

Integrated mass flow rate test during fuel injection by an injector

Measurement items : instantaneous flow rate, temperature, pressure, density, massflow, driving signal of injector

Application : evaluation for various engines of automobile, farm machine, construction machine

Purpose

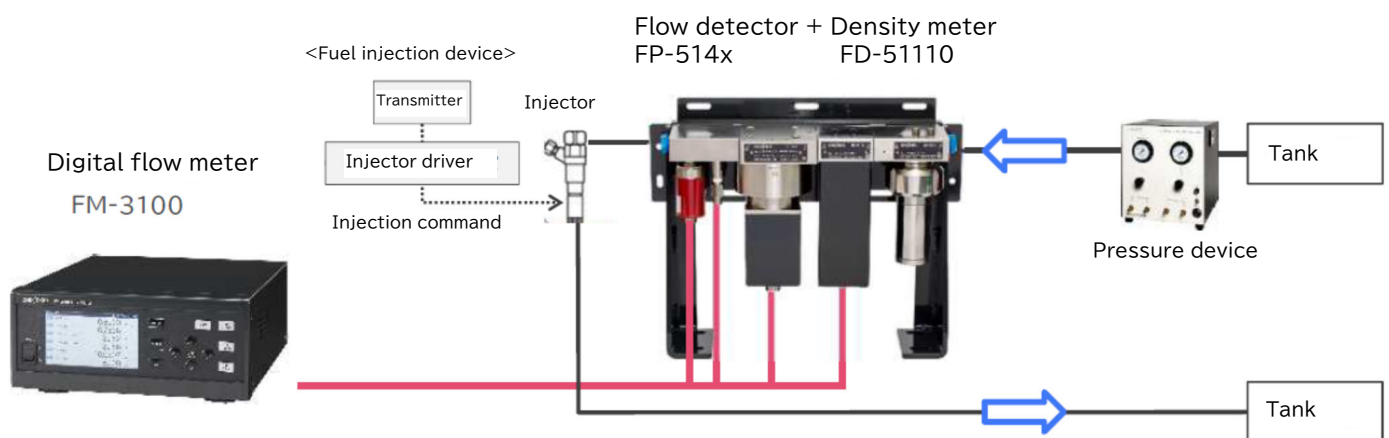
In this experiment, we will evaluate how much the variation in the integrated flow rate can be reduced and the integrated time can be shortened by the new massflow measurement system.

Overview

Repeat injection (injection cycle: 50 ms, valve opening time: 10 ms) and measure the integrated mass flow rate for 10 seconds, 20 seconds, 30 seconds, and 60 seconds. The standard deviation is calculated from the measurement results of 20 times each for the new detector and the old detector, and the variation in the integrated flow rate is compared.

	Flow detector	Density meter	Flow meter
① New (standard, 1200P/R)	FP-5141	FD-5110	FM-3100
② New(high resolution, 2400P/R)	FP-5142		
③ Old(standard, 120P/R)	FP-2140H		

Measurement system



Measurement results

Comparing the standard deviation (g/h) of the integrated mass flow rate, the new detector ones were smaller than the old detector one. It took 60 s for the old model to reduce the variation, while it took only 20 s for the new model to become smaller variation.

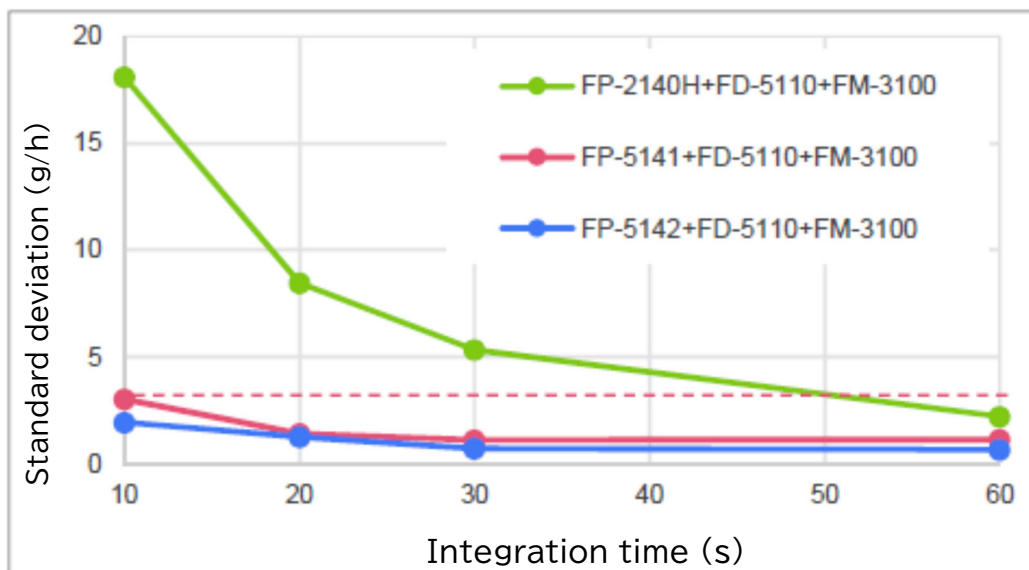
The integrated flow rate can be obtained even for short integration time.

→ The measurement time can be shortened by high resolution and less variation.

■ Average massflow rate: 900 g/h

■ Equation

$$s = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n - 1}}$$



* Contents of this document may change without prior notice.