.48</math> <math>\sigma^2_{ref} = 1346702.35</math> <math>\mu_{new} = 3689.72</math> <math>\sigma_{new} = 346.69</math> <math>\sigma^2_{new} = 120194.39</math> <math>good_{cnt}/all_{cnt}</math> 3688 / 3688 = 100%</div> <div>GOOD FIT</div>
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## Distribution for drive sensors (acceleration)



## Distribution for other sensors (acceleration)

