

**DK1s - DSP knock analyzer**

DK1s is a measuring instrument which analyzes the knock signal from a knock sensor by DSP processing, and displays the existence and the level of a knock.

Every one ignition is high-speed analysis about the existence of a knock..

Only knock window Filtering processing.

Knock analysis highly precise in digital one by DSP technology.

Program is possible for a gain and a knock level.

Knock frequency automatic setup at the diameter of a cylinder.

Band path filter by digital signal processing.

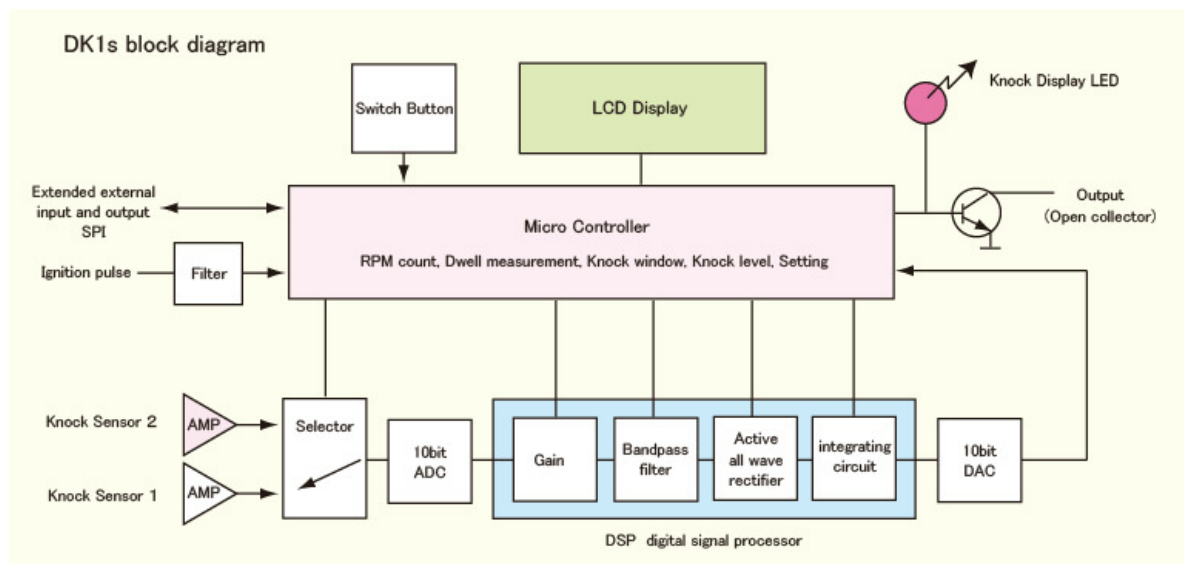
Improvement in the knock signal to noise ratio by integration processing.

Dwell time, Engine RPM display.

Knock display, High-intensity red LED, External output line.

Easy operation by three buttons of UP, DWN, and SET.

Knock level display by back light LCD.



DK1s block diagram

**Warning**

Use on a public road may be restricted.

**Installation is not performed during engine operation.**

**Our company and a store take no responsibility about damage, a disaster caused by man, etc. by the accident which occurred by use of the product.**

**Caution**

There are various forms in vehicles. Therefore, we may be unable to support about an individual discontinued line. This product needs adjustment. Therefore, we cannot guarantee accuracy.

## Installation

DK1s needs connection with a knock sensor and an ignition signal (Igniter) line.

### 1. Check the kind of knock sensor first.

**Wideband type knock sensor.** (Un-resonating type , Piezo type , Flat type)

DK1s sensor connecting cable is used and common connection is made at the knock signal entrance cable of an engine computer.



Example of a resonated type sensor (use is possible)

**Resonated type sensor.** (narrow-band type , Mechanical type)

This type of sensor cannot be used, a wideband type knock sensor is required for it separately.



Example of an un-resonating type sensor (use is impossible)

DK1s has a filter in the sensor input.

However, by connecting with a genuine engine computer and parallel, it may be influenced by a noise etc. and a problem may arise in measurement at an error or engine control.

**We recommend installing the knock sensor only for DK1s apart from a genuine knock sensor as much as possible.**

### 2. Common connection knock input cable to wiring of a knock sensor, or knock sensor is installed separately.

Knock signal entrance cable = wiring to which the golden RCA plug was attached

### 3. Wiring of a wiring connector.

**Red** power supply  
**Black** grounds (signal ground of ECU etc.)  
**Brown** Ignition signal input 1 (Not a meaning of #1 cylinder)  
**White** Ignition signal input 2-7 (No specification of the order of wiring)  
**Yellow** knock detection signal line(Open Collector)

In order to avoid the spike noise of a power supply, you should connect with an accessories power supply.

**Brown and a White line make common connection of the ignition signal wire from ECU to Igniter.**

In the case of Toyota cars, wired to IGt line.

**Maximum Ignition signal Input voltage is 30V p-p.** Wire between ECU and Igniter!

**Caution : Do not wire an ignition coil directly.**

Cannot use, when Igniter is built in type ECU.

Ignition signal input should wire sequentially from a brown line.

Not necessary to wire in order of a cylinder, please be sure to wire a brown line in one of ignition signals.

Eg.4cylinder engine. #1Brown, #2White, #3White, #4White,

This is also O.K. #3Brown, #1White, #4White, #2White,

One cylinder vehicle, only brown line connect

Two cylinders or more engine, brown and white line sequentially from the left of the connector.

### 4. Wiring of knock detection signal power (arbitrary)

When a knock occurs, a signal can be outputted to Engine Management, a warning lamp, etc.

Open collector (Type which will fall to a ground if set to ON)

By external monitor, + side of a lamp is connected to a power supply (simple LED, lamp, etc.), connect the minus side of a lamp to a yellow line.

Current capacity is a maximum of 250mA, please use a relay, when large current and reversal power are required.

Relay should use the type having the Diode of back-electromotive-force prevention.

When connecting with Engine Management System etc., pull-up by resistance from a plus power supply.

### 5. Connect the RCA plug from a knock sensor in the white RCA connector of DK1s.

(Red RCA plug is an input terminal for extension, it is not usually used)

#### Attention

Connect a knock sensor to the input #1side. (white RCA connector).

Ignition signal input should wire sequentially from a brown line.

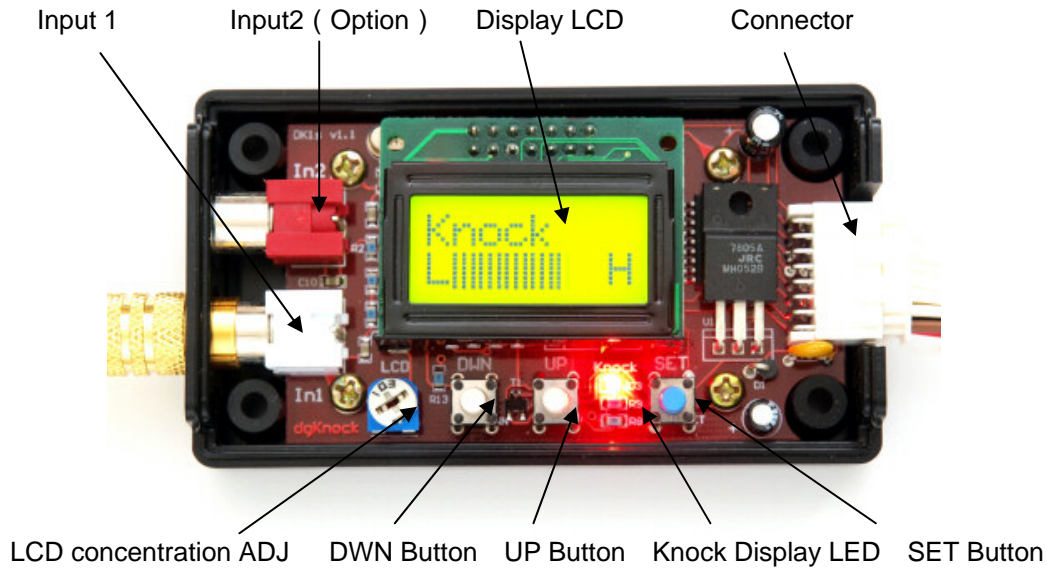
These products are precision instruments.

Do not give a strong shock.

Do not install in the place where direct rays, or high temperature.

Do not give damage to a knock sensor cable.

## Directions for use



<b>SET Button</b>	Change of a menu and determining.
<b>UP Button</b>	Data and a display are changed.
<b>DWN Button</b>	Data and a display are changed.
<b>LCD concentration</b>	LCD character concentration is adjusted. (Careful not to turn too much)

### Button Switch operation

Please refer to a Menu flow table for a menu item.

When a button switch is pushed and a display is changed, change has completed setting data. Setup is held even if it turns off the power.

#### ● Knock knock display

Bar graphical representation of the knock level between L and H.  
If a preset value is exceeded, a Knock display will blink.  
If an input level overflows, it is at the upper right. \* mark is displayed.

**DWN** button is pushed in this state, Setting mode.

**UP** button is pushed in this state., RPM display mode.

**SET** button is pushed in this state, Level setting mode.

#### ● Level level setup

Knock judging level is set up.  
Knock judging level is changed using a UP/DWN button between H from L.  
If an input exceeds this level, it will be judged with a knock and knock display LED will light up.  
If the SET button is pushed in this state, it will become Gain setting mode.

#### ● Dain Gain setting

Gain (amplification) to an input is set up.  
From Min to Max, an input gain can be set as 14 steps.  
Overflow of an input level will display \* mark on the upper right.  
Please set up not to overflow during a run.  
If the SET button is pushed in this state, it will return to Knock display mode.

#### ● EG Speed Engine number-of-rotations display

Engine number of rotations is displayed.  
(When having shifted from the display, it sets up by RPM in arrangement mode)

● **Dwell ms**            Dwell time display  
Pulse width of an ignition signal is displayed per ms (milli second).  
Generally, it turns on electricity to the ignition coil between H, and lights at the moment of being set to LO.  
In the case of the engine which is performing closed angle control by the Toyota car etc., an exact dwell time cannot be displayed.

● **Setting**                    Setting mode  
Diameter of a cylinder which sets up knock frequency, and number of rotations, a connection check and a full reset mode.

● **Bore**  
Diameter of a cylinder is set up.  
Knock frequency is mostly decided by the diameter of a cylinder, some gap arises with an engine.  
It is also good to shift from a basic value and to explore an exact value.  
It is also effective to set up the diameter of a cylinder of half size and to detect a harmonics ingredient.  
Set up per mm with a SET -> UP/DWN button.

● **RPM**  
Number of rotations calculated from an ignition signal is set up.  
Fundamentally, it corresponds to the following number of cylinders.

Wc	Waste Ignition.
1 c	1 cylinder
2 c	2 cylinders
3 c	3 cylinders
4 c	4 cylinders
6 c	6 cylinders
8 c	8 cylinders

Engine RPM is maintained at about 2000rpm, checking with the rotating meter of vehicles, and it is set as the value that the display of DK1s shows about 2000rpm.

**Please give priority to and set up the number of rotations actually displayed rather than the above-mentioned number preset value of cylinders.**

● **Connect**  
Input state of an ignition signal can be checked.  
Input sequenced of DK1s is displayed for the upper row.  
Lower row, the actual input sequenced of an ignition signal is displayed.  
“w” display is in a waste (simultaneous ignition) state.  
No connecting,, displayed on 1 by w, and 2-8. If a certain signal is inputted, it will change.  
\* Please check a display by an engine idle state.  
\* It may incorrect-display by ignition cut etc, please consider it the input check grade of an ignition signal.

● **RESET**  
All the setting data is reset.  
It becomes a YES display by SET -> UP -> UP.  
All reset if the SET button is pushed in this state.  
**Setup steps when beginning and using DK1s**

- |                       |  |
|-----------------------|--|
| <b>1. Bore setup</b>  | <b>Diameter of a cylinder is set up.</b>                                 |
| <b>2. RPM setup</b>   | <b>Number of rotations calculated from an ignition signal is set up.</b> |
| <b>3. Gain setup</b>  | <b>Gain (amplification) to an input is set up.</b>                       |
| <b>4. Level setup</b> | <b>Knock judging level is set up.</b>                                    |

## Directions for use

1. Run in the state where the knock has not taken place, and set up Gain so that bar graph may become a half grade of graph at the maximum.
2. Set up Level on several steps from the state.  
Please determine the level judged to be a knock, looking at the generating situation and run situation of an actual knock.
3. Please check that bar graph shakes when the knock has occurred, a Knock display blinks, and knock LED lights up.

### Reference data

number of cylinders	Ignition interval per cylinder	Knock Window	1 cylinder	2 cylinders	3 cylinders	4 cylinders	6 cylinders	8 cylinders
RPM								
1000	120ms	10 ms	120ms	60ms	40 ms	30 ms	20 ms	15 ms
2000	60ms	5 ms	60ms	30ms	20 ms	15 ms	10 ms	7.5 ms
3000	40ms	3.33 ms	40ms	20ms	13.3 ms	10 ms	6.65 ms	5 ms
4000	30ms	2.5 ms	30ms	15ms	10 ms	7.5 ms	5 ms	3.75 ms
5000	24ms	2 ms	24ms	12ms	8 ms	6 ms	4 ms	3 ms
6000	20ms	1.66 ms	20ms	10 ms	6.66 ms	5 ms	3.33 ms	2.5 ms
7000	17.1ms	1.425 ms	17.1ms	8.55 ms	5.7 ms	4.28 ms	2.85 ms	2.14 ms
8000	15ms	1.25 ms	15ms	7.5 ms	5 ms	3.75 ms	2.5 ms	1.875 ms
9000	13.3ms	1.10ms	13.3ms	6.65ms	4.43 ms	3.325 ms	2.21 ms	1.6625 ms
10000	12ms	1ms	12 ms	6 ms	4 ms	3 ms	2 ms	1.5ms

## Caution

Engine knock is uncancelable with this product.

Our company cannot support about the individual car wiring method.

Our company and store take no responsibility, such as engine damage etc.

Possibility that RPM and Dwell time will produce the actual condition and an error by an ignition noise etc.

Our company and store take no responsibility about the damage caused by accident etc.

DK1s Menu flow

