TYNDM-052A

Chromatic Tuner

Model 8001

Instruction Manual

NAGANO KEISO CO., LTD.

Cautions for proper and safe operation

Chromatic tuner　For safe use

To use this product safely, please read this manual carefully. Incorrect operation may cause malfunction, damage, or an accident.
Please be sure to retain this manual after reading.

Cautions

1. Be careful not to drop this product when carrying. Dropping this product may cause injury or damage.

2. Do not swing around this product with force. It may cause injury or damage to surroundings.

3. Use of a non designated power source may cause a fire or electrical shock.

4. Use this product within the range of operating temperature. Using outside the range of operating temperature may cause malfunction or damage of the unit and also injury or damage to surroundings.

5. Do not alter this product. Also, do not remodel this product by adding new functions. Contact NAGANO KEISO for repairs.

* If breakdown or malfunction of this product may threaten human life directly or it may harm human body, please contact NAGANO KEISO in advance.

Introduction

This tuner is designed to perform tuning for multiple purposes. It is used for the following purposes, including but not limited to:

1. Intonation training for wind musical instruments such as flute, oboe, clarinet, trumpet and etc.

2. For quick and accurate tuning of bands, orchestras, or ensembles

3. For tuning instruments having an equitempered scale such as piano, cembalo, organ, accordion or electronic keyboard

4. For precise pitch measurement of any musical instruments or other audio sources

5. For use in the design and manufacture of musical instruments, mouthpieces, mutes and etc.

6. For auditory education and studying

7. For use as a simple and easy-to-use tuner in concert halls

Contents

1) Front view

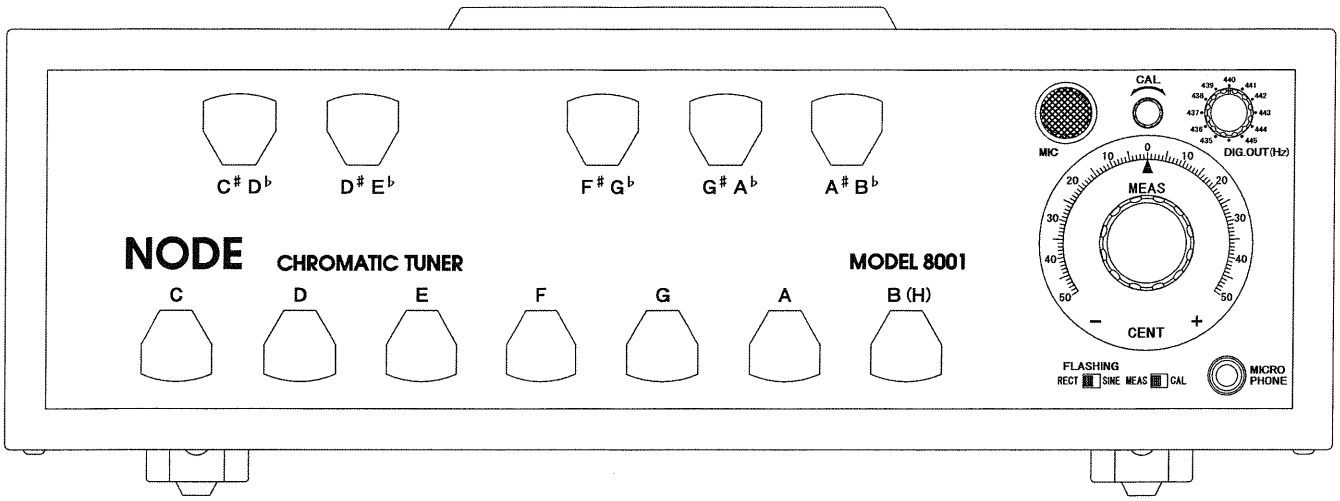


Figure 1

(Power source area)

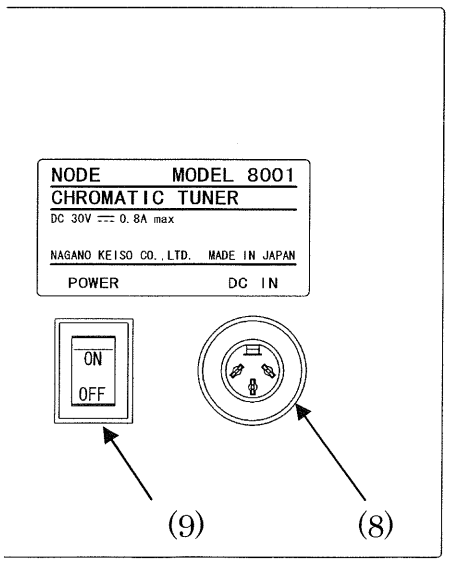
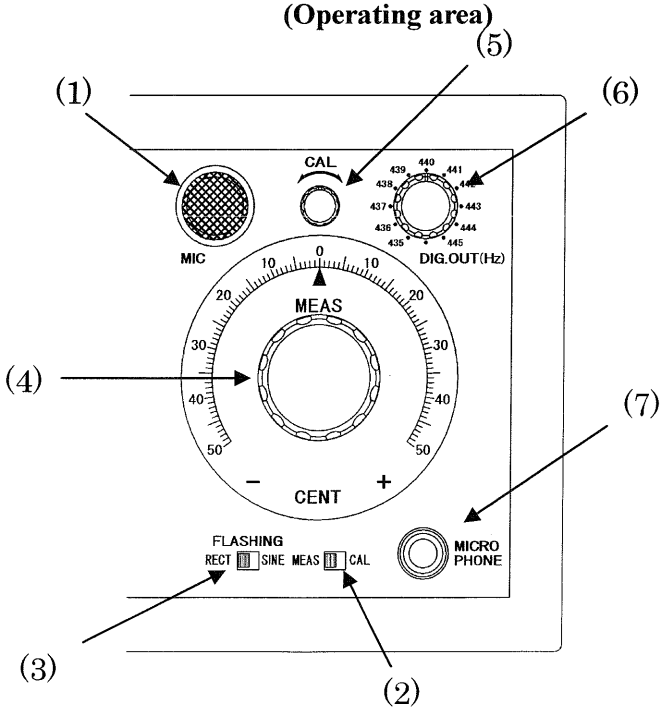


Figure 2

(Operating area)



2) Connecting to a power source/Start-up

Insert the DC plug of the accessory AC adapter into the connector on the rear side of the main body (Figure 1-(8)). Connect the power cable to the power source and turn the power switch (Figure 1-(9)) ON.

3) Features of the NODE Model 8001

When the sound of an instrument is input through the microphone, LEDs flash in the frequency of its sound. If the frequency is lower than the standard, the pattern on the disc moves to the left. On the contrary, if the pattern moves to the right, it shows that the sound (frequency) is higher than the standard.

Microphone/Input jack

This device has a built-in, sophisticated capacitor microphone.
Normally, this built-in microphone (Figure 2-(1)) is used. However, an external microphone can also be used as appropriate. In this case, the microphone jack (Figure 2-(7)) on the front side of the main body is used. (It is recommended to use a low impedance microphone with approximate 600 ohms).

CENT DIAL

There is the CENT DIAL (Figure 2-(4)) on the right side of the front panel. This dial is used to adjust the standard pitch (see 4. "Calibration").

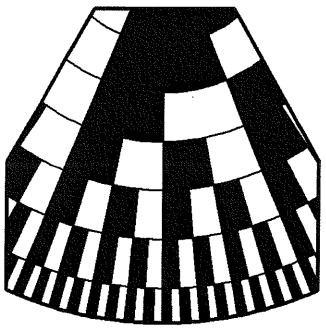
If this dial is turned right, the pitch becomes sharp. If this dial is turned left, the pitch becomes flat. This dial allows to perform calibration in musical cents (hundredths of a musical semitone).

RECT/SINE selector switch (Figure 2-(3))

The flash of LEDs can be switched between sine wave form (SINE) to rectangular wave form (RECT). This switch is located on the right bottom of the front panel indicating "RECT", "SINE". If the strobo pattern is unclear, try to flip this switch. In general, "RECT" is suited for pure tone such as tuning fork, flute, and etc. "SINE" clarifies the tone which includes many overtones such as that of piano. Flip this switch so that the clearest pattern is displayed.

Strobo pattern discs (See "Front view" and the figure below)

The twelve fan-shaped windows are arranged on the front panel as same position as piano's black and white keys. There are seven windows in the lower row and five windows in the upper row. There is a strobo pattern disc behind each window and a set of LEDs are placed behind each disc. All the pattern discs are of the same size. These pattern discs are fixed on the spindles sticking out of the scanning gear box. This gear train is driven by the synchronous motor. The adjacent gear rotates by the difference of the twelfth root of 2, which is equivalent to the ratio of adjacent semitone of equitempered scale. (The velocity of the motor differs depending on the frequency of precision oscillator).
In each disc, there are 7 concentric band areas and they have a set of black/white zones respectively. On the band closest to the center, there are 2 black zones and 2 white zones. On the next band, there are 4 black zones and 4 whit zones. This number of zones is twice as many as that of the previous band area. Each band corresponds to an octave and there are 7 octaves.



4) Calibration (1) and operation

* Please be sure to perform calibration before use.
(For the location of the CENT dial, CAL volume knob, switches and built-in microphone, see the appearance diagram and figure 2).

Normally, A=440Hz (international pitch) is used for calibration. First, set the CENT dial (Figure 2-(4)) to the zero point and turn the switch (Figure 2-(2)) to "CAL".

A pattern will appear in the "A" window. If the pattern is moving, turn the CAL volume knob (Figure 2-(5)) until the pattern comes to a standstill. If the pattern comes to a standstill firmly, the tuner is calibrated at "A=440Hz". There may be other cases that it is necessary to calibrate at other frequencies such as "A=435Hz". For example, if it is necessary to calibrate at "A=435", turn the selector switch (Figure2-(6)) to "435Hz", and adjust the CAL volume knob (Figure 2-(5)) until the pattern displayed on the "A" window comes to a standstill.

The selector switch (Figure2-(6)) allows to select a frequency from 435,436,437,438,439,440,441,442,443,445 Hz. If it is necessary to select a frequency other than the above, please perform calibration according to the calibration procedures (2) described below.

Calibration (2) and operation

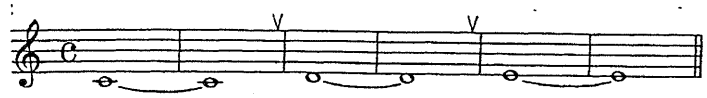
Fist, turn the switch (Figure 2-(2)) to "CAL". Then, turn the selector switch (Figure 2-(6)) to "DIG.OUT".
1 Hz is equivalent to 4 cents. Therefore, if it is necessary to calibrate at 446Hz, set the CENT dial at －24 cents. ((446－440)x 4=24)
A pattern will appear in the "A" window. If the pattern is moving, turn the CAL volume knob (Figure 2-(5)) until the pattern comes to a standstill. The tuner will be calibrated at "A=446Hz". Then, return the switch (Figure 2-(2)) to "MEAS" and turn the CENT dial (Figure 2-(4)) so that the arrow "MEAS" is pointed to zero.
In the same way, if it is necessary to calibrate at 434Hz, set the CENT dial (Figure 2-(4)) at ＋24 cent ((440－434)×4＝24).
After performing calibration as described above, set the CENT dial (Figure 2-(4)) at zero before tuning.
(Do not turn the CAL volume knob (Figure 2-(5)) after calibration. Otherwise the calibration settings of the tuner will be changed).

5) Tuning (Measuring)

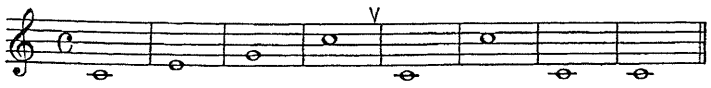
After calibration, turn the switch (Figure 2-(2)) to "MEAS" and play the instrument to be tuned. Only one sound can be tuned at one time. The strobo pattern displayed on the window corresponding to the sound stands still or moves. If the pattern moves to the left, the instrument is flat. If the pattern moves to the right, the instrument is sharp. Adjust the instrument until the pattern comes to a standstill. After the sound is tuned, proceed to the next sound. In this way, entire instrument is tuned. If the pattern moves slowly, it shows that the instrument is slightly untuned. Thus slight tuning is necessary. The quicker pattern moves, the more untuned the instrument is.

Tuning practice

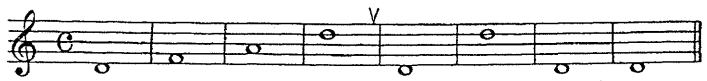
To practice tuning with a wind instrument, blow the instrument in front of this tuner. Adjust the pitch until the pattern corresponded to the sound comes to a standstill firmly. For example, practice sound "A" repeatedly until the corresponded pattern comes to a standstill. Then practice C-D-E in turn.



Then, practice C-E-G-C#--C-C#-C-C.



Next, practice D-F-A-D#-D-D#・D-D.



Proceed with E-G・E#-E-E#・E-E, etc.

After practicing above, practice pianissimo in the same way. Practice repeatedly until the strobo pattern comes to a standstill.

Then proceed with forte. In the case of wind instrument, it tends to get out of pitch when practicing forte. If each member of a brass band or an orchestra practices as described above, and if all the members come to be able to tune up their sound, grate performance will be realized.

6) Maintenance of this tuner

Although this tuner is relatively robust, refrain from rough handling such as dropping since this tuner is a precision instrument.

Cleaning

The viewing windows should be cleaned with a mild window cleaner. Put a small amount of window cleaner on a clean cloth or soft paper towel and wipe the dirt or dust from the window lightly. Do not rub hard or spray the window cleaner directly on the tuner.

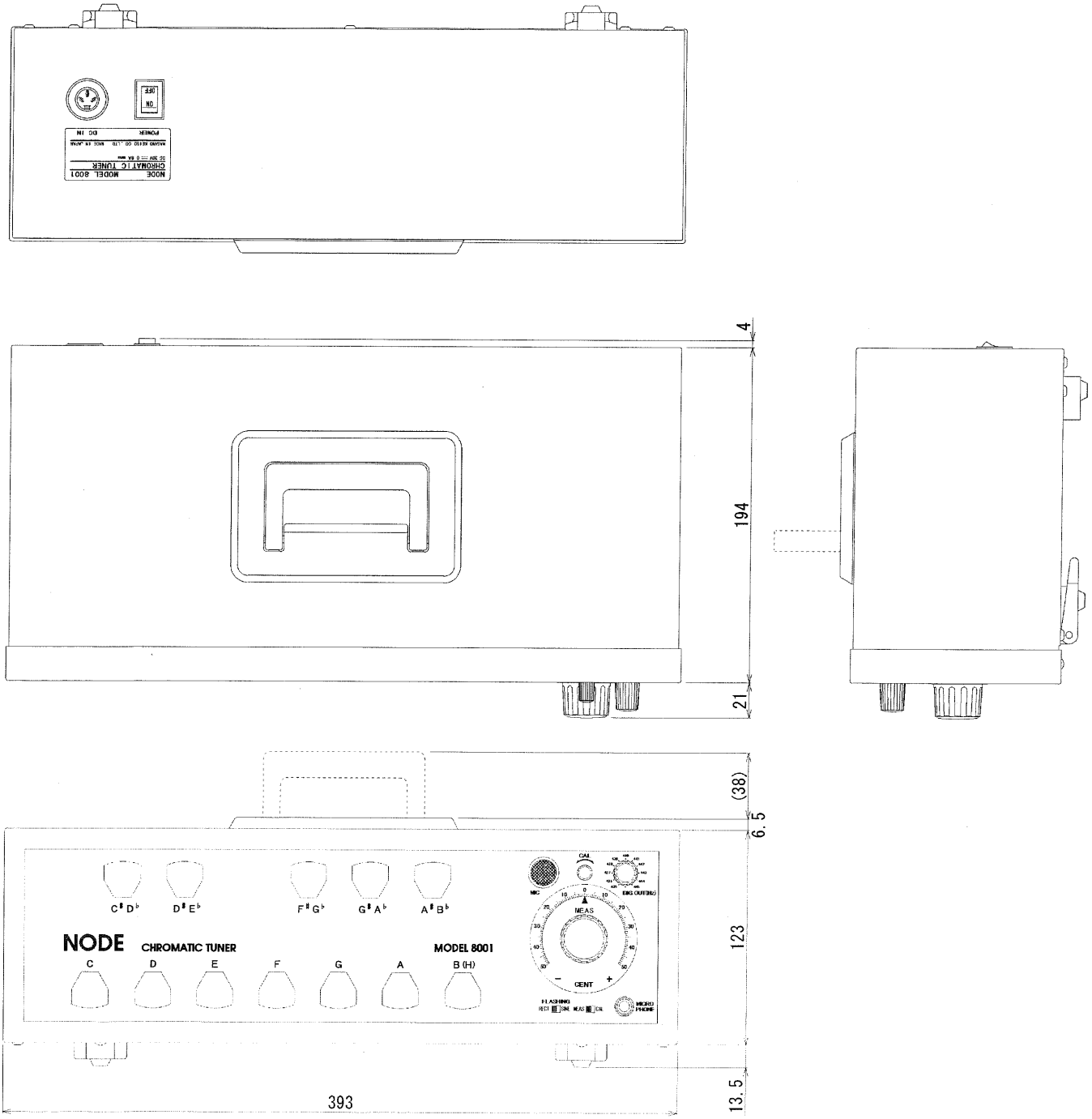
Maintenance

The internal gear box needs regular lubrication. The lubrication oil is available at our distributers.

(Specifications)

A49 pitch (Hz)	:435,436,437,438,439,440, 441,442,443,444,445
Pitch error range	:± 50 cents
Measuring range	:7 octaves(instrument with equal temperament of 12 degrees)C4(32.70) to B87(3,951.09Hz)
Accuracy	:A: 0.00% Others<0.04%
Power source	:AC adaptor (Input AC100V to 240V)
Power consumption	:24W (Max)
Dimensions	:393(W) x 129.5(H) x 198(D) (projection is not included)
Weight	: Approx. 5.8 kg

7) Dimensions



8) Appendix (Reference data)

Cent and frequency

100 cents of a 12-tempered scale denote a logarithm of the chromatic interval ratio.

$$\log\frac{A^{\#}}{A} = \frac{466.16}{440.00} \fallingdotseq \log\sqrt[12]{2}$$

$$= \log 1.059463$$

$$= 0.025086$$

The difference of two tones described as 100 cents. i.e. 0.025086 denotes the logarithm of 100 cents. Also,

$0.025086 \times 1/2 = 0.012543$ denotes the logarithm of 50 cents.
$0.025086 \times 1/10 = 0.0025086$ denotes the logarithm of 10 cents.
$0.025086 \times 1/100 = 0.0002508$ denotes the logarithm of 1 cent.

The ratio (antilogarithm) of 0 cent, 10 cents and 1 cent are defined as "x", "y" and "z" respectively.

$\log x = 0.012543 \therefore x = 10^{0.012345} = 1.029302$
$\log y = 0.002508 \therefore y = 10^{0.025086} = 1.005794$
$\log z = 0.0002508 \therefore z = 10^{0.0002508} = 1.000577$

The table below shows the expressions above.

Cent	Logarithm	Ratio
100	0.025086	1.059463
50	0.012543	1.029302
10	0.0025086	1.005794
1	0.00025086	1.000577

The ratio shown above denotes antilogarithm.

Table of antilogarithms for the cent

Cent	Ratio		Cent	Ratio	
	+	-		+	-
1	1.00058	0.99942	26	1.01513	0.98509
2	1.00116	0.99885	27	1.01572	0.98453
3	1.00173	0.99827	28	1.01630	0.98396
4	1.00231	0.99770	29	1.01689	0.98339
5	1.00289	0.99712	30	1.01748	0.98282
6	1.00347	0.99654	31	1.01807	0.98225
7	1.00405	0.99596	32	1.01865	0.98169
8	1.00463	0.99539	33	1.01924	0.98112
9	1.00521	0.99481	34	1.01983	0.98055
10	1.00579	0.99424	35	1.02042	0.97999
11	1.00637	0.99367	36	1.02101	0.97942
12	1.00696	0.99309	37	1.02160	0.97885
13	1.00754	0.99252	38	1.02219	0.97829
14	1.00812	0.99195	39	1.02278	0.97772
15	1.00870	0.99137	40	1.02337	0.97716
16	1.00928	0.99080	41	1.02397	0.97660
17	1.00987	0.99023	42	1.02456	0.97603
18	1.01045	0.98966	43	1.02515	0.97547
19	1.01104	0.98909	44	1.02574	0.97490
20	1.01162	0.98851	45	1.02633	0.97434
21	1.01220	0.98794	46	1.02693	0.97378
22	1.01279	0.98737	47	1.02752	0.97322
23	1.01337	0.98680	48	1.02811	0.97265
24	1.01396	0.98623	49	1.02871	0.97209
25	1.01455	0.98566	50	1.02930	0.97153

In the calculation above, it is shown that 1 Hz is equivalent to 4 cents. However, this is limited to the range of A=440Hz. In the range of A=220Hz, 1 Hz is equivalent to 8 cents. Because the ratio of 8 cents is 1.00463 .The table shows "220Hz≒1.00463 221Hz".