

Engine Hardware-in-the-Loop(HiL)

HiLS application using HELIOS



Easy to build environment for HiLS verification

A&D 's HiLS provides hardware and software that reduces the user' s burden on environment creation and dramatically shortens the ECU development period.

◇ Six features to shorten Development period

Direct measurement of injector drive current

Measure the injector drive current and obtain injection time. Since the current can be directly measured, an external shunt resistance circuit is unnecessary. In addition, it supports both direct injection and port injection, and can be switched from software.

Direct measurement of solenoid current

The solenoid current of each actuator can also be measured directly. Furthermore, software settings can be set according to each solenoid.

External relay of ECU supply line is unnecessary

It supports up to 10 systems with one power supply board(VB-SW). In addition, it is possible to monitor current and voltage for each system.

Graphical pattern creation

Crank · Cam · Knock patterns can be created while displaying the waveform.

Easy real load connection

A load box can be provided that can store actual loads. The user can connect the load to HiLS simply by wiring to the terminal block in the box. The user can lay out loads of various shapes using the included mounting brackets.

Easy altitude simulation

A negative pressure box can be provided that can control the pressure on the ECU body. High altitude simulation up to altitude of 6000 m can be easily performed.

Features

- Compact
- Measure the injection drive current directly and obtain the injection time
- Direct measurement of solenoid current
- Failure function(short to power/ground, open circuit)
- Self-diagnosis function on all I/O board
- Built-in power supply for ECU driving in HELIOS chassis (600 W)
- Load Box with free load layout (optional)
- Negative pressure box enabling high altitude simulation(optional)
- Tests requiring high computing capability can be done using multinode configuration with multiple HiLS, it supports .
 - Scenario-based tests
 - High precision model execution
- Working with test bench
 - LabWorX collectively manages test data of bench test and HiLS test



Standard HILS rack 24U



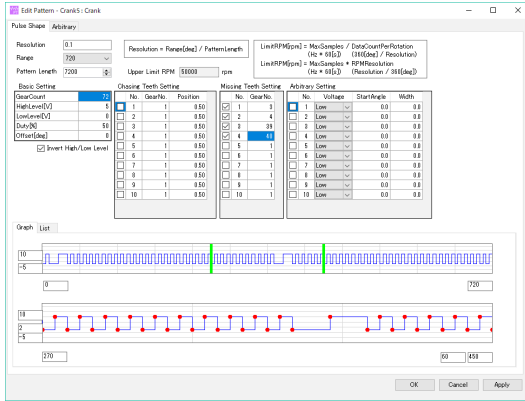
HELIOS-PRO

Engine HiLS

HiLS application using HELIOS

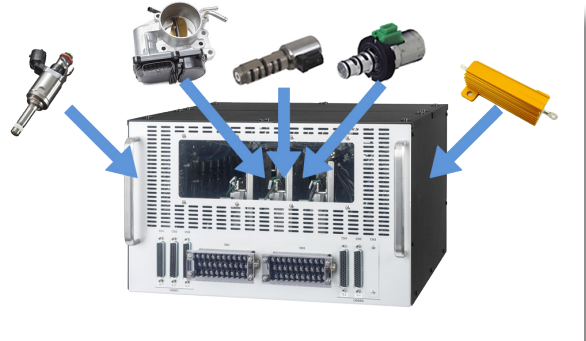
Output signal pattern creation

Crank · Cam · Knock output signal patterns can be created graphically. It is also possible to import patterns created in csv format.



Actual loads are stored in rack

Actual load and resistance loads can be placed in the load box which can be stored in HiLS rack. The temperature inside the box is monitored, and HiLS can be stopped safely when a temperature abnormality is detected.



I/O board specifications

Board	Channels	Description
ENG-IO	4CH: INJ measure	Injection angle/time measurement, input current range: 0-20A (isolated type), variable threshold, Direct injection/port injection compatible
	4CH: IGN measure	Ignition angle/time measurement, operation Input voltage range: 0to36V
	1CH: Crank angle out	Single-ended AMP output (range: ±10 V, output current: ±5mA) Open collector output (output level: 5V or VB, drive current: 100mA)
	4CH: Cam angle out	
	4CH: Pulse out	
	4CH: Knock sensor out	Single-ended AMP output (±10V), output current: ±5mA
PLS-IO	16CH: Pulse voltage measure	Comparator input (Range: 0-30V, Frequency: ~100kHz)/TTL input(Range: 0-5 V, Frequency: ~1MHz)
	16CH: Pulse voltage out	Push-pull output (range: 0-30V, drive current: ±100mA)/CMOS output(range: 0to5 V, drive current: 5mA)
ACT-IO	12CH: Solenoid measure	Measurement current range: ±5A(isolated type), measurement voltage range: 0-30 V, frequency: 100kHz or less, resolution: 24bits
	2CH: Motor measure	Measurement current range: ±20 A(isolated type), measurement voltage range: 0-30 V, frequency: 100kHz or less, resolution: 24 bits
	2CH: Throttle sensor measure	Measurement voltage range: 0-5V
SENSOR-IO	16CH: Analog in	Single ended input, range: 0-5 V/0-30V/±10V switchable, filter switchable, resolution: 24bits
	16CH: Analog out	Single ended output, range: 0-5V/±10V switchable, output current: ±5mA (±100mA switchable), resolution: 16bits
COM-IO	6CH: CAN/CANFD	CANFD MAX 4Mbps, terminating resistance switchable
	2CH: CAN	MAX 1Mbps, terminating resistance switchable
	4CH: LIN	LIN 1.x/2.0/2.1/2.2A, bus voltage switchable
	1CH: K-Line	VB input range: 6-36V, pull-up switchable
	2CH: Serial	RS232-C/RS422/RS485/TTL, terminating resistance switchable(120Ω/60Ω/none)
VB-SW	10CH: VB supply relay	Mechanical relay 60V/50A×1, 60V/20A×9, ※ Maximum total current: 50A, voltage/current monitor
	1CH: Sub battery input	MAX 30A

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