POWERLINK AC Dynamometer for Engine Transient Test

Configuration reference

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1. Major part of AC dynamometer

1.1 AC Dynamometer

AC dynamometer transfers mechanical energy of engine into electrical energy. The converter controlling AC dynamometer feedbacks the electrical energy to the public power grid. The AC variable frequency speed regulation system adjusts the current to control the engine speed and torque.

1.2 High Accuracy Torque Sensor

High-precision and durable torque sensor can be used in oily and dusty engine test benches environment.
1. Major part of AC dynamometer

1.3 Converter

The load motor is driven by the converter which is composed by the rectifier/ regenerative unit and inverter. The rectifier/ regenerative unit consists of two antiparallel units capable of flowing electrical energy in two directions, i.e. to return the electrical energy back to the grid (four-quadrant operation).

The power generation bridge is connected to the grid via an autotransformer. When the motor is in the power generation state, the power can be fed back to the grid through its feedback unit.
1. Major part of AC dynamometer

1.4 Dynamometer Calibration device

The static calibration is applied for dynamometer torque sensor.

Calibration device includes the calibration arm, balance arm, weight disc and 4 standard weight composition. High accuracy of the calibration arm length, accurate weight hanging position and standard weight ensures the accuracy of the static calibration. The counterweight surface has blackening treatment and metered.
2. Foundation, Mechanical Installation Section

2.1 Shaft Protection Cover

2.2 Cast Iron Base Plate and Dampers

2.3 Drive Shaft and Coupling

2.4 FC2480A Engine Mounting Bracket
3. Temperature and Pressure conditioning devices

3.1 FC2430T Engine Oil Temperature Control Device

FC2430T is used for engine performance and factory test and also can be used for transmission oil temperature control.

3.2 FC2420T Engine Water Temperature Control Device

FC2420T is used in the engine test bench to adjust the engine coolant temperature. It is used to replace the vehicle engine radiator to keep the engine coolant temperature in a constant range.
3. Temperature and Pressure conditioning devices

3.3 **FC2440(A) Fuel Temperature Control Device**

FC2440(A) can provide steady fuel flow and constant fuel temperature for diesel engine and gasoline engine test. It solves the previous problem in engine performance test which the fuel temperature instability happens (affected by environmental temperature and fuel return temperature) and fuel temperature cannot be arbitrarily changed according to the test requirements.

3.4 **FC2490T Intercooling Temperature Control Device**

FC2490T is used for turbocharged engine performance and factory testing.
3. Temperature and Pressure conditioning devices

3.5 FC2050 Exhaust Pressure Measurement Control Unit

FC2050 is the pressure measurement and regulation equipment to control the engine exhaust pressure (or inlet pressure).

3.6 FC2511 Fuel Inlet Pressure Regulating Device

FC2511 Fuel Inlet Pressure Regulating Device is designed according to the EFI engine for EFI engine test bench. This system can provide stable fuel flow and constant fuel pressure to solve the previous problem in engine performance test, which the engine fuel consumption cannot be accurately measured due to the fuel pressure instability.
3. Temperature and Pressure conditioning devices

3.7 BFY3000 Engine Cylinder Pressure Measuring Unit

BFY3000 uses high-precision, high-speed analog-to-digital converter for sampling. It collects the engine cylinder pressure transient data and calculate a cycle of the average pressure and maximum pressure values. The engine stroke and range can be set by the LCD touch keys. The set values can be permanently saved.
4. Throttle Actuation

4.1 FC2310 series Throttle Actuator *(Drive: DC Torque Motor)*

FC2310 Throttle Actuator uses DC torque motor as the drive motor. It outputs torque through the gear deceleration and the rod (or reel) installed on the actuator controls the engine throttle opening. Actuator rod full-scale action is $90^\circ$ angle, linear stroke is 85-140mm and the corresponding throttle is 0-100%. The straight travel distance can be adjusted by the rod slider.

4.2 FC2320 series Servo Throttle Actuator *(Drive: Servo Motor)*

FC2320 is used as the power output source, with the external mechanical parts including mechanical deceleration, rack and other components composing as the Servo Throttle Actuator. It is mainly used to adjust the engine throttle opening and assists FC2012 Dynamometer Control Unit to complete the engine test related to the throttle control.
5. Fuel Consumption Measurement

5.1 FC2210 Fuel Consumption Meter (Weight type)

FC2210 using integrated design technology, fuel consumption measurement and display are integrated as one for better cost control and achieving engine fuel consumption measurement independently.

- Measurement accuracy: ±0.4% F.S

5.2 FC2212L series Transient Fuel Consumption Meter (Coriolis Mass Flow Meter)

FC2212L can simultaneously measure the engine fuel mass flow, volume flow, temperature, density and cumulative fuel consumption.

- Measurement accuracy: ±0.2% (reading value).
5. Fuel Consumption Measurement

FC2440(A) Fuel Temperature Control Device and FC2210 Fuel Consumption Meter (Weight type)

FC2440(A) Fuel Temperature Control Device and FC2212L series Transient Fuel Consumption Meter (Coriolis Mass Flow Meter)
6. Control Units and Modules

- For fixing mounting Powerlink system components and control, monitoring and measuring equipment.
- Modular design provides extensive system expansion possibilities.
- The industrialized design of the operation ensures the best installation and service environment.
6. Control Units and Modules

6.1 **FC2012 Dynamometer Control Unit**

FC2012 can be used with various AC dynamometers and throttle actuator. It can support the dual closed-loop automatic control for engine throttle and AC dynamometer to meet the engine performance test and durability test.
6. Control Units and Modules

- Industrial personal computer
- UPS power supply
- TCP/IP Switch
- RS-422/ RS485 serial device servers
6. Control Units and Modules

6.2 FC2022 Data Acquisition Module

- Acquisition accuracy <0.3% FS.
- Sampling rate: 10 ms
- 16 channels: PT100, CU50, K-type thermocouple, 4-20mA, etc

6.3 FC2021C Switch Module

- 8 channel switch inputs
- 8 channel switch outputs
- 2 channel frequency inputs

6.4 FC2025 D/A Conversion Module

- Digital/ Analog conversion precision: 12 digit
- 8 channel digital/ analog outputs
- 4 channel frequency inputs
7. Accessories

7.1 JXJ-1 Rocker Junction Box

JXJ-1 Rocker Junction Box is suitable for many parameters acquisition test bed. As modules and sensors are installed in the chassis, Rocker Junction Box can reduce the field wiring. Maintenance is very convenient.

Rocker uses expansion bolts to install on concrete walls with the rotation angle 180°. Four FC2022 Data Acquisition Modules.

7.2 Emergency Stop Device

In case any incident happening, this device can effectively protects the engine and the complete test bench system.
8. **Software** (English interface can be selected)