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98371A

Column Type Air Micrometer

CAG2000(2CH) Instruction Manual

NIDEC-SHIMPO CORPORATION

1. Overview

The column type air micrometer is a measuring instrument with an easy to see three color bargraph display. The combination with an air/electric(A/E) converter provides this compact instrument with an automatic mastering function. It can also be easily connected with one or more identical units to allow the trend of the measured units to be read from the bargraph displays arranged side by side.

2. Main Features

1) A three color bargraph allows the measurement result to be seen more easily.

2) An eight digit alphanumeric display indicates the measured value, set items and other types of information.

3) Control keys are used to automatically calibrate the instrument with the maximum and minimum masters.

4) The instrument is only 50mm wide, so it is best suited for multiple measurements using one or more identical units linked together.

5) The standard serial communication function allows the output of data to a PC and printer. The data can be stored, statistically processed, and input to a spreadsheet software like Excel.

6) In the set mode, the ENT key can be pressed to select all items one by one.

7) Programs can be changed and selected to store ten types of set values and mastering data.

3. Functions

1) Bargraph Display
The display is shown using a 101 dot, 3-color bar. A green color is displayed when the judgement result is OK while a red color is displayed when the judgement result is NG.

2) Range Display
Indicates the top and bottom dimensions in two digits.
With ITEMS 1～3 common :

Measuring range(μm)	Digital display
20	10
50	25
100	50
200	10

3) Item and judgement LEDs
Indicates the judgement result. Green LED is ON when result is OK while the red LED is ON when the result is - NG or +NG. “1” is displayed for A-Channel, “2” for B-Channel and “3” for the computation result.
The item being measured is displayed blinking.

4) Mode LEDs

Indicates the current mode and the mastering result.

LED name	LED color	Mode or Condition
SET	Orange	Set mode
	Green	Program change mode
MAS	Orange	Master mode
	Blinking Red	Mastering result NG

5) Alphanumeric display

Indicates the measured value, set value, set item and other types of information using 8-digit 7 x 5 dot characters.

6) Panel Control keys

① Left arrow key

Press this key for 2 secs to change the mode from measure mode to set mode.
In the set mode, press this key to select the set item.

② Right arrow key

Press this key for 2 secs to change the mode from measure mode to mastering mode. In the set mode, press this key to select the set item.
In the mastering mode, press this key to change to raw data display.

③ Down arrow key

Press this key for 2 secs to change from measure mode to program change mode.
In the set and mastering mode, press this key to change the displayed item.
In the set mode, press this key to input the numerical value.
After the set item is selected, press this key to decrease the set value.

④ Up arrow key

In the measurement and mastering mode, press this key to change the displayed item. In the set mode, press this key to input the set numerical value.
After the set item is selected, press this key to increase the set value.

⑤ Enter key

In the measure mode, press this key to hold the measured value.
In the set mode, press this key to confirm the item and set value.
In the mastering mode, press this key to read the minimum and maximum measured value during mastering.

⑥ Reset key

In the measure mode, press this key to cancel the measured value hold.
In the set and mastering mode, press this key to return to the previous condition.
When a set item is being selected, press this key to finish setting and change to (WRITE or CANCEL).

7) Sensitivity adjustment knob (ＭＡＧ)

Adjusts the sensitivity of the air circuitry. This adjustment is necessary only when changing the measuring nozzle and correcting a mastering error.

8) Zero adjustment knob (ＺＥＲＯ)

Adjusts the zero position of the air circuitry. This adjustment is necessary only when changing the measure nozzle and correcting a mastering error.

９) Measuring nozzle port
Connects the vinyl hose of the measuring nozzle.

１０) Power connector(input) and Power switch
Inputs AC power. Possible to use in the range of AC 85～264V. Use the accessory power cable in the range of AC 85～125V.

１１) Power connector(output)
Connects the power connector(input) from an adjacent instrument to be used in combination and is internally connected to the power connector(input).

１２) Fuse holder
Provides over current protection to the internal circuit using a glass tube fuse (φ5.2×20 3A)

１３) DC input/output connector(Option)
Provides connection to LED and sequencer used for output of judgement result and BCD.

１４) RS232 connector
Provides serial communication connection for PC or printer.

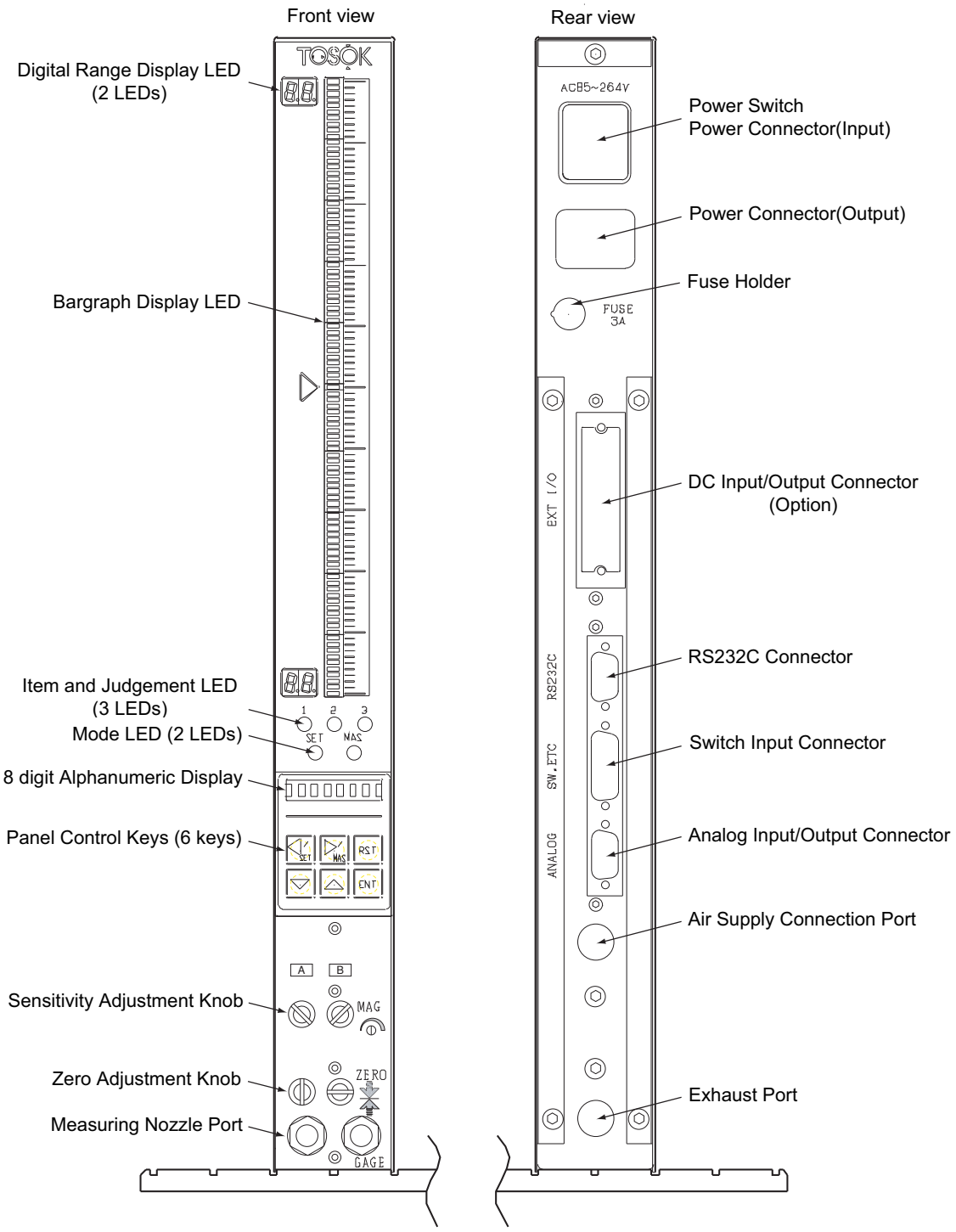
１５) Switch input connector
Provides connection for measure or mastering command using an external button. Also used for RS422 communication and Digimatic output(option).

１６) Analog input/output connector
Provides connection for external analog signal input and A/E converter signal output.

１７) Air supply connection port
Supplies 196KPa of air pressure using a precision regulator.

１８) Exhaust port
Serves as exhaust for air used in zero position adjustment.

Column Type Air Micrometer(2 CH) Main Unit



4. Specifications

Item	Specification	Remarks
Input	2 Air channels	
Air supply pressure	196 KPa	Source pressure : 300KPa or more
Measurement Item	３(Computation１)	
Computation formula	Ａ－Ｂ、Ａ＋Ｂ、ＡＶＥ(=(A+B)/2)、Ｂ－Ａ、(Ａ－Ｂ)/２、(Ｂ－Ａ)/２	Ａ＝ＩＴＥＭ１ Ｂ＝ＩＴＥＭ２
Measuring range [mm]	0.0200 0.0500 0.100 0.200	For export, exclude 0.0200
Resolution [mm]	0.0002 0.0005 0.001 0.002	For export, exclude 0.0002
Bargraph display	101 dots(red,green,orange,light/dark)	
Bargraph display method	Bar (OK: Green, NG: Red) Dots (MAX/MIN)	
Range display	2 digits(numbers), 2 places	
Multifunctional Display	8 digits(numbers/alphabet), measured value, set item, set value and error display	
Shift range	± 300 % (full scale)	From Ver1.4
Judgement result	－ＮＧ、ＯＫ、＋ＮＧ	
Judgement result display	Bargraph display(color)、 Item/judgement LEDs Multifunctional display	
Automatic mastering	Minimum and maximum masters	
Automatic mastering range	Min Master ± 50 % (full scale) Max Master ± 20 % (full scale)	
Program input	Panel operation keys	
No. of set programs	10 types	From Ver1.4
Power supply voltage Operating frequency	AC 85 ～ 265 V 50 / 60 Hz	AC100V power cable included
Power supply capacity	30 VA	
Dimensions and weight	50(L) x 480(H) x 200(W) mm / 4 Kg	
Operating temperature	0 ～ 45 ℃	
Standard		
External input	4(measure,reset,max master,min master)	Ext keys, Foot SW
Serial output	1(printer, PC)	RS232C
Option		
Printer output	1 (DP1)	Digimatic
Judgement output	8 (DC12/24V)	
BCD output	1 set (DC 12/24 V)	
Analog input	4 (Column link)	
Serial comm.	1 (Sequencer)	RS 422

5. Operation Instructions

1) Preparation

① Attach the regulator to the rear of the instrument and connect it with an air filter.

② Connect the measuring nozzle hose to the front of the instrument and connect the power cable accessory to the rear of the instrument.

③ Turn on the power switch at the rear of the instrument(or press marked ○) to supply AC85～265V (50/60Hz) power to the main unit. Supply air at 0.3～0.7 MPa to the air filter.

④ When the instrument is started, it is in measure mode. Press [MAS] for 2secs to change to the master mode, [SET] for 2secs to change to the set mode and [▽] for 2secs to change to the program change mode.

2) Measurement

① Bargraph LED display

- The judgement upper and lower limit values are indicated by orange(dark) on the bargraph display.
- The bargraph is lighted green(bright) and red(bright) when the judgement result is OK or NG, respectively.
- LED "1" is for channel A, LED "2" is for channel B and LED "3" indicates the judgement computation result and the current bargraph display item.
- For each item, 「Item・Judgement LED」is lighted in green(bright) when the judgement result is OK, and is lighted in red(bright) when the result is - NG or +NG.
- The displayed item can be changed by pressing [△] or [▽] key.
  For the item being measured, 「Item・Judgement LED」 shall be blinking (bright/dark).

② Measured value hold

- Normally, the bargraph display shows the actual measured value(this is called free run condition).
  During free run condition, the measured value is indicated by green(light) on the bargraph display when it is OK and by red(light) on the bargraph display when it is NG.
- Press [ENT] key to hold the measured value(this is called hold condition). In the hold condition, the measured value is indicated by green(dark) on the bargraph display when it is OK and by red(dark) on the bargraph display when it is NG.
- The displayed item can be changed by pressing [△] or [▽] key.
  For the item being measured, 「Item・Judgement LED」 shall be blinking (dark).
- Press [RST] to clear the measured value hold.
  The measured value cannot be held if mastering is NG.

3) Automatic mastering

① In the measure mode, press [MAS] for 2 secs or more.

② The MAS LED below the bargraph display is lighted in orange, “MIN M.” appears on the 8 digit display, and the instrument changes to the master mode.

③ In the setting mode at “MAS SET”,
if “ALL” is selected, mastering is performed on all channels collectively.
if “EACH” is selected, mastering is performed for each channel individually.

④ Press [△] or [▽] key to change the channel where mastering will be performed. The current channel is indicated on the 「Item・Judgement LED」.

⑤ Set the minimum master in the measuring nozzle and press [ENT]. The instrument is calibrated with the minimum master and “MAX M.” is shown on the 8 digit display.

⑥ Set the maximum master in the measuring nozzle and press [ENT]. The instrument is calibrated using maximum master. If there is no mastering error, “MAS OK” is shown for 2 secs on the 8 digit display, ends the mastering then returns back to measure mode.

⑦ If there is a mastering error, the error description is shown on the 8 digit display as follows :

“ERR ZERO”	Zero position error(outside of automatic mastering range)
“ERR MAG”	Sensitivity error(outside of automatic mastering range)
“ERR REV”	Maximum and minimum master values reversed
“ERR OFFR”	Outside of measuring range

Press [ENT] key to return to step ② above. If it is necessary to adjust the sensitivity, press [MAS] key and perform ZERO and MAG adjustment.

⑧ In case mastering is performed for each channel, if mastering result is not OK, the channel mastering will change and return to step ② above.

⑨ During automatic mastering, press [RST] to go back to the previous condition. Returns to measure mode when “MIN M.” is displayed,

4) ZERO and MAG sensitivity adjustment

There is no need to adjust the ZERO and MAG sensitivity except after changing the measuring head or an NG output result after automatic mastering due to wear.

① In the measure mode, press [MAS] for 2 secs or more.

② The “MAS” LED below the bargraph display lights up and “MAX M.” or “MIN M.” is shown in the 8 digit display panel. Press [MAS] to change to the adjust detector mode and ADJ is displayed.

③ Press [ENT] to double the indicating range of the bargraph display. The input data for the measuring nozzle is shown on the bargraph display and the 8 digit display panel.

④ Press [△] or [▽] to change the displayed channel. The current channel is disp layed at the 「Item・Judgement LED」.

⑤ Using 「ZERO」and「MAG」knobs, adjust the minimum and maximum master dimension.

⑥ Press [ENT] after finishing the adjustments. “MIN M.” is shown on the 8 digit display panel and will return to automatic mastering.

⑦ Press [RST] to return to measure mode even without performing automatic zero position adjustment.

5) Clearing mastering data

① In the measure mode, press [MAS] for 2 secs or more.
② When the "MAS" LED is turned on and either "MIN M." or "MAX.M" is shown on the 8 digit display panel, press [MAS] to change to the adjust detector mode and ADJ is displayed.
③ Press [MAS] to change to the clear mastering data mode and "MAST CLS" is displayed.
④ Press [ENT] to clear all the mastering data. "M. CLS OK" is displayed and return to the automatic mastering.

6) Changing programs

① In the measure mode, press [▽] for 2 secs or more.
② The "SET" LED under the bargraph display is lighted up in green, "PROG" is shown on the 8 digit display panel and changes to change program mode.
③ With "PROG" shown on the 8 digit display panel, press [ENT]. The current program number "0" ～ "9" shall be displayed.
④ Press [△] or [▽] and select the program number to be used then press [ENT].
⑤ Change program mode is ended and returns to measure mode.
⑥ It is necessary to perform mastering in case a program number change is made. It is also necessary to do ZERO and MAG sensitivity adjustment when the nozzle is changed.
⑦ When setting an item, select the program number to be used before changing to the set mode.
⑧ When power is turned on, the instrument starts at the last program number selected.

7) Settings

Setting relevant items is required for each program to be used. After a program change, set the necessary items.

7-1) Setting measuring range

When changing measuring range, it may be necessary for the A/E converter to be switched over.

Between the measuring range of 50⇔100μm, the A/E converter does not need to be switched over but it is necessary to do adjustments as explained at『5.4) ZERO and MAG sensitivity adjustment』.

For details, refer to『6. Changing measurement range and switching A/E converter』.

① In the measure mode, press [SET] for 2 secs or more.
② The "SET" LED under the bargraph display is lighted in orange, "RANGE" is shown in the digital display and goes to set mode.
③ Press [ENT] then the current measuring range setting is shown on the digital display.
④ Press [△] or [▽] to select measuring range(20・50・100・200μm) then press . (For export use, 20μm range is not included)
⑤ After selecting the measure range is finished, proceed to setting of the shift value and "SHIFT" is displayed.

7-2) Setting the shift value

In the case of one side tolerance, for example, the measured value is shown at the center of the bargraph display. Set the shift value to "0" when this function is not used.

① With "SHIFT" shown on the 8 digit display panel, press [ENT]. The current shift value is displayed.
② Press [△] or [▽] to change the shift value then press [ENT] to set it.

③ After setting the shift value is finished, proceed to selecting mastering and “MAS SET” is shown on the 8 digit display panel.

7-3) Setting mastering mode

① With “MAS SET” shown on the 8 digit display panel, press ENT. The current mastering value setting is displayed.

② Press △ or ▽ and select either “ALL” or “EACH”. In case mastering will be performed on both channel A and B select “ALL”. In case mastering will be performed individually select “EACH”. Press ENT to confirm the selection.

③ After mastering mode is selected, proceed to selecting item and “ITEM” is shown on the 8 digit display panel.

7-4) Selecting Items

① With “ITEM” shown on the 8 digit display panel, press ENT. Setting of each item will be performed.

② Press △ or ▽ and select item where the setting will be changed (ITEM1～3). Press ENT to confirm selection.

③ After the item is selected, it will go to each item’s settings. If “ITEM1” or “ITEM2” is selected, “POL” (refer below at 7-5) will be displayed. If “ITEM3” is selected, “CALC” (refer below at 7-10) will be displayed. If “FINISH” is selected, “END” (refer below at 7-11) will be displayed.

7-5) Setting polarity

① With “POL” shown on the 8 digit display panel, press ENT. The current polarity setting of either “+”, “-“ or “NO USE” is displayed.

② Press △ or ▽ and set the polarity setting. In case of inner diameter measurement set to “+”, for outside diameter measurement set to “-“ or if not used set to “NO USE”. Press ENT to confirm selection.

③ After setting the polarity is finished, proceed to setting of judgement upper limit value and “MAX” is shown on the 8 digit display panel.

7-6) Setting judgement upper limit value

① With “MAX” shown on the 8 digit display panel, press ENT. The current judgement upper limit is displayed.

② Press △ or ▽ to input the new judgement upper limit value. Press ENT to confirm the new value.

③ After setting the judgement upper limit value is finished, proceed to setting of judgement lower limit value and “MIN” is shown on the 8 digit display panel.

7-7) Setting the judgement lower limit value

① With “MIN” shown on the 8 digit display panel, press ENT. The current judgement lower limit is displayed.

② Press △ or ▽ to input the new judgement lower limit value. Press ENT to confirm the new value.

③ After setting the judgement lower limit value is finished, if “ITEM1” or “ITEM2” setting is done proceed to maximum master value setting and “MAX M.” is shown on the 8 digit display panel. If “ITEM3” setting is done proceed to selecting item(refer above at 4)②) and “FINISH” is displayed on the 8 digit display panel.

7-8) Setting maximum master value

① With “MAX M.” shown on the 8 digit panel display, press [ENT]. The current maximum master value is displayed.

② Press [△] or [▽] to input the new maximum master value. Press [ENT] to confirm the new value.

③ After setting the maximum master value is finished, proceed to minimum master value setting and “MIN M. is shown on the 8 digit display panel.

④ In case the maximum master value is equal to or smaller than the minimum master value, after “ERR MAS” is shown, the set value returns to the previous value and condition in step ② above.

7-9) Setting minimum master value

① With “MIN M.” shown on the 8 digit panel display, press [ENT]. The current minimum master value is displayed.

② Press [△] or [▽] to input the new minimum master value. Press [ENT] to confirm the new value.

③ After setting the minimum master value is finished, proceed to selecting item(refer above at 4)②) and either of the following items(ITEM1.ITEM2.ITEM3.FINISH) is displayed on the 8 digit display panel.

④ In case the minimum master value is equal to or greater than the maximum master value, after “ERR MAS” is shown , the set value returns to the previous value and condition in step ② above.

7-10) Selecting computation formula (ITEM3)

① With “CALC” shown on the 8 digit display panel, press [ENT]. The current computation formula setting is displayed.

② The computation formula shown for A and B are “ITEM1” and “ITEM2” respectively.

③ Press [△] or [▽] to select the computation formula or set to “UNUSED” if the function will not be used. Press [ENT] to confirm the selection.

④ After the selection of the computation formula is finished, proceed to setting of judgement upper limit(refer above at 6)①) and “MIN” is displayed on the 8 digit display panel.

7-11) Storing set values (as described in items (1) to (10) above)

① Once the setting procedures is finished, “FINISH” is shown on the display. Press [ENT] and “END” is displayed. When [RST], [◀/SET] or [▶/MAS] is pressed in the middle of the set mode, “END” is also shown.

② Press [ENT] to show “WRITE” in the display. Press [△] or [▽] to select either “WRITE” or “CANCEL”.

③ With “WRITE” shown on the display, press [ENT] to store the set values. This will end the set mode and return to measure mode.

④ With “CANCEL” shown on the display, press [ENT] to cancel the current set value. The previous set values are made effective and will end the set mode and return to measure mode.

8) Serial output(RS232C)

8-1)Description

This instrument can output the measured values to a printer and communicate with a PC through RS232C.

Command	Symbol
Hold measured value	E
Cancel measured value hold Cancel master request	R
Request measured value	D
Minimum mastering	N
Maximum mastering	X
Change to program 1	P01
Change to program 4	P04

8-2)Preparation

The RS232C connector of the instrument is provided as connection port for PC and printer. Connect the D-sub9P(male) plug of an optional communication cable to the RS232C connector. Three types of optional communication cables are available for specific applications. For details, refer to “8. Options”.

8-3)Serial port setting

Baud rate : 9600
Bits/character : 8
Stop bit : 1
Start bit : 1
Parity bit : None

8-4)Measured values transmission

① Commands to instrument

Command	Data type	Symbol
Hold measured value	Character string	E
	ASCII	45H
Cancel measured value hold	Character string	R
	ASCII	52H
Request measured value	Character string	D
	ASCII	44H

② Data transmission to PC

I	T	E	M	1	SP	M	E	A	S		V	A	L	SP	R	E	S	SP		
49	54	45	4D	31	20									20				20		
I	T	E	M	2	SP	M	E	A	S		V	A	L	SP	R	E	S	SP		
49	54	45	4D	32	20									20				20		
I	T	E	M	3	SP	M	E	A	S		V	A	L	SP	R	E	S	CR	LF	
49	54	45	4D	33	20									20				0D	0A	

※SP represents a space character.

◎ In the measure mode, press ENT. The measured value is held and transmitted to the PC. The data transmission is disabled when the mastering result is NG.

8-5)Automatic mastering

The master request can be cancelled and the instrument can be calibrated with the minimum and maximum masters.

① Commands to instrument

Command	Data type	Symbol
Cancel master request	Character string	R
	ASCII	52H
Minimum mastering	Character string	N
	ASCII	4EH
Maximum mastering	Character string	X
	ASCII	58H

Calibrate the instrument with the minimum then maximum masters in that order.

② Data transmission to PC

When automatic mastering is performed through serial communication, one of the data shown in the table below is returned back.

Instrument Cond			Data type	Externally returned data														
Mastering OK			Char String	@	0	O	K				M	A	S				CR	LF
			ASCII	40H	30H	4FH	4BH	20H	20H	20H	4DH	41H	53H	20H	20H	20H	0DH	0AH
Mastering ERROR	Zero	MAS1 only	Char String	@	0	E	R	R	0	1	Z	E	R	O	M	1	CR	LF
			ASCII	40H	30H	45H	52H	52H	30H	31H	5AH	45H	52H	4FH	4DH	31H	0DH	0AH
		MAS2 only	Char String	@	0	E	R	R	0	2	Z	E	R	O	M	2	CR	LF
			ASCII	40H	30H	45H	52H	52H	30H	32H	5AH	45H	52H	4FH	4DH	32H	0DH	0AH
		MAS1 &MAS2	Char String	@	0	E	R	R	0	3	Z	E	R	O			CR	LF
			ASCII	40H	30H	45H	52H	52H	30H	33H	5AH	45H	52H	4FH	20H	20H	0DH	0AH
	Sensitivity	MAS1 only	Char String	@	0	E	R	R	0	4	G	A	I	N	M	1	CR	LF
			ASCII	40H	30H	45H	52H	52H	30H	34H	47H	41H	49H	4EH	4DH	31H	0DH	0AH
		MAS2 only	Char String	@	0	E	R	R	0	5	G	A	I	N	M	2	CR	LF
			ASCII	40H	30H	45H	52H	52H	30H	35H	47H	41H	49H	4EH	4DH	32H	0DH	0AH
		MAS1 &MAS2	Char String	@	0	E	R	R	0	6	G	A	I	N			CR	LF
			ASCII	40H	30H	45H	52H	52H	30H	36H	47H	41H	49H	4EH	20H	20H	0DH	0AH
	Master Rev	MAS1 only	Char String	@	0	E	R	R	0	7	R	E	V		M	1	CR	LF
			ASCII	40H	30H	45H	52H	52H	30H	37H	52H	45H	56H	20H	4DH	31H	0DH	0AH
		MAS2 only	Char String	@	0	E	R	R	0	8	R	E	V		M	2	CR	LF
			ASCII	40H	30H	45H	52H	52H	30H	38H	52H	45H	56H	20H	4DH	32H	0DH	0AH
		MAS1 &MAS2	Char String	@	0	E	R	R	0	9	R	E	V				CR	LF
			ASCII	40H	30H	45H	52H	52H	30H	39H	52H	45H	56H	20H	20H	30H	0DH	0AH
	Others	MAS1 only	Char String	@	0	E	R	R	1	0	O	F	F	R	M	1	CR	LF
			ASCII	40H	30H	45H	52H	52H	31H	30H	4FH	46H	46H	52H	4DH	31H	0DH	0AH
		MAS2 only	Char String	@	0	E	R	R	1	1	O	F	F	R	M	2	CR	LF
			ASCII	40H	30H	45H	52H	52H	31H	31H	4FH	46H	46H	52H	4DH	32H	0DH	0AH
		MAS1 &MAS2	Char String	@	0	E	R	R	1	2	O	F	F	R			CR	LF
			ASCII	40H	30H	45H	52H	52H	31H	32H	4FH	46H	46H	52H	20H	30H	0DH	0AH

8-6) Changing programs

Program numbers 0 to 9 can be changed.

① Commands to instrument

Command	Data type	Symbol
Change to prog ram 1	Character string	R
	ASCII	52H
Change to prog ram 2	Character string	N
	ASCII	4EH

② Data transmission to PC

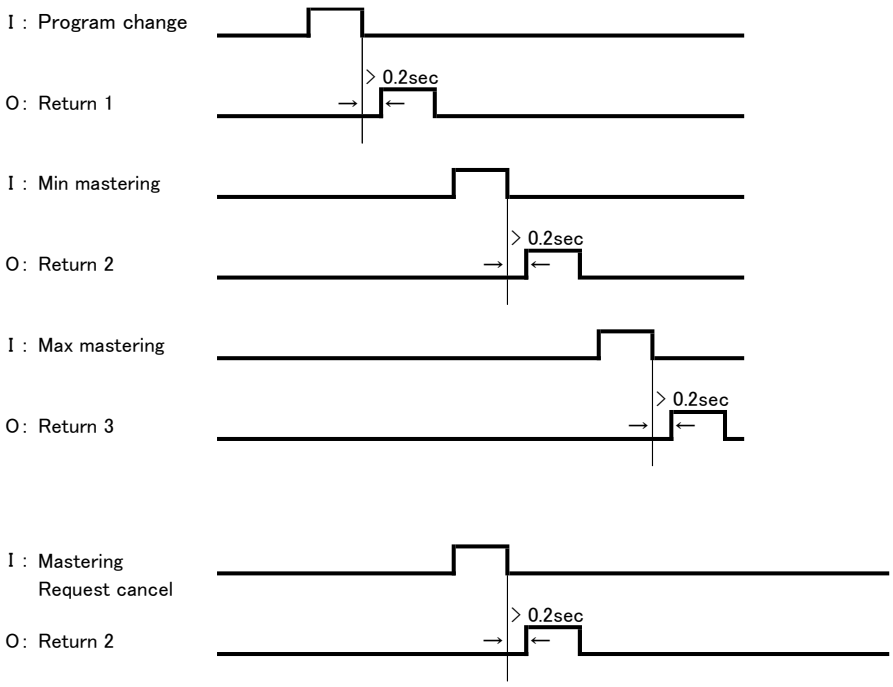
When a program change is made through the serial communication, one of the data shown in the table below is returned back.

Instrument cond	Data type	Externally returned data													
Change to prog 1 finished	Char String	@	0	P	R	O	G	1						CR	LF
	ASCII	40H	30H	50H	52H	4FH	47H	31H	20H	20H	20H	20H	20H	20H	0DH	0AH
Change to prog 4 finished	Char String	@	0	P	R	O	G	2						CR	LF
	ASCII	40H	30H	50H	52H	4FH	47H	32H	20H	20H	20H	20H	20H	20H	0DH	0AH

8-7) Changing program and mastering timing charts

The commands cannot be executed in combination but must be executed individually.

(I : Transmission to CAG/CEG2000、O : Reception from CAG/CEG2000)



9) External input

9-1) Description

Using external buttons and foot switch, the instrument can :

① Measure a work
② Reset itself
③ Be calibrated with minimum master
④ Be calibrated with maximum master

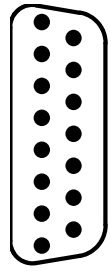
Note : Do not use the instrument through relay contact input

9-2) Preparation

The SW, ETC connector at the rear of the instrument is provided for external buttons. It is possible to connect a D-sub15P(male).

9-3) Connector pin arrangement

Description	No.
	1
	2
	3
	4
	5
GND	6
Measure button	7
RESET button	8



No.	Description
9	Max master button
10	Min master button
11	
12	
13	
14	
15	

Fig 11-1. Pin arrangement diagram of SW, ETC connector at the rear of the instrument

9- 4) Operation with external buttons

① Measure button
(a) In the measure mode, press the measure button.
(b) The measured value is held(called the hold measured value condition).
Note : The measured value cannot be held when the mastering result is NG.

② RESET button
Cancels the measured value hold.

③ Minimum master button
(a) In the measure mode, set the minimum master in the measuring nozzle.
(b) When the bargraph display has stabilized, press the minimum master button.
(c) The instrument is calibrated with the minimum master and becomes ready fo r maximum master calibration.

④ Maximum master button
(a) When maximum mastering is ready, set the maximum master in the measuring nozzle.
(b) When the bargraph display has stabilized, press the maximum master button.
(c) The instrument is calibrated with the maximum master and returns to the measure mode.
(d) When a mastering error occurs, use the control keys on the instrument to clear the mastering error.

6. Changing measurement range with A/E converter switch

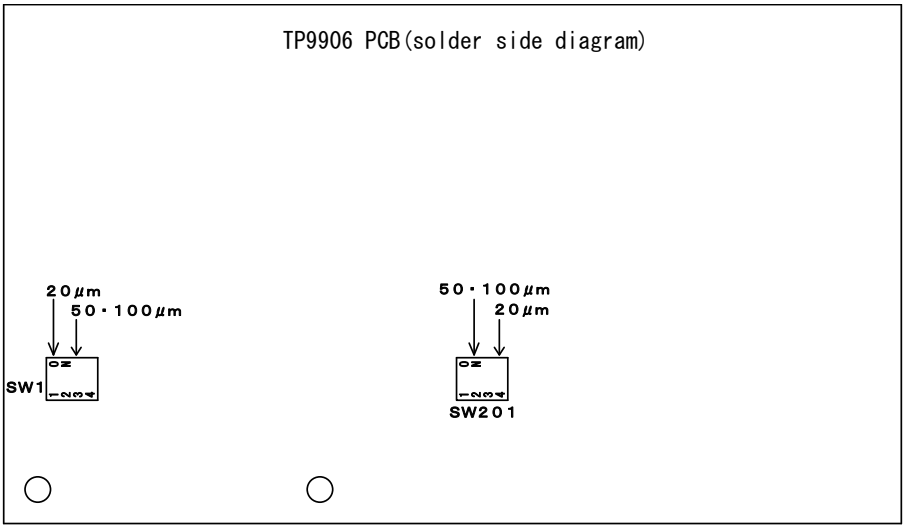
1) Initially

① Between the measurement range of 50μm and 100μm, there is no need for a change.

2) Preparation

① From the front part of the instrument, remove the allen screws(uppermost and lowermost part on 2 places). Remove the A/E converter from the main unit.

② The TP9906 PCB on the solder side has SW1(channel B) and SW201(channel A) which are used for changing the range. (refer to figure below)



3) Switching

- In case of measurement range from 50 to100μm,

Turn ON switch 2 of SW201 and switch 3 of SW1 while all the rest are OFF. (standard)

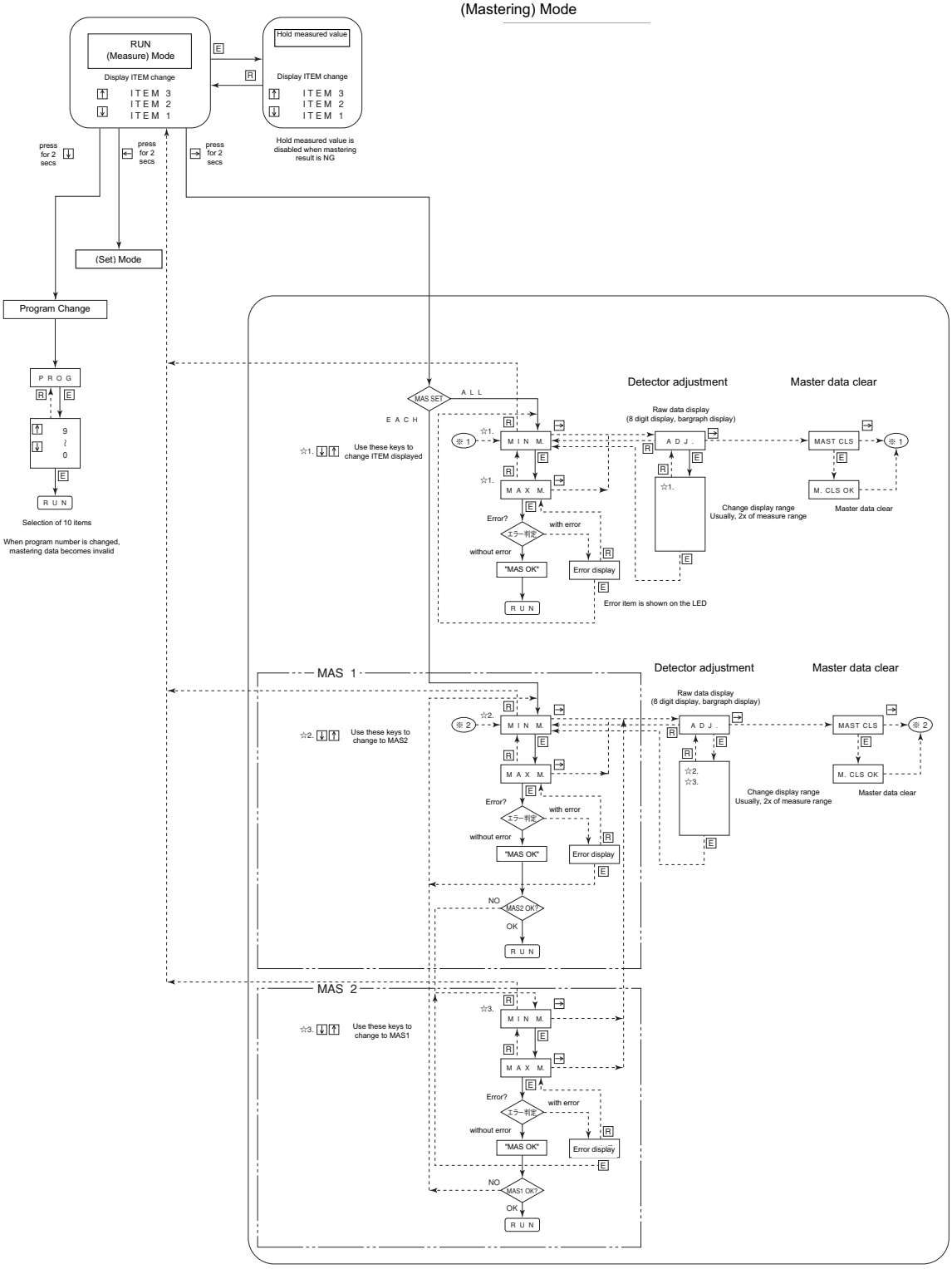
- In case of measurement range of 20μm

Turn ON switch 4 of SW201 and switch 1 of SW1 while all the rest are OFF.

- In case of measurement range of 200μm, circuit modification is necessary

The instrument is not applicable for other measurement ranges not mentioned above.

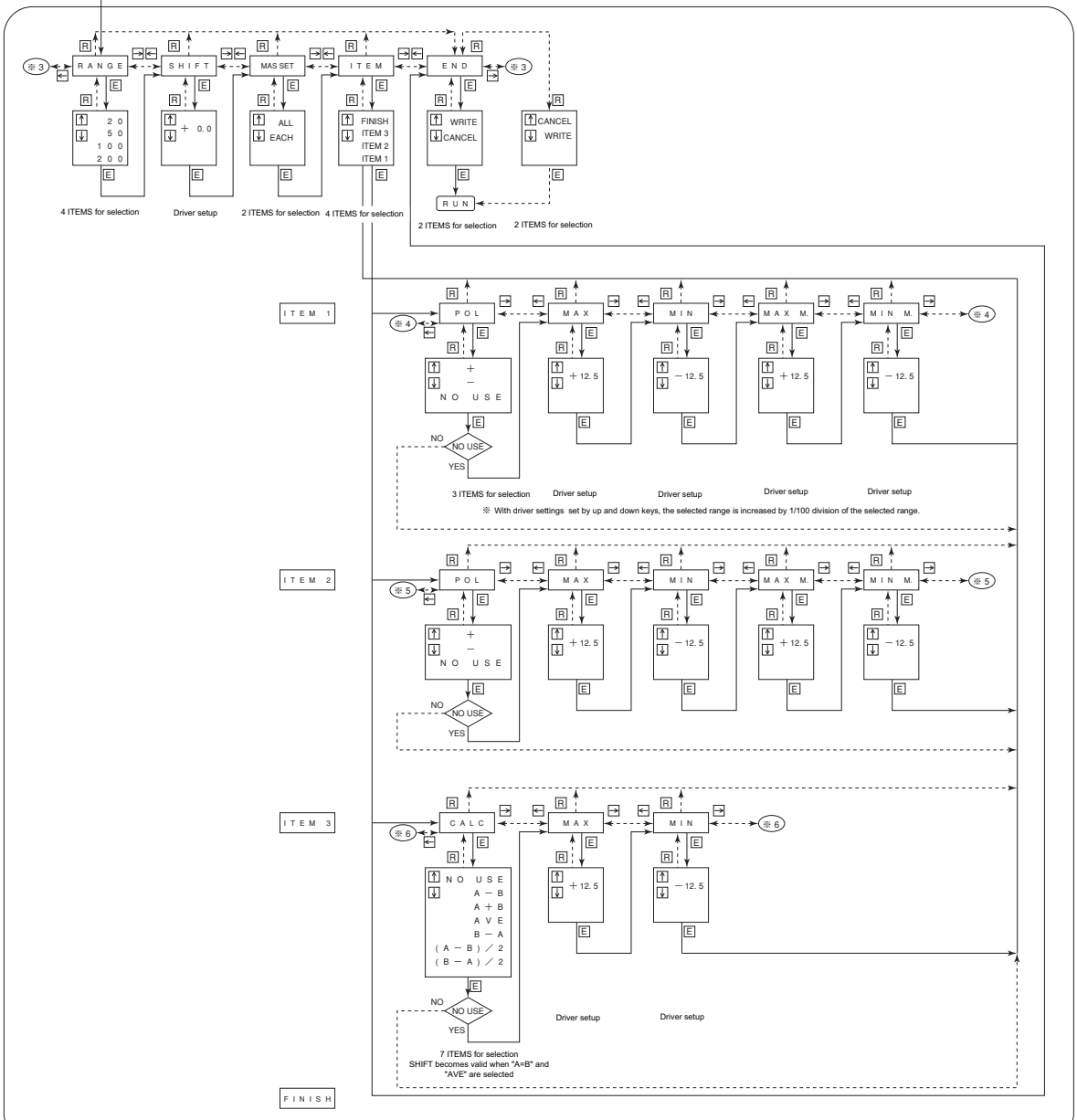
(Mastering) Mode



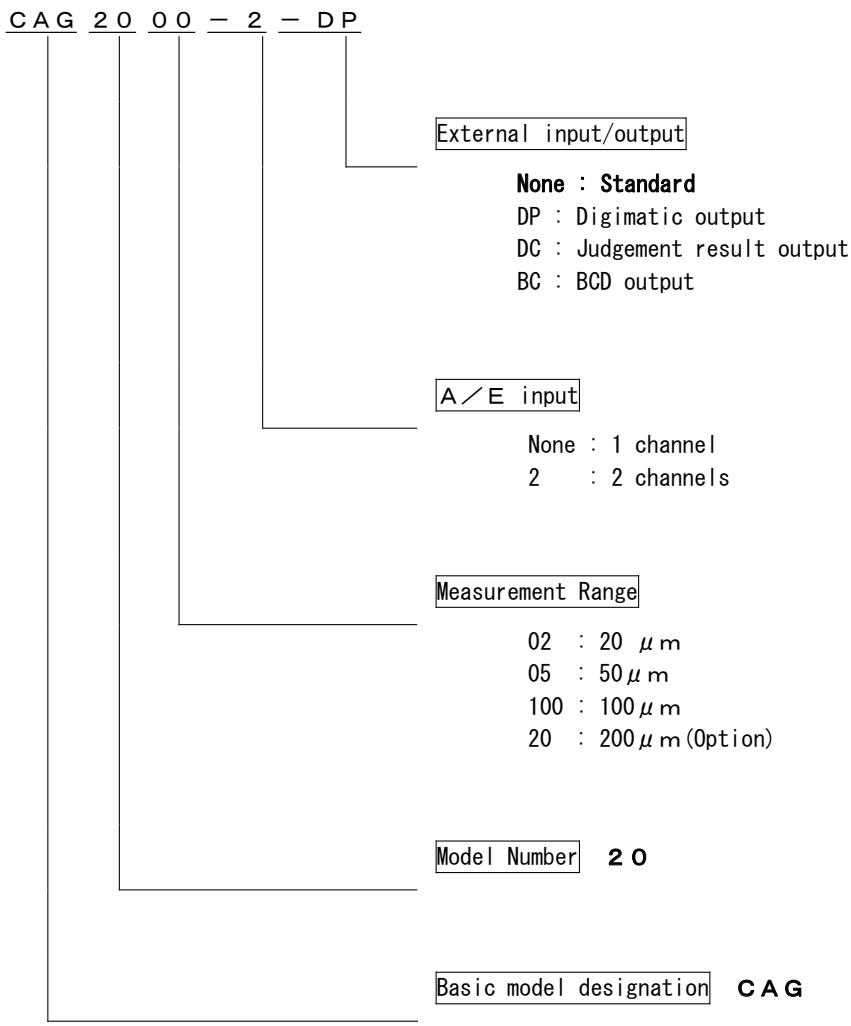
(Set) Mode

(Measure) Mode

Setting is needed for every program used.
Do the necessary settings when program number is changed



7. Model Identification



8. Option

1) Instrument

① Measuring range	: 200μm
- Effective measuring range	: 160μm(with linear compensation)
② Digimatic output	: Printer(DP1)
③ Judgement result output	: DC 24V
④ BCD output	: DC 24V

2) Separately sold parts

① Filter	(CAG2000-OP-AF) Air filter + Mist separator
② Filter	(CAG2000-OP-AFA) Air filter + Mist separator(with automatic drain)
③ Regulator	(CAG2000-OP-AR) Precision regulator
④ Communication cable	(CAG2000-OP-CB-1): D-sub9 pin connector(EIA-232) for PC
Communication cable	(CAG2000-OP-CB-2): D-sub25 pin connector(EIA-574) for PC
Communication cable	(CAG2000-OP-CB-3): D-sub25 pin connector(EIA-574) for printer

9. Maintenance

1) The air filter can be clogged due to use for long period of time. Change the air filter element after 2 years of use or when the pressure drop reaches 0.1MPa.

2) Cleaning A/E converter

When the A/E converter is used for a long period of time, oil and dust can accumulate in the air internal circuit. Clean the A/E converter as described below.

① Record the approximate installation position of the zero and sensitivity adjustment knobs at the front of the instrument(the distance of each knob from the edge). This makes mastering easier after cleaning.

② Turn the zero and sensitivity adjustment knobs counterclockwise and remove them from the instrument.

③ Check the O-ring(P4) of the needle. Change the O-ring if it is damaged.

④ Clean the needle if it is dirty. Dampen a cotton swab with alcohol and use it to clean the φ3mm hole into which the needle enters.

⑤ Re-insert the needle in each knob. If the set screw is loose, expand it with the tip of the minus screwdriver. Take caution not to over bend the screw.

⑥ Turn the needle of each knob clockwise, and install the knobs in the original position recorded initially. Perform zero and sensitivity adjustment and mastering.

１０. Troubleshooting

Phenomenon	Cause	Remedy
Repeatability is not stable	① Air supply is not stable.	① Set regulator pressure source at 300KPa or more.
	② Regulator is malfunctioning.	② Overhaul or change regulator.
	③ Nozzle is worn out.	③ Change to new nozzle.
	④ Piping and joints are leaking.	④ Check for leakage and retighten.
	⑤ Mixing of oil and water inside the instrument.	⑤ Clean instrument.
ZERO adjustment knob is ineffective.	① Air supply pressure is too low or high.	① Set regulator at 196 KPa.
	②Piping and joints are leaking.	②Check for leakage and retighten.
	③ Nozzle gap is too small.	③,④ Adjust to proper gap.
	④ Nozzle gap is too large.	
Bargraph display does not operate.	① Specified power is not supplied.	① Supply power of AC85～264V.
	② ZERO･MAG is improperly adjusted.	② Perform master calibration.
	③ Instrument is in measured value hold mode. Bargraph display is lighted in green or red(dark).	③ Press RESET key to clear the condition.
	④ Instrument is in set mode. (orange)	④ End set mode.
Bargraph and digital Displays are not lighted up.	① Power is not supplied.	① Supply power of AC85～264V.
	② Fuse is blown up.	② Change the fuse(3A).
	③ Power supply or internal circuit is faulty.	③ Ask NIDEC TOSOK for repair.

１１. Cautions

１) Air Supply
Supply clean air free from dust, moisture and oil. Drain the air filter at least once per day.

２) Power cable
The power cable supplied as standard accessory is for 100V. If you supply voltage in excess of 125V, separately prepare a separate 250V power cable.

３) Control keys
Never operate the control keys with sharp pointed tool or the like.

４) Export
When the instrument is for export overseas, it may be necessary to have the export approved by the Ministry of Economy, Trade and Industry under the Export Trade Control Ordinance. In such case, contact your nearest NIDEC TOSOK sales office.

５) Specifications
The specifications are subject to change without notice.

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SHIMPO

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