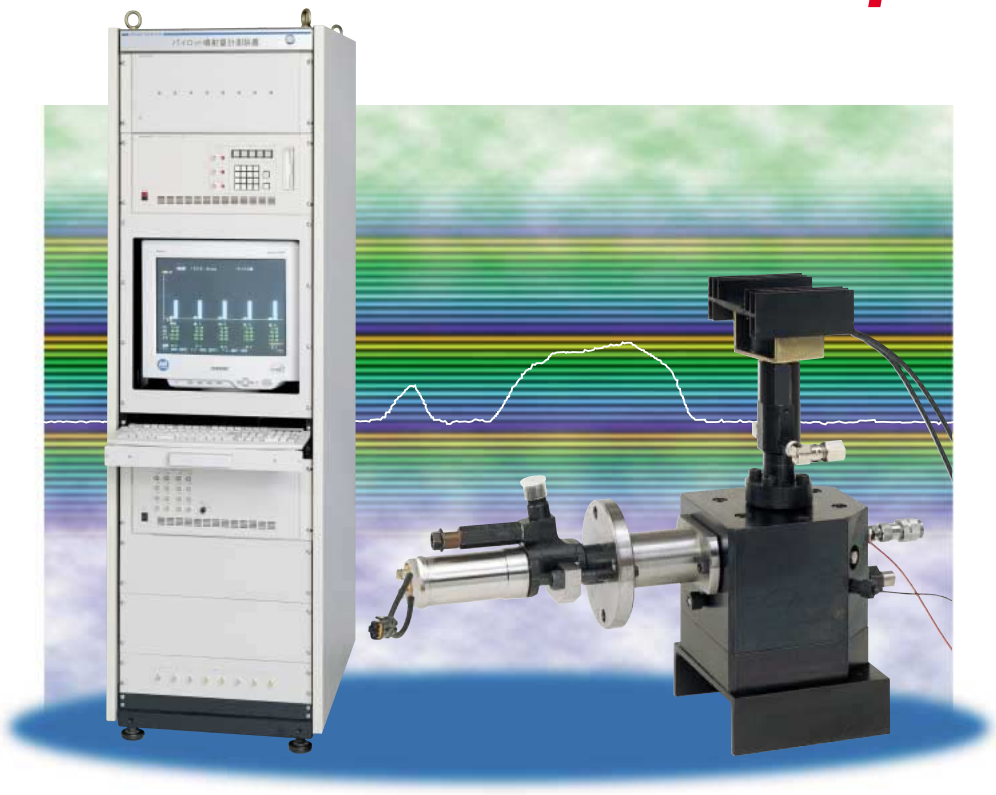
***New product***



# Pilot Injection Measuring System

# FJ-6000 Series

The FJ-6000 is a precision, multi-functional pilot injection measuring system that can output the continuous signals of the fuel injection rate.
It continuously measures the quantity of each pilot, main and total fuel injection. Results are given for the average, total, maximum and minimum values in tabular format or as bar-graphs.

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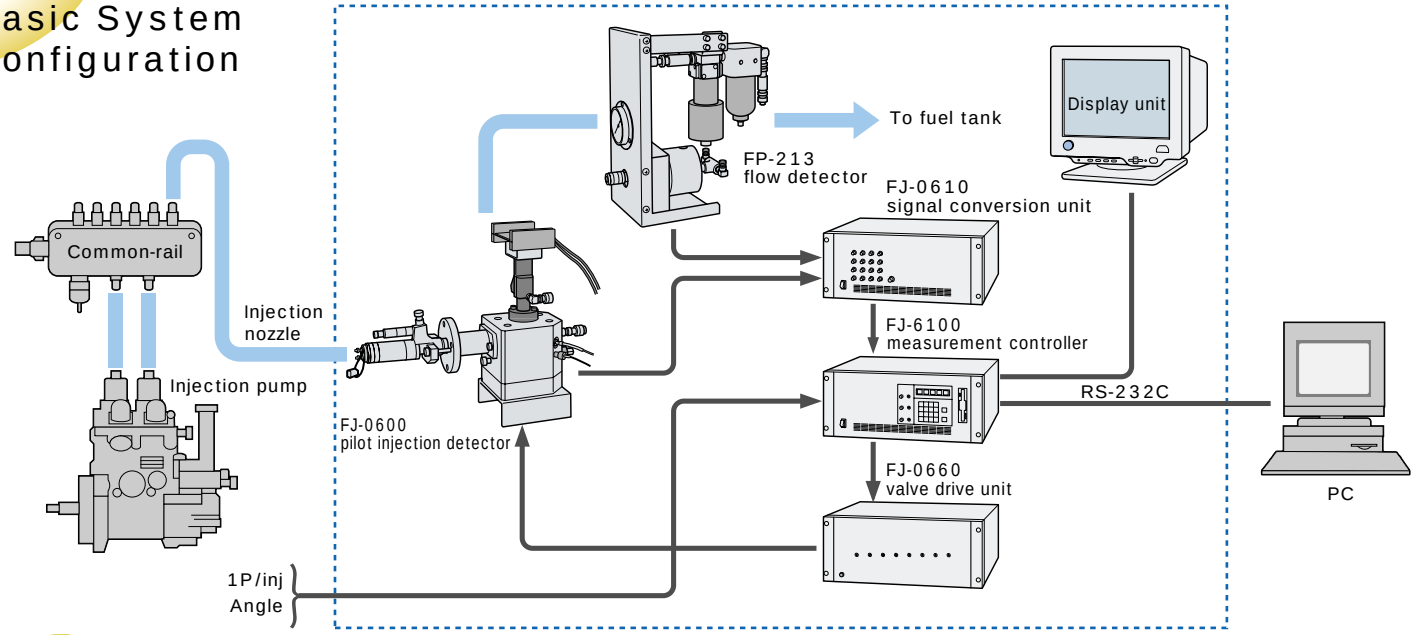
# The FJ-6000 series.....advancing pilot injection measuring system more than ever.

## Features:

- Precision pilot injection measurement (within±0.5% of reading)
- Wide measuring range (0 to 300 mm³/stroke)
- Distortion free injection rate waveform output through digital filtering
- User-defined back pressure setting(1 to 4 MPa)
- Injection-by-injection continuous measurement (0.6 to 50 Hz [36 to 3,000 injections/min])
- Equipped with a measurement controller that can connect to a maximum of eight sensors

## Basic System Configuration




## Specifications

| | | |
|---|---|---|
| Main function | : | Measurement of the fuel injection quantity and rate of a pilot injection system |
| Measured parameters | : | Fuel injection quantity (pilot, main and total injections), fuel injection rate (pilot and main injections), pump revolution (injections/min), fuel temperature, and back pressure |
| Fuel injection quantity | : | Instantaneous value, average, total, standard deviation, maximum, minimum, and cylinder-to-cylinder deviation |
| System configuration | : | ● FJ-0600 pilot injection detector<br>● FJ-0610 signal conversion unit<br>● FJ-0660 valve drive unit<br>● FJ-6100 measurement controller<br>● External CRT or LCD display unit (optional) |

### ● FJ-0600 Pilot Injection Detector

| | | |
|---|---|---|
| Measuring range | : | Pilot injection quantity - 0 to 20 mm³/stroke<br>Total injection quantity - 0 to 100 mm³/stroke;0to200mm³/stroke;0to300mm³/stroke |
| Resolution | : | 1/1000 of the maximum injection quantity |
| Accuracy | : | Pilot injection quantity - ±0.2 mm³/stroke<br>Main injection quantity - ±0.2 mm³/stroke<br>(for quantities no greater than 40mm³/stroke);<br>±0.5% of reading (for quantities greater than 40 mm³/stroke) |
| Injection frequency | : | 0.6 to 50 Hz (36 to 3,000 injections/min) |
| Nozzle back pressure | : | 1 to 4 MPa |
| Fuel temperature | : | 10 to 80℃ (inside the detector) |
| Pressure detector | : | Strain gauge type sensor for back pressure measurement and piezoelectric sensor for pilot and main injection measurement |
| Temperature detector | : | Pt 100 resistance bulb |
| Others | : | Equipped with 12-MPa safety valve |

### ● FJ-0610 Signal Conversion Unit

**【Input Signal】**

| | | |
|---|---|---|
| Pressure | : | Pilot and main injections and back pressure Up to 8 input channels for each signal |
| Temperature | : | Inside FJ-0600 and FP-213's inlet (outlet)<br>Up to 8 input channels for each signal |
| Flow | : | From FP-213<br>Up to 8 input channels for each signal |

**【Voltage Output】** Note 1

| | | |
|---|---|---|
| Injection rate | : | 0 to 10 V/0 to 100 mm³/ms Note 2 (during calibration) |

Note 1 The unit outputs the voltage signal for injection rate separately for the pilot injection and main injection pressure detectors.

Note 2 This upper limit changes to 200 or 300 mm³/stroke, depending on the measuring range applied.

**【Digital Lowpass Filter】**

| | | |
|---|---|---|
| Bandwidth | : | 2, 4, 6, 8 kHz and through |

**【General Specifications】**

| | | |
|---|---|---|
| Power supply Note 3 | : | 100 V AC ±10%, 50/60 Hz, approx. 100 VA |
| Outer dimensions | : | 420 (W)×199 (H)×450 (D) (mm) |
| Weight | : | Approx. 10 kg |

### ● FJ-0660 Valve Drive Unit

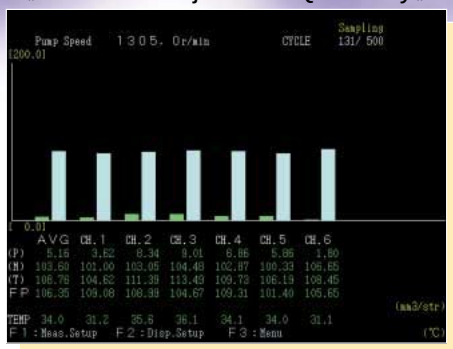
This unit controls valves (up to 8 channels) by means of a timing signal sent from the FJ-6100 measurement controller.

**【General Specifications】**

# FJ-6100 Measurement Controller Display Examples

FJ-6000 SERIES

## 《Realtime Injection Quantity》

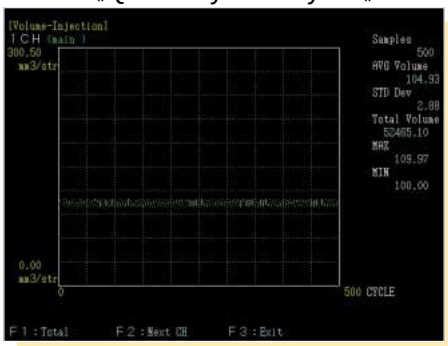



## 《 Statistics》


## 《Measured Data》


## 《Histogram》


## 《Quantity vs. Cycle》

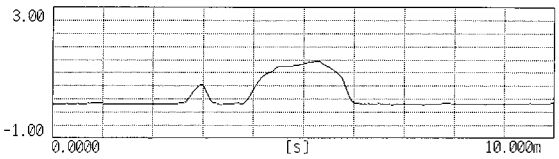



## 《Quantity vs. Speed》

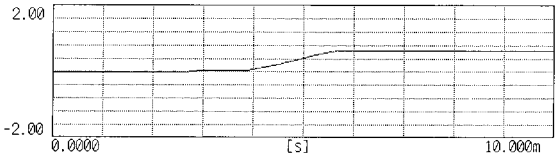

# Injection Rate and Chamber Pressure

Injection pressure: 80 MPa Pilot injection quantity: 5 mm³/stroke Main injection quantity: 50 mm³/stroke

## 《Injection Rate》




## 《 Chamber Pressure 》




Power supply Note 3 : 100 V AC ±10%, 50/60 Hz, approx. 200 VA
Outer dimensions : 420 (W) × 199 (H) × 450 (D) (mm)
Weight : Approx. 18 kg

## ● FJ-6100 Measurement Controller

**【Input Section】**

Fuel injection quantity input (Pilot and main injections) : Up to 8 input channels for each signal
16-bit A/D converter
Fuel temperature input (Inside detector and FP-213's inlet (outlet)) : Up to 8 input channels for each signal
12-bit A/D converter
0 to 10 V/0 to 100℃ input level
Back pressure measurement section : Up to 8 input channels 0 to 10 V/0 to 10 MPa input level (pressure converter equipped as an option)
Timing pulse input section :
- 1 P/R and angular signal (either 360, 720, 900, 1800 or 3600 P/R) (detector equipped as an option)
- Injector drive current

Input level : 1 P/R 0.3 to 30 Vp-p
Angular signal TTL
Drive current 0.5 A minimum
Adjustable range of trigger level : -7.5 to +7.5 V (for 1 P/R only)

**【Display Unit】**

Built-in LCD display : Used to confirm settings.
External display unit : Either a CRT or LCD display can be connected.
Displayable data items formats :
- Bar graph of realtime injection quantity (pilot and main for each channel and average) and numeric data of realtime injection quantity (pilot, main and total for each channel and average)
- Injection quantity vs. cycle plot (pilot, main and total injections)
- Injection quantity vs.speed plot (pilot, main and total injections)
- Injection quantity histogram (pilot, main and total injections)
- Numeric listing of injection quantities (pilot, main and total injections), temperature and revolution
- All-channel display of the average, total, standard deviation, maximum, minimum and cylinder-to-cylinder deviation of pilot and main injections

**【Memory】**

Capacity : Maximum of 2,000 cycles' worth of data per channel

**【Output Section】**

Voltage output : Fuel injection quantity 0 to 3 V/0 to 300 mm³/stroke (separately for pilot, main and total injections)
Revolution 0 to 3 V/0 to 3000 r/min

**【Interface】**

Data interface : RS-232C as a standard feature
GPIB as an option

**【General Specifications】**

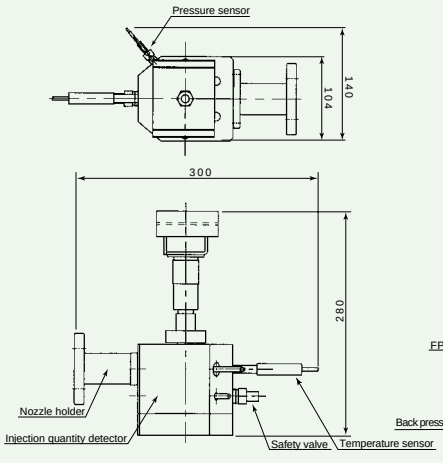
Power supply Note 3 : 100 V AC ±10%, 50/60 Hz, approx. 80 VA
Outer dimensions : 420 (W) × 199 (H) × 450 (D) (mm)
Weight : Approx. 8 kg

Note.3 Power supply requirement of the total system can be adjusted to 100, 120, 220 or 240V.

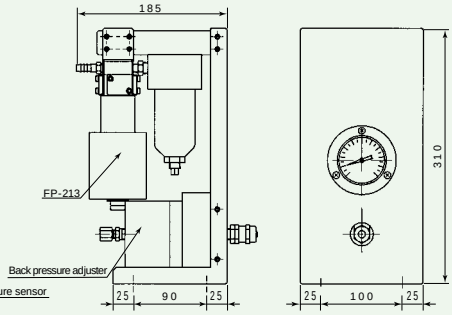
# Outer Dimensions

(unit:mm)

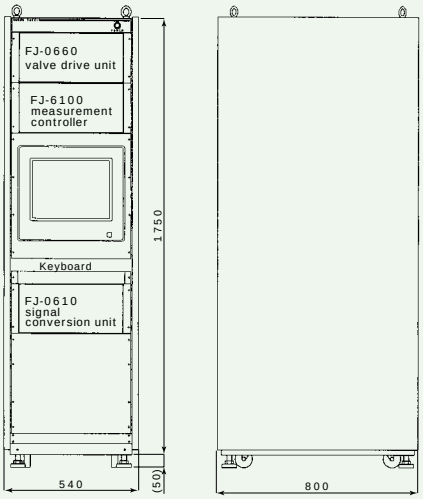
〈Detector Main Unit〉




〈Back Pressure Adjustment Panel and Flow Detector〉




〈Measuring Unit〉





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*Outer appearance and specifications are subject to change without prior notice.

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Printed in Japan 986(SK)3K