Column Type AIR MICROMETER

CAG4000-1CH

Instruction Manual

Thank you for your purchasing of
CAG-4000-1CH

- Please read this instructions thoroughly and well understand for safety use of the unit.
- After reading, please always put and use this instructions at your hand.
- Specifications may be changed without prior notification. Please ask our company for details.

Prior notices to usage

- Surely obey “Precautions for Safety” to prevent from fire, electric shock, and injury
- After reading, please be sure to keep it where you can always use it.
- If lending to another person, please hand it along with the instruction manual.
- Warranty

  Based on our warranty policy.

  ・ Even within a term of warranty, we will ask for repair cost if malfunctions or damages are apparently attributed to causes from handling of a customer.

  ・ We may not accept repair work if malfunctions or damages are caused from modifications or changes by a customer.

  ・ Repair work shall be performed by being sent back the unit to our company.
  Even within a term of warranty, if repair work would be requested at site, we will ask for expenses for business trip.

Contents

SKS CORPORATION

1 . Precautions for Safety

Before use, read “Precautions for Safety” thoroughly and follow directions, then use correctly.

Warning indications

Precautions are classified into following three

⚠ Warning ⚠ Caution Important

⚠ Warning • Precaution for possibility of getting death or serious injury if a user misuse the unit

⚠ Caution • Precaution for possibility of getting serious injury if a user misuse the unit

Important • Please be aware that if you handle it incorrectly, it may result in machine damage.

⚠ Caution

In addition, even matters assigned with a “Caution” level box, possibility of a serious result may be caused, so that surely obey described every precaution for safety

⚠ Warning

1 . Do not modify or dismantle the unit.
If a person who does not have enough knowledge on the unit modifies or dismantles, not only insufficient performance but also fire, electric shock or an injury may be caused.

2 . Do not repair the unit by yourself.
If a person who does not have enough knowledge on the unit repairs, not only insufficient performance but also fire, electric shock or an injury may be caused.

3 . Use the power supply at the voltage described in the instruction manual.
Failure to use the specified voltage may cause a fire or electric shock.
This unit is compatible with DC 9 to 12 V
An external ac adapter (standard accessary) is for 100 - 240vac

4 . Remove the power cable from the main body when conducting air connection, installation or move. If the power cable is not removed, an electric shock may occur

5 . Surely install a grounding wire, if it is not installed, an electric shock may be caused when malfunction or a leak current occurs.

6 . Put the power plug into the power outlet securely, if it is unsuccessfully inserted that may cause fire or an electric shock.

7 . Do not use a damaged cable or a plug, it may cause fire or an electric shock

8 . Check the power cable periodically, if it is damaged, never use it. The damaged cable may cause fire or an electric shock.

9 . When an expansion cord is used, check it periodically if it is damaged, do not use it.
The damaged cable may cause fire or an electric shock.

10 . Make sure that the power switch is “off” before putting the power plug into the power outlet. If the power switch is “on”, an electric shock may occur.

11 . Do not use the power cable when taking the power plug off from the power outlet. If the power cable is used, it is damaged and it may cause fire or an electric shock.

12 . Do not place the power cable close to heat, oil or a sharp corner, if the power cable is damaged, it may cause fire or an electric shock.

13 . Clean the dust on the power plug periodically, if dust accumulates, that may cause fire or an electric shock.

14 . Take the cable off from the main body when cleaning. If the cable is put on, an electric shock may occur.

15 . Take the power plug off from the power outlet when you don’t use the unit for a long time. If you do not do so, deterioration may cause fire or an electric shock.

16 . Do not use the unit in the condition of much humidity or water. Electric leakage, fire or an electric shock may occur.

17 . Do not use the unit at unstable place.
If the main body topples down or falls, resulting in giving a shock that may cause a malfunction. If such situation occurs, please contact us

18 . Do not put foreign matters into the main body. If the foreign matters such as conductive matters enter into gap of the unit may cause a malfunction.

19 . Do not use chemical agent such as benzene or thinner for cleaning, they may cause discoloration.

Important

1 . Be care not to put seal materials into pipe when plumbing.
2 . Make sure a label on each port and then make correct plumbing
3 . Attach an air filter
4 . Periodical maintenance should be made on the air filter
5 . Before supplying the air, make sure not to cause an accident on an out port side device.
6 . Conduct daily inspections and regular inspections in a planned manner.

7 . When the power cable has 3P i.e. a grounding wire is attached, surely connect the grounding wire.
8 . This instruction manual does not describe all functions.
Features not listed are prepared separately.

Contact us about you want to know functions.
Contact: Sales management section in Kanagawa

2 . Overview

Specification 1/4

Item			Specifications					Notes
Product Name			Column Type Air Micrometer					
Model			CA G 40 xx -1 CH					
Specifications								
A/E Converter								
Number of loading			1					
specification			AE 21 xx S DA					
Range [μm]			10	20	50	100	200	When ordering Note 1
10	H	OPTION	○	○	○	○	×	Specify the measurement range.
20	M	OPTION	×	○	○	○	×	The setting changeable range differs
50			×	×	○	○	×	depending on the specified
100			×	×	○	○	×	measurement range.
200	W	OPTION	×	×	×	×	○	
Connection			Takeno nipple					For inner diameter φ4 polyurethane tube
display								
BAR LED			101dot Color LED					
LCD								Touch Screen No function
size			2" TFT LCD					
resolution			240 x 320					
Setting								
Number of programs			30					
MENU Display language			English, Japanese, Chinese					Changeable in settings
Change the settings			Change in CAG					
External editing			Change in PC					Changed by via SD card Separate document
Master								
MASTER Adjustment			ZERO/MAG					
Master alignment method			Small Master /Large Master					Dedicated button Note 2
Small Master alignment			±50%(Range)					
Large Master alignment range			±20%(Range)					
			0.5 ~ 2.0 within					
Special master		OPTION	Small/Large Master Change					Pitch measurement

Note 1 . About measurement range for A/E converter

① Measurement range needs to be specified at the time of shipment from the factory.

・ FS.200μm is a dedicated machine.

② If you want to change the measurement range of the A / E converter already in use
We need to return the CAG4000 to our factory.

Note 2 . About Master calibration

・ According to usage situation of measurement tools;
Adjustment for ZERO/MAG adjuster of A/E converter may be needed.

Specification 2/4

Item	Specifications					Notes
Measurement						
Number of items	1					
range [µm]	10	20	50	100	200	Note 3
Instruction range [µm]	8	16	40	80	160	
resolution [µm]	0.1 / 1 Select				1	
Measurement standard	real time					Note 4
Peak function OPTION						Function to temporarily hold the maximum and minimum values during measurement
Measurement P	maximum					
	minimum					
	maximum - minimum					
	(maximum - minimum) / 2					
	(maximum + minimum) / 2					
	maximum & minimum					
Stabilization time [SEC]	0.0 ~ 9.0					A stable time until the start of measurement
Start measurement [%]	± 50 ~ 95					
Measurement time [SEC]	0.1 ~ 99.9 , ∞					Time from start of measurement to completion of measurement
Post processing	Hold					Processing after measurement completion
	Reset					
Measurement						
correction standard						Posted in a separate document
Judgment standard	OK NG -NG			OK		-NG Function to judge pass / fail from measured value Note 5
Rank OPTION	OK 3 Rank -NG -OK			OK		+OK -NG
R	OK 99 Rank -NG R01 R02 … R98 R99 -NG					

Note 3 . Measurement range

- Change for setting makes measurement range selectable.
- The selection range of the measurement range depends on the measurement range of the A / E converter at shipment.

Note 4 . Measurement function

- Only real time mode is standard
- When the peak measurement function (option) is included, other measurement functions can be selected by setting.

Note 5 . Judgment function

- Judgment for -NG/OK/+NG is only equipped as standard.
- When the rank judgment function (option) is attached, the OK range can be subdivided and judgment can be made.

2 . Overview

Specification 3/4

Item			Specifications	Notes
Save measurement results				
Storage location			SDCard	Note 6
Supported SD Card Types			SD Card(~ 2GB) ○ SDHC Card(4GB ~ 32GB) ○ SDXC Card(64GB ~) × 	It does not correspond to the capacity more than DXC card The SD card purchased by the customer is not covered by the operation guarantee. When used It is recommended to use it after performing sufficient operation check.
file organization			Every program	One file configuration can be selected daily / monthly
Saved contents			CSV file format	Storage data is date and time, measured value, judgment
Save timing			Save when holding measurement value	Note 7
Data deletion function			None	
External input / output				
RS232C	standard		1 port	Output measured value and judgment
USB 2.0	standard		1 port	For PC connection (Virtual COM port connection) Note 8
External switch input	standard		DRY contact input 4 points (MAS/RESET/MIN/MAX)	For push button / foot switch connection
Continuous data output		RD	(CONT/RESET/MIN/MAX)	Specification is required at the time of factory shipment
Digimatic output	OPTION		1 port	
printer		DP	Dedicated cable option	
U-WAVE		UW	Dedicated cable option	
DCInput and output	OPTION			Specification is required at the time of factory shipment
Judgment output		DC	Judgment(-NG/OK/+NG)	
BCD output		BC	Output measured value	
Rank output		DR	Judgment(-NG/Rank/+NG)	It is necessary to use in combination with the rank judgment function
DC program switching		PK	Program switching is possible	PROG[01] ~ [16]

Note 6 . Storage location of measurement results

- Backup should be performed once a week periodically by data saving.

Note 7 . Timing of saving measurement results

- Measurement → Save when measured measurement value changes.
- Real time data saving during measurement is impossible.

Note 8 . USB

- mpossible to connect with a PLC or so on.
- A driver should be installed before connection to a PC.

2 . Overview

Specification 4/4

Item			Specifications	Notes
usage environment				
	Operating temperature		5 - 40 [℃]	
	Power supply		DC 9-12[V],2[A]	Dedicated AC adapter included
		Dedicated AC adapter		
			Power supply	AC100-240[V],50/60[Hz]
			Plug	A2
	Supply air pressure		0.3 - 0.7 [MPa]	Clean dry air (no water or oil) Note 9
	Air supply amount		50 / 60 [L/min]	60 [L / min] for a range of 200 μm
	External dimensions(WxDxH)		width Depth High	
		Single type	50 x 131 x 480 [mm]	Stand,Regulator uneven part not included
			170 x 291 x 480 [mm]	Stand,Regulator uneven part not included
	weight			Excluding accessories
		Display	3.5 [kg]	

Note 9 . Air supply source

- Supply filtered air with less than 0.3μm filter element.
- If the supply air source contains water or oil, install a water removal / oil removal filter on the front.

2 . Overview

Model type

Note A telop shows at power on.
A part of description differs from model type described on the catalogue.

CAG 40 XX □ - 1CH - P - R - SD - DC - DP - S - ☐ - ☐ - RD

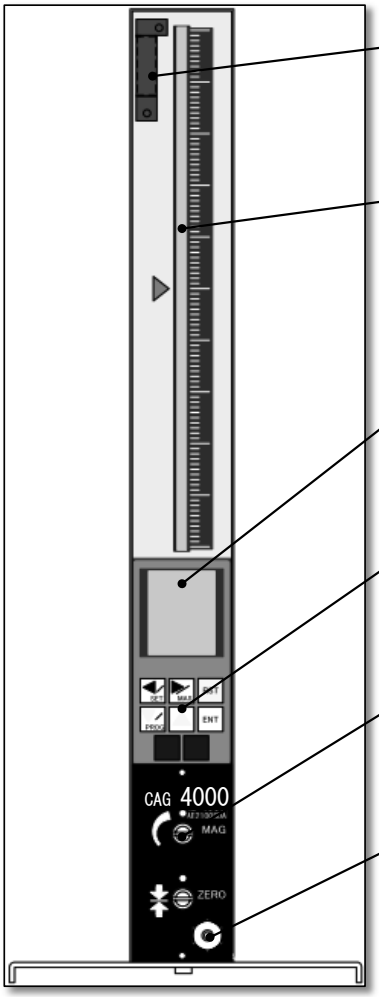
item	symbol	内容
option		No option
	P	Peak measurement function
	R	Rank judgment function
	SD	Measurement result save function
	DC	Judgment output
	BC	BCD output
	DR	Rank output
	PK	DC program switching
	DP	Digimatic output There is no difference between printer and U-WAVE
	S	Special master alignment
	RD	Continuous data output (RS232C)
A / E	1	1 channel
range factory shipment Initial setting	H	10 20 50 100 200 μm
	M	20 50 100 200 μm
		50 100 200 μm
	W	200 μm designated
range Shipping settings	01	10 μm
	02	20 μm
	05	50 μm
	10	100 μm
	20	200 μm
Series name	40	
Model	CAG	Column Type Air Gage

Accessories [Standard]

- AC adapter

3 . Part names and functions

Front view



1 Flash Memory slot

SD CARD slot.

2 BAR LED

Display the measured value.

3 LCD display

Displays measured values, pass / fail judgments, set values, etc.

4 Panel switches

Uses to switch various mode and change settings

5 ZERO/MAG adjusters

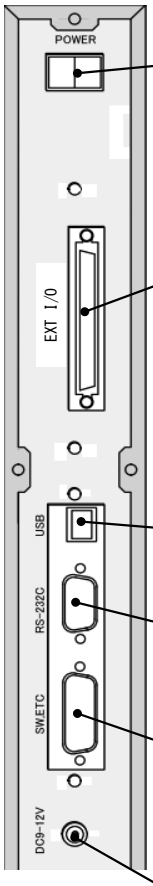
Uses when a master calibration error occurs at replacement of measurement tool.

6 GAUGE port

Connect the measuring tool (measuring element, measuring stand)

3 . Part names and functions

Rear view



7 Power switch

Used to turn the power on / off.

8 Connector EXT I/O OPTION

- Uses to communicate through an I/O with external devices such as PLC and etc.
- Signal arrangement has four kinds as following 1) - 4).
- Specifying is required at shipment.

1) Judgment output DC
2) BCD output BC
3) Ranking output DR
4) DC program switching PK

9 Connector USB

- USB connector connects with pc.
- PC software is required for data collectio

10 Connector RS232C

- The RS232C connector is connected to PLC etc.

11 Connector for switches and etc.

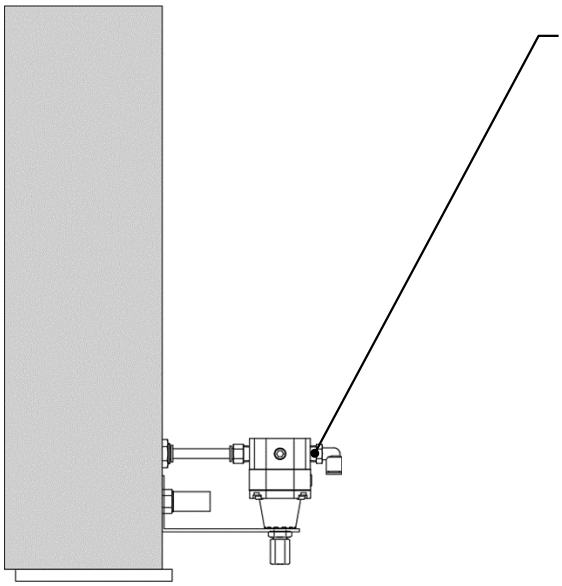
- Connect a push button and a foot switch to match a small scale master, measure a large scale master, and input a RESET signal.

12 Power connector

- Connects ac adaptor

3 . Part names and functions

Side view

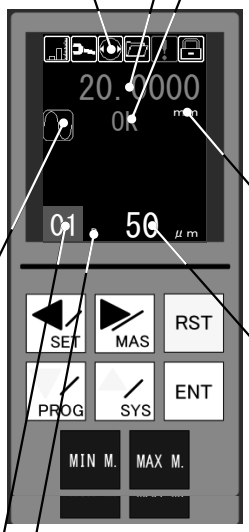


13 Precision regulator

- actory air source to IN port, supply clean dry air with 0.3-0.7MPa.
- Available to connect a polyurethane tube with φ8.
- Stable pressured air is supplied to an A/E converter.
- Never make adjustments. The pressure has been adiusted. **Important**
- If mishandled, quit using the unit. **Important**

3 . Part names and functions

Details of LCD display



1 Mode display

Display the current mode and status.

icon	Operating mode and status
	White: Measurement
	White: Setting Yellow: System setting
	White: Master Red: Master NG
	White: Program change Red: SD card error
	Error condition
	White:Measurement value retention

2 measured value

Display the measured value.

3 Display value

Displays what the measured value is

icon	
	real time

4 Judgment result and master matching status

display	
+NG	Judgment“+NG”
OK	Judgment“ OK”
-NG	Judgment“-NG”
CAL	Master set request → Please do the master set

5 Display unit

Displays the display unit of the measured value.

6 Program number

Displays the current program number.

7 State of measurement

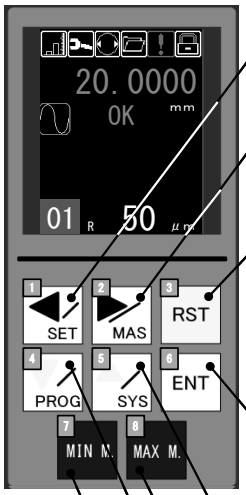
8 Measurement range

Displays the measurement range.

Display	
W	During stable time operation
M	Measurement time in operation
R	During continuous data output
R	During continuous data output

3 . Part names and functions

Panel switches



	Switch Name / Operation Screen		Key operation	State
1	Left arrow key SET			
	1	Measurement screen	2 seconds	Switch to setting screen
2	Right arrow key MAS			
	1	Measurement screen	2 seconds	Switch to master set screen
	3	Master set screen	Once	Switching display content
3	Reset key RST			
	1	Measurement screen (Measured value hold)	Once	Release hold
	3.1	Master set screen	Once	Revert to the previous state
	3.2	Adjustment screen	Once	Revert to the previous state
	5	Settings screen (Set value input)	Once	Revert to the previous state
	5	Settings screen (Item selection)	Once	Finish setting(WRITE/CANCEL)
6	Enter key ENT			
	1	Measurement screen	Once	Hold the measured value (In the case of master OK)
	3.1	Master set screen	Once	Read master value
	3.2	Adjustment screen	Once	End of detector adjustment
	5	Settings screen	Once	Setting decision
5	Up arrow key SYS			
	1	Measurement screen	2 seconds	Switch to system mode
	5	Settings screen	Once	Input of setting value
8	Large master key MAX M.			
	1	Measurement screen	Once	Large master setting
4	Down arrow key PROG			
	1	Measurement screen	2 seconds	Program switching mode
	5	Settings screen	Once	Input of setting value
7	Small master key MIN M.			
	1	Measurement screen	Once	Small mastersetting

3 . Part names and function

Display screen

1/2

Power on

0 Start screen

2 Measurement screen

① After power on
② After setting change
③ After program switching
④ After mastering
2 to 4 hours

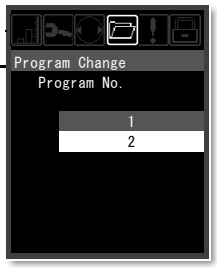
MAS

Hold for more than 2 seconds

PROG

Hold for more than 2 seconds

4 Program change screen



SET

Hold for more than 2 seconds

5 Settings screen

5.1. Settings screen

5.2. Settings screen

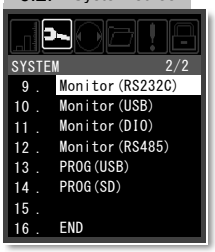
SYS

Hold for more than 2 seconds

6 System screen

6.1. System screen

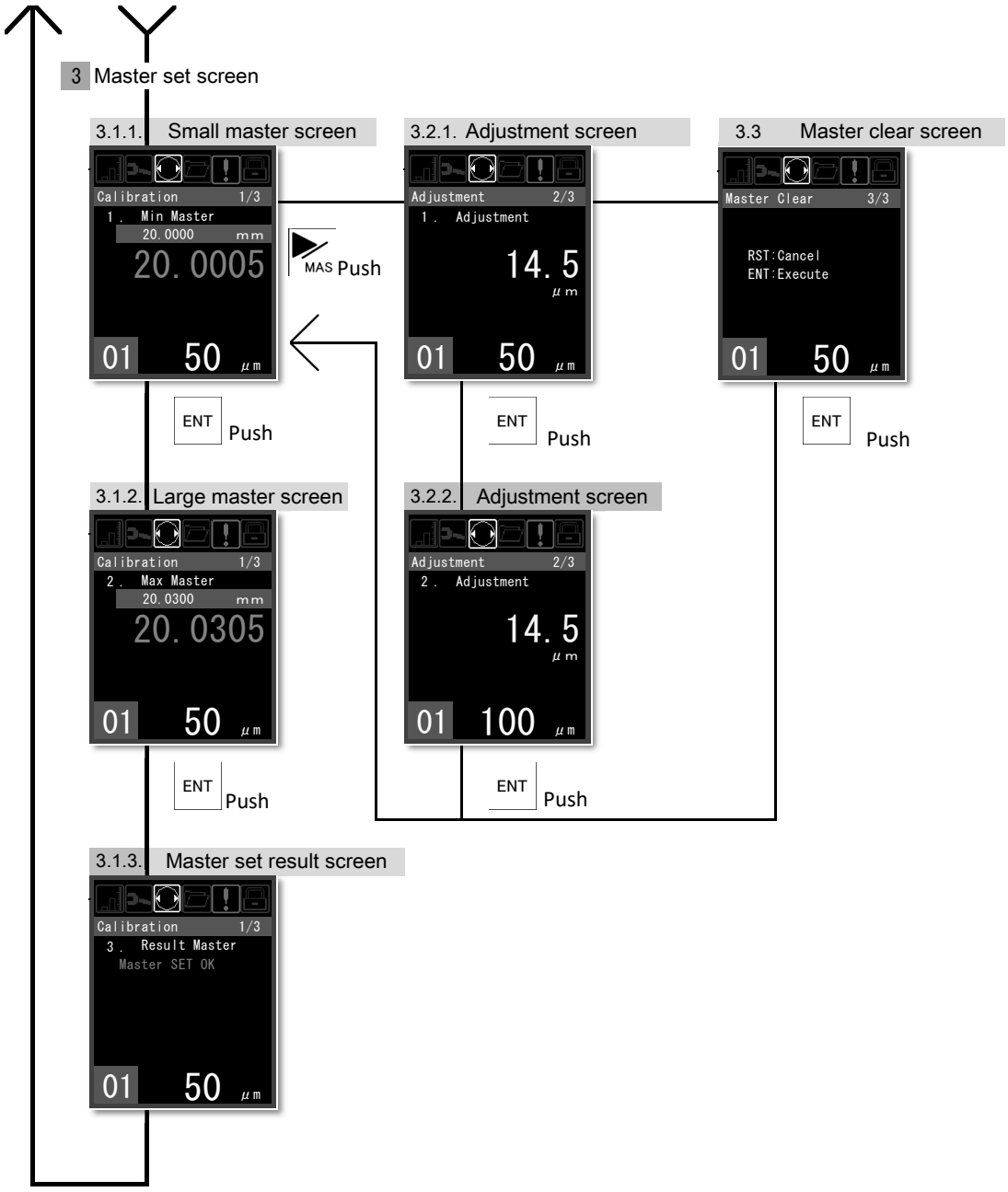
6.2. System screen



注 Preparing a separate volume.

3 . Part names and functions

Display screen



4 . Installing the unit

Installing main body

Important

- Install the main body on the flat and stable place without vibration.
- Install the filter parts lower than the main unit.

Connecting AC adaptor

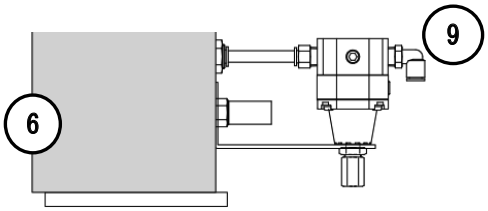
Follow below steps to connect the ac adaptor.

1	Turn off the power switch	
2	Connect the ac adaptor to the power connector	
3	Put the power plug of ac adaptor into the power outlet.	

Connect the air tube

Warning

- Connect the air hose while the power is turned “off”.



1	Turn off the power switch	
2	Connect the air hose from measurement tool to the GAGE port	
3	Connect the air tube from the filter to the precision regulator.	

5 . Turning the power on/ off

Turning the power “on”

1 Make sure that the AC adapter's power plug is fully inserted into the power outlet.

2 Turn the power switch “on”

3 Display the startup screen.

Turning the power “off”.

1 Turn the power switch off”

2 Take the power plug of the ac adaptor off from the power outlet.

6 . Operation procedures

Preparing before measurement

Important

- Air micrometer is a comparison type measurement device.
  - Accuracy is not guaranteed if dirt, flaw, dent, or rust exists on the master and measurement tools

- Connectable measuring tool
  - Connection to other company's measurement tools is out of guarantee for accuracy
  - If specs of the measurement tools to be connected and that of the main body (measurement range) are not in conformance to, they may not connect with each other.

- Air micro is vulnerable to water and oil.
  - If water or oil invades into the air micrometer
    The following symptoms occur.
    - Impossible for master calibration
    - Impossible to adjust ZERO/MAG adjuster.
    - The same value does not appear even if the same workpiece is measured
    - The indicated value becomes unstable
    - Accuracy will be worse
  - To suppress above symptoms is periodical replacement of a filter element.

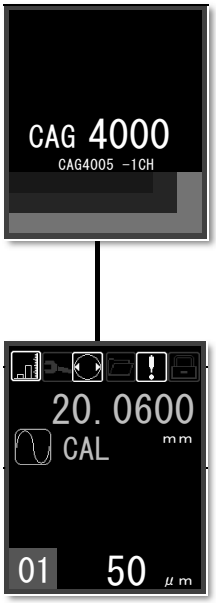
  - If water or oil invades, immediate quit using, and repair or overhaul is recommended.

1
- Check the filter
  Is there no water or oil buildup

2
- Check the measuring tool and the master.
  Are there any dirt, scratches, dents, rust?

3
Turn "on" the compressed air and the power.

4
After a startup screen appears, and then "CAL" is displayed on the measurement screen.
Perform the master calibration.



6 . Operation procedures

Calibrating to the master

Important

- Perform master calibration with use of Min and Max masters.
- Master and measurement tool
  Make sure that no flaw and dust on the master and measurement tool.
- Be sure to perform master calibration in the following cases.

・ When the power and supply air are turned “on”

・ When replacing the measuring tool

・ Two to four hours have passed after use.

・ An indication value is shown wrong.

1 Please keep pressing for more than 2 seconds.

A Min master screen appears

2 Set a Min master to the measurement tool.

Numeric indication and bar color are

・ “Green” :
  Min master calibration is possible

・ “Red” ;
  Min master calibration is impossible
  → Perform ZERO/MAG adjustment.

3 Please press it.

Min master calibration is performed and then Max master calibration screen appears.

4 Set a Max master to the measurement tool.

Numeric indication and bar color are

・ “Green” :
  Max master calibration is possible

・ “Red” ;
  Max master calibration is impossible
  → Perform ZERO/MAG adjustment.

6 . Operation procedures

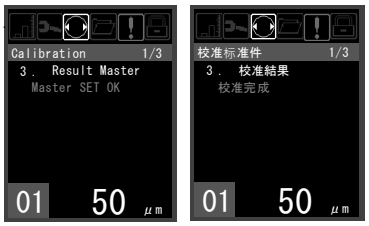
Calibrating to the master

5 ENT Please press it.

Performs the Max master calibration and then displays its results

6 Display of master alignment result

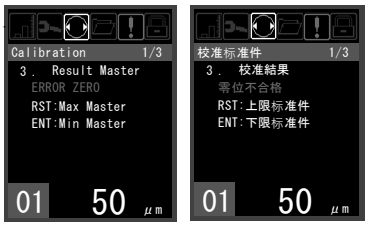
1 Master calibration OK



Master calibration successfully completes.

The measurement screen is displayed.

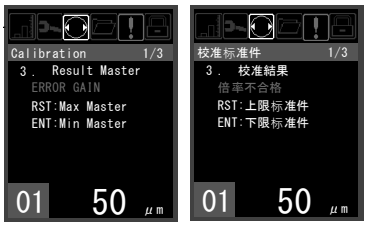
2 ZERO NG (failed)



It is a small master match NG.

Go to master calibration error processing.

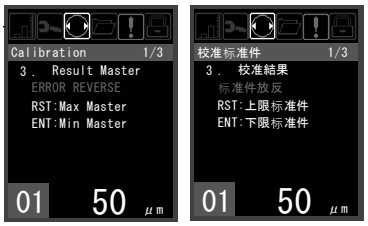
3 Sensitivity NG



It is a master set matching NG.

Go to master calibration error processing.

4 Master reverse NG (failed)



Min master and Max master seem to be crossing

Go to master calibration error processing.

6 . Operation procedures

Master calibration error processing

When an error occurs

Check and take actions followings;

- Is supplying air correct?
- Don’t you misuse between the Min master and the Max master?
- re there any dirt, flaw, dent or rust on the measurement tool and master?

- In case of exception above, go to 8 adjustment.

6 . Operation procedures

Measurement

Performs work measurement.

Important

- To keep measurement accuracy, perform the master calibration every two-hour.

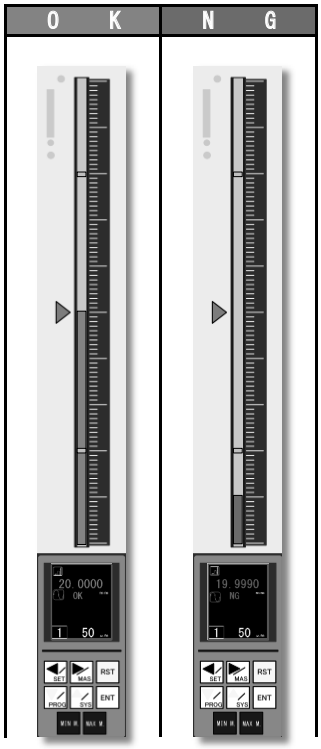
1 Set a work (objective to be measured) on the measurement tool

2 Measured value and judged result are displayed

Indication color of ″BAR LED" is

“**Green**” Within OK range.

“**Red**”: Out of Ok range.



Hold measured values and output

Holds measured values and outputs to RS232C

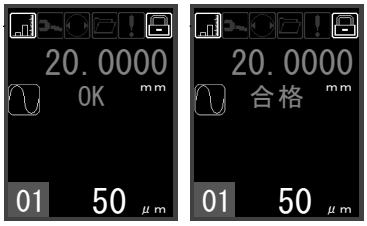
Imoirtant

- When master calibration is NG, to hold measured values and to output cannot be performed.

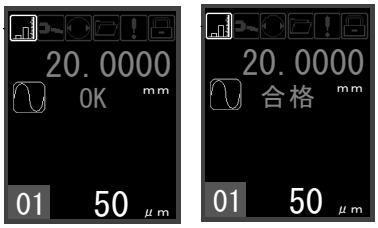
1 In state of mode as this press the **ENT** key.

Thus the measured values are held and this figure that shows holding state is displayed.

Measured values and judged results are outputted to RS232C.



2 Press an **RST** button, then this figure disappears.



7 . Setting procedures

Switching program

Setting values are switched to newly entering program.

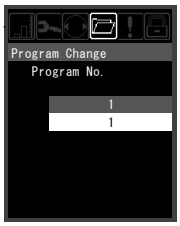
Important

- If you want to change the, setting for currently using program follow next procedures “Entering setting values”.

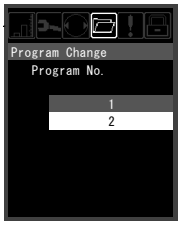
1 Turn the power “on”.
After a startup screen appears, then

2 Press PROG button for two seconds more, a program switching screen is displayed.

Current program No. in an upper box and newly entering program No. in a lower box are displayed.



3 Select program No. with SYS and PROG buttons.



4 Press ENT button.

Switches to selected program and the measurement screen is displayed.

7 . Setting procedures

Entering setting values

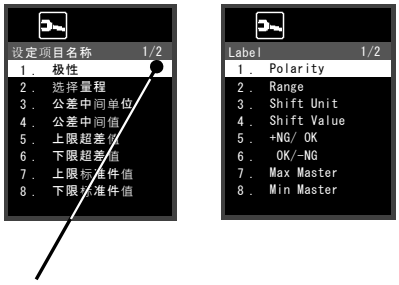
1/13

Enter setting values for new measurement tool.
Measurement conditions can be registered up to 30 kinds.

Important

- Optional addition of measurement range
  - Customer selectable measurement range is determined by designating measurement range at an order
  - After delivery
    The optional addition is modified at the factory in way of sending back the unit.
  - Measurement range for 200μm works on an exclusive unit, so that no other measurement range can be selected.
- Setting mode
  The setting mode consists of two screens such as a screen for selecting item as [Setting items] and for entering values as [Setting values].

● How to select setting item



Multiple pages
About setting items;
“Selection” is handled with

SYS and PROG buttons.

“Decision” is made with ENT button.

● How to enter setting values

Current value is in upper box.
Changed value is lower box.

Following is handled with each button

Move of place

SET MAS

Change of setting value

SYS PROG

Decision of setting value

ENT

Cancelling setting value

RST

7 . Setting procedures

Entering setting values

ENGLISH

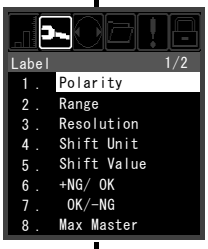
JAPANESE

CHINESE

0 Switch setting mode

1 

Press it more than 2 seconds



2 Change  this icon, and shows setting options.

7 . Setting procedures

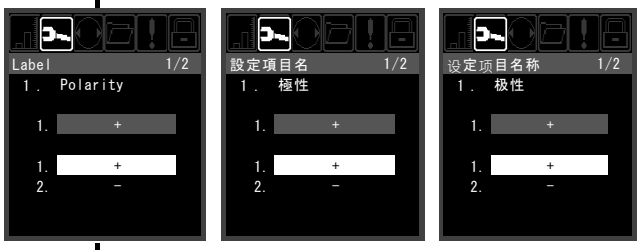
Entering setting values 3/13

ENGLISH | JAPANESE | CHINESE

1 Setting of polarity

Set to
1.Inner diameter measurement ...「1. + 」
2.Outer diameter measurement...「2. - 」

1	Press ENT
	Shows current setting value.



2	Enter new setting value.
	Select with ▲/SYS and ▼/PROG

3	Press ENT
	Following setting items are displayed in state of being selected.

7 . Setting procedures

Entering setting vcalues

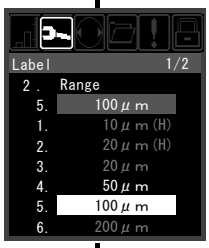
4 / 13

ENGLISH　JAPANESE　CHINESE

2 Setting of measuring range

It sets measuring range
Please match with the measuring tool that is connected.

1	Press ENT Shows current setting value.
2	Connect Check the mark of measuring tool. 1 . AE2101-3 ☐ 2 . AE2102-3 ☐ 3 . AE2102-1 ☐ 4 . AE2105-1 ☐ 5 . AE2110-1 ☐ 6 . AE2120-1 ☐
3	Enter new setting value. Select with ▲/SYS and ▼/PROG



3	Press ENT Following setting items are displayed in state of being selected.

7 . Setting procesures

Entering Setting values

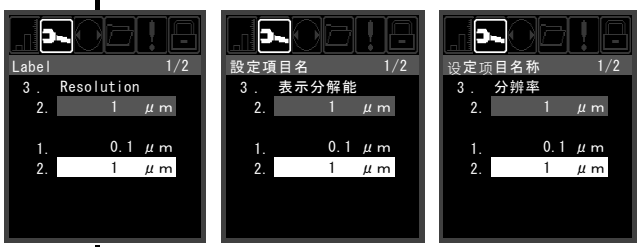
5/13

ENGLISH | JAPANESE | CHINESE

3 Setting of Resolution

Set display resolution.
Below is possible to choose.
1) 0.1μm
2) 1 μm

1	Press ENT
	Current setting value is. displayed



2	Enter new setting value.
	Select with SYS and PROG

3	Establish the setting value.
	Press ENT
	Following setting items are displayed in state of being selected.

7 . Setting procedures

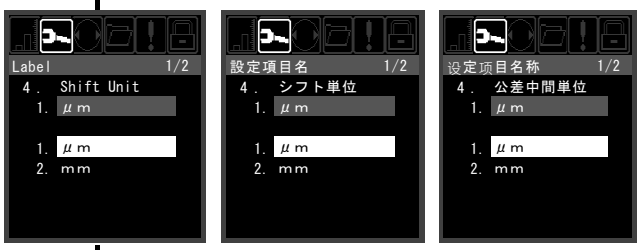
Entering setting values 6/13

ENGLISH | JAPANESE | CHINESE

4 Setting of Shift Unit

Set display unit for measurement value.
Below unit is selectable.
1) μm
2) mm

1	Press ENT Current setting value is displayed



2	Enter new setting value. Select with ▲/SYS and ▼/PROG

3	Press ENT Following setting items are displayed in state of being selected.

7 . Setting procedures

Entering setting Values


ENGLISH


JAPANESE

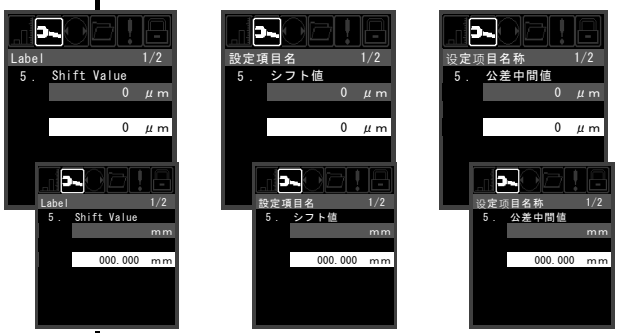

CHINESE

5 Setting of Shift Value

Set this when the measurement value is displayed in a one-side tolerance or actual measured value.
If you do not use this function, set 0 (zero).

1 Press ENT

Current setting value is displayed



2 Enter new setting value.

Enter with SYS and PROG

・When mm is used.
Move input place with SET MAS

3 Press ENT

Following setting items are displayed in state of being selected.

7 . Setting procedures

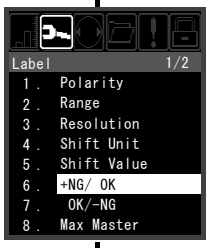
Entering setting values



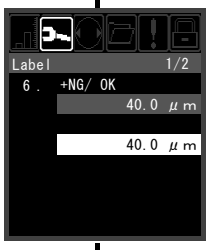
ENGLISH | JAPANESE | CHINESE

6 Upper Limit

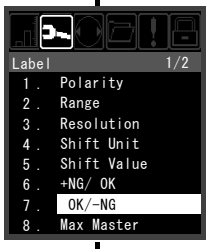
Set an upper limit of the work.



1	Press ENT
	Current setting value is displayed.



2	Enter new setting value.
	Select with SYS and PROG



3	Press ENT
	Following setting items are displayed in state of being selected.

7 . Setting procedures

Entering setting values

9/13

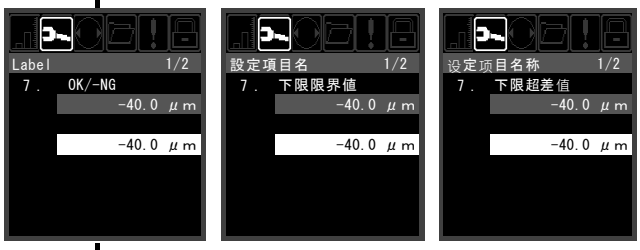
ENGLISH | JAPANESE | CHINESE

7 Lower limit

Set a lower limit of the work.

1 Press ENT

Current setting value is displayed



2 Enter new setting value.

Select with SYS and PROG

3 Press ENT

Following setting items are displayed in state of being selected.

Entering setting values

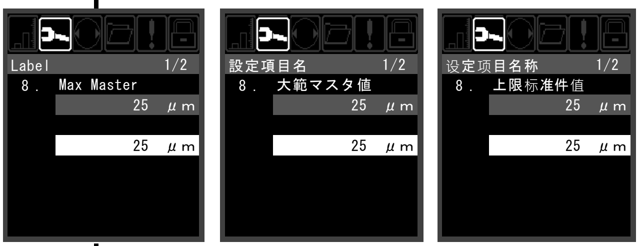
10/13

ENGLISH | JAPANESE | CHINESE

8 Max Master

Set a value for the Max master.

1	Press ENT
	Current setting value is displayed.



2	Enter new setting value.
	Select with SYS and PROG

3	Press ENT
	Following setting items are displayed in state of being selected.

7 . Setting procedures

Entering setting values

11 / 13

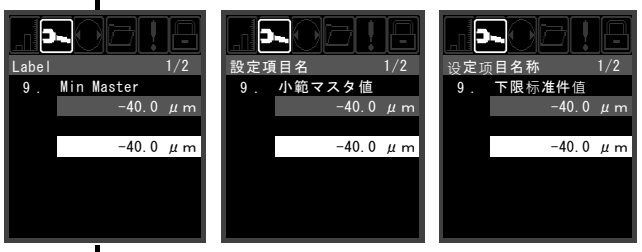
ENGLISH | JAPANESE | CHINESE

9 Min Master

Set a value for the Min master.

1 Press ENT

Current setting value is displayed.



2 Enter new setting value.

Select with SYS and PROG

3 Press ENT

Following setting items are displayed in state of being selected.

7 . Setting procedures

Entering setting values

10 Language

Set a display language

1 Press ENT

Current setting value is displayed.

2 Enter new setting value.

Select with SYS and PROG

3 Press ENT

Following setting items are displayed in state of being selected.

7 . Setting procedures

Entering setting values 13/13

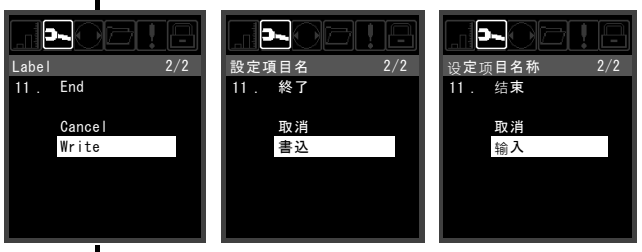
ENGLISH | JAPANESE | CHINESE

11 End (Save the settings)

Perform saving the setings.

1 Press ENT

Current settings are displayed.



2 Select “to save (Write)”. or not save (Cancel)

Select with ▲/SYS and ▼/PROG

3 Press ENT

Performs saving the settings.

Switches to the measurement mode.

8 . Adjustments

Adjusting ZERO/MAG adjuster 1/3

Adjustment of ZERO/MAG adjuster is required when weariness or change / setup of the measurement tool.

ENGLISH | JAPANESE | CHINESE

0 Switches to an adjustment screen

1 MAS Continue to press this button for two seconds more.

2 Displays small master calibration screen.

3 MAS Press this button.

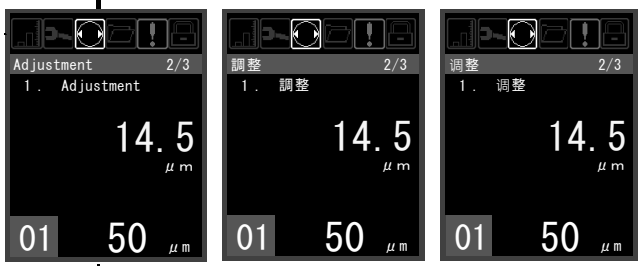
4 Adjustment
Displays 1. Adjustment screen.

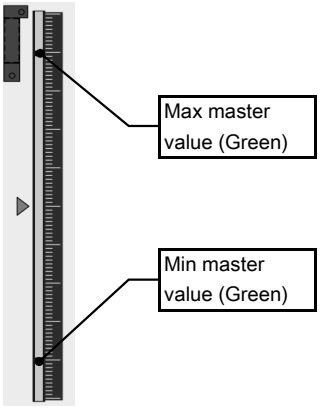
8 . Adjustments

Adjusting ZERO/MAG adjuster

Adjustment of ZERO/MAG adjuster is required when weariness or change / setup of the measurement tool.

ENGLISH | JAPANESE | CHINESE

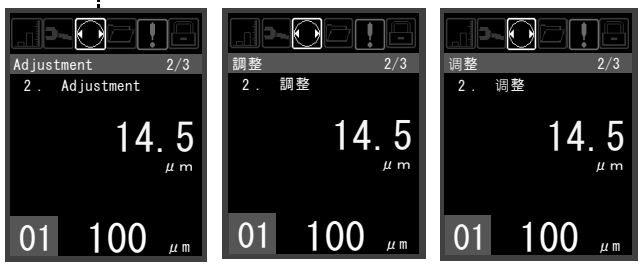


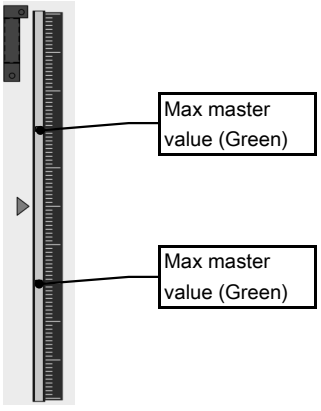


1 Expand the display range

1 Press ENT

The display range is expanded.





8 . Adjustments

Adjusting ZERO/MAG adjuster 3/3

Important

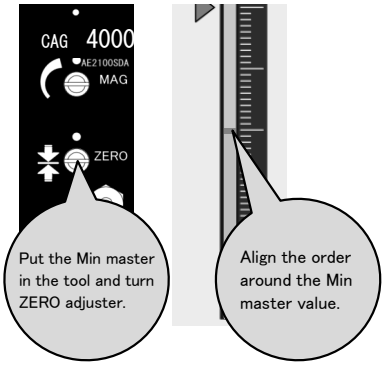
- Adjustment method is different between Inner dia and outer dia measurements.
- For inner dia measurement
  Perform followings.
  Zero position adjustment with Min master
  Sensitivity adjustment with Max master
  → Go to “For Inner dia measurement”.

- For outer dia measurement
  Perfomfollowings.
  Zero position adjustmentwith Max master
  Sensitivity adjustment with Min master
  → Go to “For Outer dia measurement

For Inner dia measurement 1/3

2 Set the Min master to the measurement tool.

Set an indication at vicinity of the Min master value by turning ZERO adjuster



3 Set the Max master on the measurement tool.

Follow depending on the indication position:

・If it is at vicinity of Max master value, adjustment completes.

・ If it is smaller than the Max master value , go to step 4 Shortage of sensitivity.

・ If it is larger than the Max master value, go to step 5 Over sensitivity.

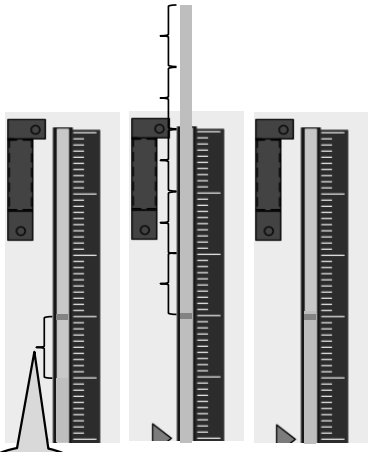
8 . Adjustments

For Inner dia measurement 2/3

4 Shortage of sensitivity

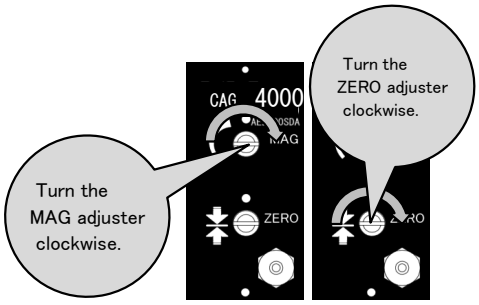
1 Set the Max master on the measurement tool, and then turn the MAG adjuster in direction of CW till the indication becomes approx. five times to the Max master value + amount of minus.

2 Conform the indication with close to the Max master value by turning a ZERO adjuster in direction of CW.



Please put the Max master on the tool, and check a shorgate

※It doesn't display the bar. It is just a image



3 Set the Min master on the measurement tool.
Follow depending on the indication position;

1 It is close to the Min master value.
Adjustment is complete.
① Press ENT
Displays the Min master calibration screen.
② Go to 6 Operation procedures Go to step 2 in "Calibration to the master".

2 If it is larger than the Min master value
It is a shortage of sensitivity.
① Conform the indicator with close to the Min master value by turning the ZERO adjuster.
② Go to step 1 in 4 Shortage of sensitivity

3 If it is smaller than the Min master value.
It is over sensitivity.
① Conform the indicator with close to . the Min master value by turning the ZERO adjuster
② Go to step 1 in 5 Over sensitivity.

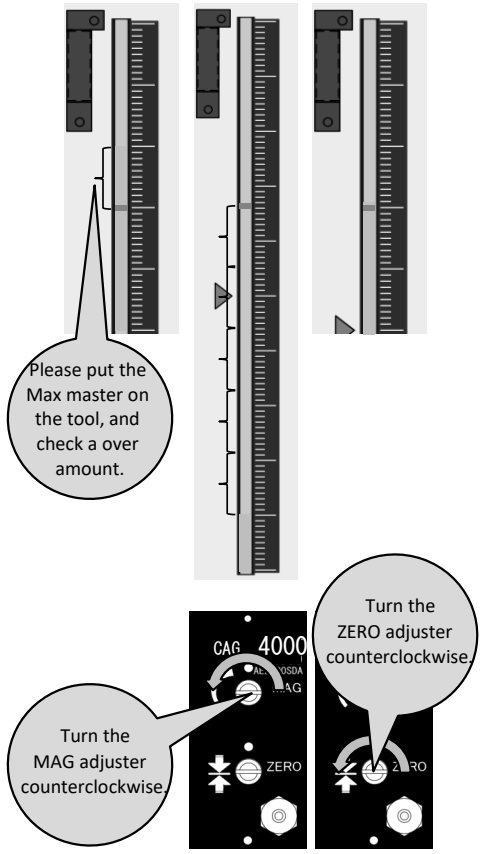
8 . Adjustments

For Inner dia measurement 3/3

5 Over sensitivity

1 Set the Max master on the measurement tool, and then turn the MAG adjuster in direction of CCW till the indication becomes approx. five times to the Max master value - amount of plus.

2 Conform the indication with close to the Max master value by turning a ZERO adjuster in direction of CCW.



3 Set the Min master on the measurement tool.

Follow depending on the indication position

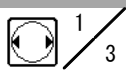
1 It is close to the Min master value.
Adjustment is complete.
① Press ENT
Displays the Min master calibration screen.
② Go to 6 Operation procedures
Go to step 2 in Calibration to the master"

2 Go to step 2 in Calibration to the master"
It is a shortage of sensitivity.
① Conform the indicator with close to the Min master value by turning the ZERO adjuster.
② Go to step 1 in 4 Shortage of sensitivity.

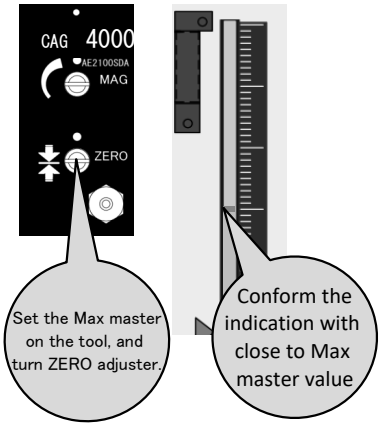
3 If it is smaller than the Min master value
It is over sensitivity.
① Conform the indicator with close to the Min master value by turning the ZERO adjuster.
② Go to step 1 in 5 Over sensitivity.

8 . Adjustments

For Outer dia measurement



2 Set the Max master on the measurement tool.
Conform the indication with close to Max master value by turning the ZERO adjuster.

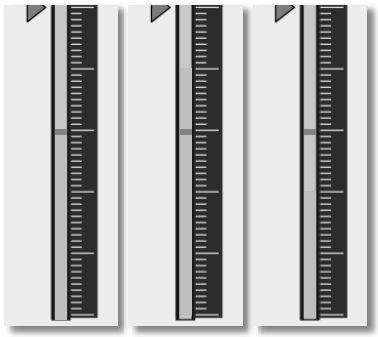


3 Set the Min master on the measurement tool
If the indication is;

・Pointing at close to Min master value:
Adjustment is complete.

・If it is larger than the Min master value.
Go to step 1 in 4 Shortage of sensitivity.

・If it is smaller than the Min master value.
Go to step 1 in 5 Over sensitivity.



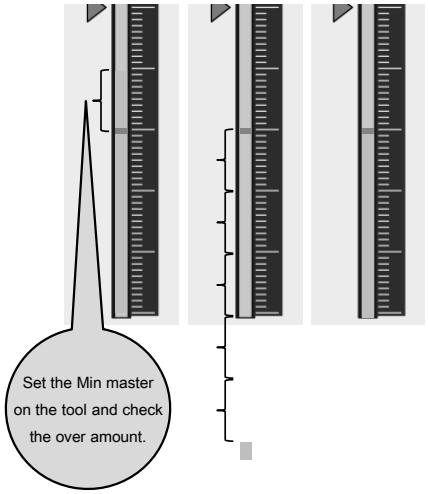
8 . Adjustments

For Outer dia measurement 2/3

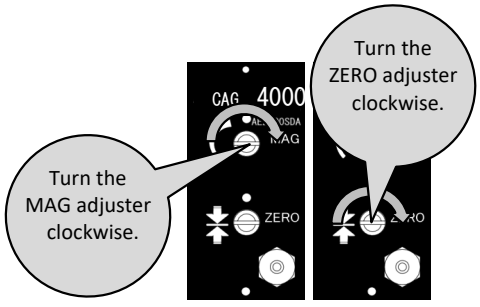
4 Shortage of sensitivity

1 Set the Min master on the measurement tool, and then turn the MAG adjuster in direction of CW till the indication becomes approx. five times to the Min master value - amount of plus.

2 Conform the indication with close to the Min master value by turning a ZERO adjuster in direction of CW.



※It doesn't display the bar.
It is just a image



3 Set the Max master on the measurement tool.

Follow depending on the indication position;

1 It is close to the Max master value.
Adjustment is complete
① Press ENT
Displays the Min master calibration screen
② Go to 6 Operation procedures Go to step 2 in Calibration to the master"

2 If it is larger than the Max master value.
It is over sensitivity.
① Conform the indicator with close to the Max master value by turning the ZERO adjuster.
② Go to step 1 in 5 Over sensitivity

3 If it is smaller than the Max master value.
It is a shortage of sensitivity.
① Conform the indicator with close to the Max master value by turning the ZERO adjuster.
② Go to step 1 in 4 Shortage of sensitivity.

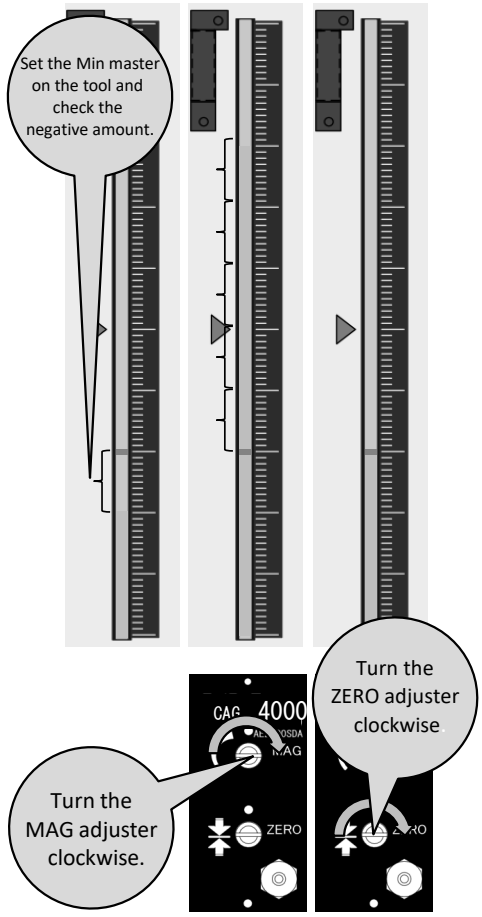
8 . Adjustments

For Outer dia measurement 3/3

5 Over sensitivity

1 Set the Min master on the measurement tool, and then turn the MAG adjuster in direction of CCW till the indication becomes approx. five times to the Min + amount of minus.

2 Conform the indication with close to the Min master value by turning a ZERO adjuster in direction of CCW.



3 Set the Max master on the measurement tool

Follow depending on the indication position;

1 It is close to the Max master value.

Adjustment is complete

① Press ENT

Displays the Min master calibration screen.

② Go to 6 Operation procedures.
Go to step 2 in Calibration to the master.

2 If it is larger than the Max master value.

It is over sensitivity.

① Conform the indicator with close to the Max master value by turning the ZERO adjuster.

② Go to step 1in 5 Over sensitivity.

3 If it is smaller than the Max master value.

It is a shortage of sensitivity

① Conform the indicator with close to the Max master value by turning the ZERO adjuster.

② Go to step 1 in 4 Shortage of sensitivity.

9 . External input/output

RS232C

1/15

1 Outline

1/1

Connecting “RS232C” connector on the CAG to an external device such as PLC with an RS232C cable, the external device can perform following command operation to the CAG.

① Switching program
② Master calibration
③ Measurement (outputting measured judgment)

2 Connecter

1/1

Name RS-232C
Type D-SUB9P(メス)
Screw M2.6
Pin location

Pin No	信号名	内容
1	N.C.	Not connect
2	RxD	Receive data
3	TxD	Send data
4	N.C.	Not connect
5	GND	Ground
6	N.C.	Not connect
7	N.C.	Not connect
8	N.C.	Not connect
9	N.C.	Not connect

3 Specs of communications

1/1

Communication protocol is our company original.

No	項目	
1	Protocol	Original
2	Communication data	ASCII
3	Communication method	RS-232C
4	Communication speed	9,600 bps
5	Data bit	8 bit
6	Parity	None
7	Stop bit	1 bit
8	Start bit	1 bit
9	Flow control	None

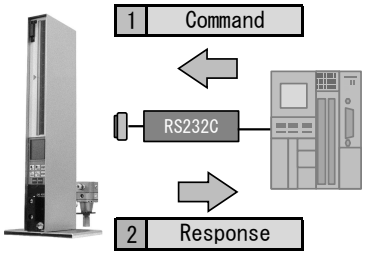
4 Communication method

1/1

Important

- When PLC send 1 Command to CAG,

  CAG replys 2 Response to PLC.



● Following three kinds are provided for response.
・Normal action process
・Abnormal action processing
・No response

RS232C  2/15

5 Command list 1/1

No	Classificatio	1 Command											
		Processing content						Transmission order					
								1	2	3	4	5	6
03	Program switching	Switch to	PROG No	0	1			A	0	0	1	1	CR
05		Switch to	PROG No	0	2			A	0	0	2	1	CR
07		Switch to	PROG No	0	3			A	0	0	3	1	CR
09		Switch to	PROG No	0	4			A	0	0	4	1	CR
11		Switch to	PROG No	0	5			A	0	0	5	1	CR
13		Switch to	PROG No	0	6			A	0	0	6	1	CR
15		Switch to	PROG No	0	7			A	0	0	7	1	CR
17		Switch to	PROG No	0	8			A	0	0	8	1	CR
19		Switch to	PROG No	0	9			A	0	0	9	1	CR
21		Switch to	PROG No	1	0			A	0	1	0	1	CR
22		Switch to	PROG No	1	1			A	0	1	1	1	CR
23		Switch to	PROG No	1	2			A	0	1	2	1	CR
24		Switch to	PROG No	1	3			A	0	1	3	1	CR
25		Switch to	PROG No	1	4			A	0	1	4	1	CR
26		Switch to	PROG No	1	5			A	0	1	5	1	CR
27		Switch to	PROG No	1	6			A	0	1	6	1	CR
28		Switch to	PROG No	1	7			A	0	1	7	1	CR
29		Switch to	PROG No	1	8			A	0	1	8	1	CR
30		Switch to	PROG No	1	9			A	0	1	9	1	CR
31		Switch to	PROG No	2	0			A	0	2	0	1	CR
32		Switch to	PROG No	2	1			A	0	2	1	1	CR
33		Switch to	PROG No	2	2			A	0	2	2	1	CR
34		Switch to	PROG No	2	3			A	0	2	3	1	CR
35		Switch to	PROG No	2	4			A	0	2	4	1	CR
36		Switch to	PROG No	2	5			A	0	2	5	1	CR
37		Switch to	PROG No	2	6			A	0	2	6	1	CR
38		Switch to	PROG No	2	7			A	0	2	7	1	CR
39		Switch to	PROG No	2	8			A	0	2	8	1	CR
40		Switch to	PROG No	2	9			A	0	2	9	1	CR
41		Switch to	PROG No	3	0			A	0	3	0	1	CR
45	Master matching	Min master matching						N					
47		Max master matching						X					
57	Measurement	Result	Output instruction					D					

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6 Response list (Normal processing) 1/1

No	Classification	1 Command						2	Response															
		Transmission order→						Processing categoory	Transmission order→															
		1	2	3	4	5	6		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
03	Program switching	A	0	0	1	1	CR	Normal	A	0	0	1	1	1	0	1	CR	LF						
05		A	0	0	2	1	CR	Normal	A	0	0	2	1	1	0	2	CR	LF						
07		A	0	0	3	1	CR	Normal	A	0	0	3	1	1	0	3	CR	LF						
09		A	0	0	4	1	CR	Normal	A	0	0	4	1	1	0	4	CR	LF						
11		A	0	0	5	1	CR	Normal	A	0	0	5	1	1	0	5	CR	LF						
13		A	0	0	6	1	CR	Normal	A	0	0	6	1	1	0	6	CR	LF						
15		A	0	0	7	1	CR	Normal	A	0	0	7	1	1	0	7	CR	LF						
17		A	0	0	8	1	CR	Normal	A	0	0	8	1	1	0	8	CR	LF						
19		A	0	0	9	1	CR	Normal	A	0	0	9	1	1	0	9	CR	LF						
21		A	0	1	0	1	CR	Normal	A	0	1	0	1	1	1	0	CR	LF						
22		A	0	1	1	1	CR	Normal	A	0	1	1	1	1	1	1	CR	LF						
23		A	0	1	2	1	CR	Normal	A	0	1	2	1	1	1	2	CR	LF						
24		A	0	1	3	1	CR	Normal	A	0	1	3	1	1	1	3	CR	LF						
25		A	0	1	4	1	CR	Normal	A	0	1	4	1	1	1	4	CR	LF						
26		A	0	1	5	1	CR	Normal	A	0	1	5	1	1	1	5	CR	LF						
27		A	0	1	6	1	CR	Normal	A	0	1	6	1	1	1	6	CR	LF						
28		A	0	1	7	1	CR	Normal	A	0	1	7	1	1	1	7	CR	LF						
29		A	0	1	8	1	CR	Normal	A	0	1	8	1	1	1	8	CR	LF						
30		A	0	1	9	1	CR	Normal	A	0	1	9	1	1	1	9	CR	LF						
31		A	0	2	0	1	CR	Normal	A	0	2	0	1	1	2	0	CR	LF						
32		A	0	2	1	1	CR	Normal	A	0	2	1	1	1	2	1	CR	LF						
33		A	0	2	2	1	CR	Normal	A	0	2	2	1	1	2	2	CR	LF						
34		A	0	2	3	1	CR	Normal	A	0	2	3	1	1	2	3	CR	LF						
35		A	0	2	4	1	CR	Normal	A	0	2	4	1	1	2	4	CR	LF						
36		A	0	2	5	1	CR	Normal	A	0	2	5	1	1	2	5	CR	LF						
37		A	0	2	6	1	CR	Normal	A	0	2	6	1	1	2	6	CR	LF						
38		A	0	2	7	1	CR	Normal	A	0	2	7	1	1	2	7	CR	LF						
39		A	0	2	8	1	CR	Normal	A	0	2	8	1	1	2	8	CR	LF						
40		A	0	2	9	1	CR	Normal	A	0	2	9	1	1	2	9	CR	LF						
41		A	0	3	0	1	CR	Normal	A	0	3	0	1	1	3	0	CR	LF						
45	Master matching	N						Normal	@	0	E	R	R	0	4	G	A	I	N	M	1	CR	LF	
47		X						Normal	@	0	0	K	SP	SP	SP	M	A	S	SP	SP	SP	CR	LF	
57	Measurement	D						Normal	Measured value								SP	Judge			CR	LF		

1 Purpose

- Uses when you want to switch Program No. of CAG operation.
  Just after the program switching, surely perform the master calibration.

2 Resnse of CAG

- When normal action processing, command + “1”+ “PROG No” +CRLF is responded.
- When abnormal action processing, command + ”4” + "00" +CRLF is responded.
- When status is following cases, no response is returned.
  During startup at the power is on.
  During continuous data from the connector “SW ETC” is outputting.
  During performing writing measured results or reading /writing between CAG and SD Card.

3 Abnormal action processing

When status of CAG is following cases, abnormal is responded.

- ・During under operation other than the measurement mode.
- An error occurred at EEPROM reading when internal processing for Program No switching.

4 Command and Response list

1 Switch to PROG No. 0 1

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	03		A	0	0	1	1	CR					
2	Response	03	Normal	A	0	0	1	1	1	0	1	CR	LF	Switch complete. Operate with PROG No 01
			Abnormal	A	0	0	1	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

2 Switch to PROG No. 0 2

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	05		A	0	0	2	1	CR					
2	Response	05	Normal	A	0	0	2	1	1	0	2	CR	LF	Switch complete. Operate with PROG No 02
			Abnormal	A	0	0	2	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

3 Switch to PROG No. 0 3

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	07		A	0	0	3	1	CR					
2	Response	07	Normal	A	0	0	3	1	1	0	3	CR	LF	Switch complete. Operate with PROG No 03
			Abnormal	A	0	0	3	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

4 Switch to PROG No. 0 4

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	09		A	0	0	4	1	CR					
2	Response	09	Normal	A	0	0	4	1	1	0	4	CR	LF	Switch complete. Operate with PROG No 04
			Abnormal	A	0	0	4	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

4 Command and Response list

5 Switch to PROG No. 05

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	11		A	0	0	5	1	CR					
2	Response	11	Normal	A	0	0	5	1	1	0	5	CR	LF	Switch complete. Operate with PROG No 05
			Abnormal	A	0	0	5	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

6 Switch to PROG No. 06

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	13		A	0	0	6	1	CR					
2	Response	13	Normal	A	0	0	6	1	1	0	6	CR	LF	Switch complete. Operate with PROG No 06
			Abnormal	A	0	0	6	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

7 Switch to PROG No. 07

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	15		A	0	0	7	1	CR					
2	Response	15	Normal	A	0	0	7	1	1	0	7	CR	LF	Switch complete. Operate with PROG No 07
			Abnormal	A	0	0	7	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

8 Switch to PROG No. 08

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	17		A	0	0	8	1	CR					
2	Response	17	Normal	A	0	0	8	1	1	0	8	CR	LF	Switch complete. Operate with PROG No 08
			Abnormal	A	0	0	8	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

4 Command and Response list

9 Switch to PROG No. 0 9

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	19		A	0	0	9	1	CR					
2	Response	19	Normal	A	0	0	9	1	1	0	9	CR	LF	Switch complete. Operate with PROG No 09
			Abnormal	A	0	0	9	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

10 Switch to PROG No. 1 0

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	21		A	0	1	0	1	CR					
2	Response	21	Normal	A	0	1	0	1	1	1	0	CR	LF	Switch complete. Operate with PROG No 10
			Abnormal	A	0	1	0	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

11 Switch to PROG No. 1 1

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	21		A	0	1	1	1	CR					
2	Response	21	Normal	A	0	1	1	1	1	1	1	CR	LF	Switch complete. Operate with PROG No 11
			Abnormal	A	0	1	1	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

12 Switch to PROG No. 1 2

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	23		A	0	1	2	1	CR					
2	Response	23	Normal	A	0	1	2	1	1	1	2	CR	LF	Switch complete. Operate with PROG No 12
			Abnormal	A	0	1	2	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

4 Command and Response list

13 Switch to PROG No. 1 3

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	24		A	0	1	3	1	CR					
2	Response	24	Normal	A	0	1	3	1	1	1	3	CR	LF	Switch complete. Operate with PROG No 13
			Abnormal	A	0	1	3	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

14 Switch to PROG No. 1 4

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	25		A	0	1	4	1	CR					
2	Response	25	Normal	A	0	1	4	1	1	1	4	CR	LF	Switch complete. Operate with PROG No 14
			Abnormal	A	0	1	4	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

15 Switch to PROG No. 1 5

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	26		A	0	1	5	1	CR					
2	Response	26	Normal	A	0	1	5	1	1	1	5	CR	LF	Switch complete. Operate with PROG No 15
			Abnormal	A	0	1	5	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

16 Switch to PROG No. 1 6

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	27		A	0	1	6	1	CR					
2	Response	27	Normal	A	0	1	6	1	1	1	6	CR	LF	Switch complete. Operate with PROG No 16
			Abnormal	A	0	1	6	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

4 Command and Response list

17 Switch to PROG No. 17

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	28		A	0	1	7	1	CR					
2	Response	28	Normal	A	0	1	7	1	1	1	7	CR	LF	Switch complete. Operate with PROG No 17
			Abnormal	A	0	1	7	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

18 Switch to PROG No. 18

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	29		A	0	1	8	1	CR					
2	Response	29	Normal	A	0	1	8	1	1	1	8	CR	LF	Switch complete. Operate with PROG No 18
			Abnormal	A	0	1	8	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

19 Switch to PROG No. 19

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	30		A	0	1	9	1	CR					
2	Response	30	Normal	A	0	1	9	1	1	1	9	CR	LF	Switch complete. Operate with PROG No 19
			Abnormal	A	0	1	9	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

20 Switch to PROG No. 20

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	31		A	0	2	0	1	CR					
2	Response	31	Normal	A	0	2	0	1	1	2	0	CR	LF	Switch complete. Operate with PROG No 20
			Abnormal	A	0	2	0	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

4 Command and Response list

21 Switch to PROG No. 2 1

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	32		A	0	2	1	1	CR					
2	Response	32	Normal	A	0	2	1	1	1	2	1	CR	LF	Switch complete. Operate with PROG No 21
			Abnormal	A	0	2	1	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

22 Switch to PROG No. 2 2

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	33		A	0	2	2	1	CR					
2	Response	33	Normal	A	0	2	2	1	1	2	2	CR	LF	Switch complete. Operate with PROG No 22
			Abnormal	A	0	2	2	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

23 Switch to PROG No. 2 3

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	34		A	0	2	3	1	CR					
2	Response	34	Normal	A	0	2	3	1	1	2	3	CR	LF	Switch complete. Operate with PROG No 23
			Abnormal	A	0	2	3	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

24 Switch to PROG No. 2 4

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	35		A	0	2	4	1	CR					
2	Response	35	Normal	A	0	2	4	1	1	2	4	CR	LF	Switch complete. Operate with PROG No 24
			Abnormal	A	0	2	4	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

4 Command and Response list

25 Switch to PROG No. 2 5

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	36		A	0	2	5	1	CR					
2	Response	36	Normal	A	0	2	5	1	1	2	5	CR	LF	Switch complete. Operate with PROG No 25
			Abnormal	A	0	2	5	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

26 Switch to PROG No. 2 6

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	37		A	0	2	6	1	CR					
2	Response	37	Normal	A	0	2	6	1	1	2	6	CR	LF	Switch complete. Operate with PROG No 26
			Abnormal	A	0	2	6	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

27 Switch to PROG No. 2 7

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	38		A	0	2	7	1	CR					
2	Response	38	Normal	A	0	2	7	1	1	2	7	CR	LF	Switch complete. Operate with PROG No 27
			Abnormal	A	0	2	7	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

28 Switch to PROG No. 2 8

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	39		A	0	2	8	1	CR					
2	Response	39	Normal	A	0	2	8	1	1	2	8	CR	LF	Switch complete. Operate with PROG No 28
			Abnormal	A	0	2	8	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

4 Command and Response list

29 Switch to PROG No. 2 9

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	40		A	0	2	9	1	CR					
2	Response	40	Normal	A	0	2	9	1	1	2	9	CR	LF	Switch complete. Operate with PROG No 29
			Abnormal	A	0	2	9	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

30 Switch to PROG No. 3 0

Classification			Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	Processing content
1	Command	41		A	0	3	0	1	CR					
2	Response	41	Normal	A	0	3	0	1	1	3	0	CR	LF	Switch complete. Operate with PROG No 30
			Abnormal	A	0	3	0	1	4	x	x	CR	LF	Switch failure. Operate with PROG No xx

7 5 Small range master calibration 1/1

1 Purpose

- Uses when you want to perform Min master calibration for CAG.

2 Response of CAG

- When normal action processing, command + “1”+ CRLF is responded.
- When abnormal action processing, command + ”4” + CRLF is responded.
- When status is following cases, no response is returned.

  During startup at the power is on.

  During continuous data from the connector “SW ETC” is outputting.

  During performing writing measured results or reading /writing of setting values between CAG and SD Card.

3 Abnormal action processing

When status of CAG is following cases, abnormal is responded

- During under operation other than the measurement mode.
- NG of Min master calibration
- An error occurred at EEPROM writing when internal processing for Min master calibration.

4 Command and Response list

34 Small range master calibration

Classification		Processing categoory	Transmission order→ 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Processing content
1	Command 45		N																
2	Response 45	Normal	@	0	E	R	R	0	4	G	A	I	N	M	1	CR	LF		Min OK
		Abnormal	@	0	E	R	R	0	1	Z	E	R	0	M	1	CR	LF		Min OK

76 Large range master calibration 1/1

1 Purpose

- Uses when you want to perform Max master calibration for CAG.

2 Response of CAG

- When normal action processing, command + “1”+ CRLF is responded.
- When abnormal action processing, command + ”4” + CRLF is responded.
- When status is following cases, no response is returned.

  During startup at the power is on.

  During continuous data from the connector “SW ETC” is outputting.

  During performing writing measured results or reading /writing of setting values between CAG and SD Card.

3 Abnormal action processing

When status of CAG is following cases, abnormal is responded.

- During under operation other than the measurement mode.
- NG of Max master calibration
- An error occurred at EEPROM writing when internal processing for Max master calibration.

4 Command and Response list

35 Large range master calibration

Classification			Processing category	Transmission order→																Processing content
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1	Command	47		X																
2	Response	47	Normal	@	0	0	K	SP	SP	SP	M	A	S	SP	SP	SP	CR	LF		Master OK
			Abnormal	@	0	E	R	R	0	4	G	A	I	N	M	1	CR	LF		Max OK
			Abnormal	@	0	E	R	R	0	7	R	E	V	SP	M	1	CR	LF		Min/Max Reverse

9 . External input/output

RS232C

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7 Details of commands 12/12

7 13 Measured results / output command 1/1

1 Purpose

- When you want to output measured results of CAG.

2 Response of CAG

- When normal action processing, measured value (8 char's) + "space" + judge (3 char's)+ CRLF are responded.
- No abnormal action processing
- When status is following cases, no response is returned.
  During startup at the power is on.
  During continuous data from the connector "SW ETC" is outputting.
  During performing writing measured results or reading /writing of setting values between CAG and SD Card.

3 Abnormal action processing

None

4 Command and Response list

42 Measured results / Output command

Classification		Processing categoory	Transmission order→																Processing content
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1	Command 57		D																
2	Response 57	Normal																	
		Description	Measured value								SP	Judeg			CR	LF			
		Ex.	SP	2	0	.	0	0	0	0	SP	SP	0	K	CR	LF			

9 . External input/output

External buttons input 1/3

1 Outline 1/1

By connecting a “SW ETC” connector on CAG to a contact switch such as a foot switch, an external device can operate the CAG with commands as follows

① Measured values hold / Continuous data output

Note When “Continuous data output” is used.

- Addition of optional “RD“ is required at shipment.

② Cancellation of measured value hold

③ Min master calibration

④ Max master calibration

- Multiple use is effective.

2 Connector 1/1

Name SW,ETC

Type D-SUB15P(ｵｽ)

Screw M2.6

Pin position

Pin No	Signal	Content
1	N.C.	Not connect
2	N.C.	Not connect
3	N.C.	Not connect
4	N.C.	Not connect
5	N.C.	Not connect
6	GND	GND
7	MEAS	Measurement/Continuous data ourput
8	RESET	Reset
9	MAX M	Max master calibration
10	MIN M	Min master calibration
11	N.C.	Not connect
12	N.C.	Not connect
13	N.C.	Not connect
14	N.C.	Not connect
15	N.C.	Not connect

⚠ Caution

● Cable length should be within 2m.

9 . External input/output

External buttons input 2/3

3 Operation 1/2

3 1 Measured value hold and Resetting 1/1

1 Purpose

- Uses when measured values of the CAG is outputted to RS232C interface.

2 Command and Response

① Short measurement and GND while displaying a measurement screen.

② Measurement screen changes to measured value hold state and then output the measured value and the judged results to RS232C.

When you do not want to let the measured value hold

- On the system screen, set setting item name SW (MEAS) to 2. NOT HOLD

③ Short Reset and GND

④ Measurement screen display goes into state of measurement.

3 2 Continuous data output 1/1

1 Purpose

- Continuous data output judges are continuously outputted.

- Only works when a feature of continuous data function is attached

2 Command and Response

① Short measurement and GND

② Measurement screen

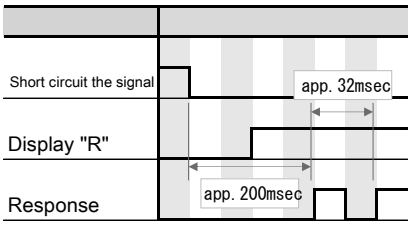
- No display for measured values and judge.
- "R" is displayed by the side of program No.

③ RS232C output format.

Transmission order→

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
D														
D	Measured value								SP	Judeg			CR	LF

3 Timing chart



9 . External input/output

External buttons input 3/3

3 Operation 2/2

3 3 Min master calibration 1/1

1 Purpose

- Uses when Min master calibration is performed.
- Perform an order of Min master calibration =>Max master calibration.

2 Command and Response

① Set Min master on the measurement while displaying the measurement screen.

② Short the Min master and GND.

③ The indication becomes


Red, and


blinks red.

④ When Min master

- caribration becomes OK,
  Measured value shifts to Min master value.

3 4 Max master calibration 1/1

1 Purpose

- Uses when Max master calibration is performed.
- Perform an order of Min master Calibration → Max master calibration.

2 Command and Response

① Set Max master on the measurement while displaying the measurement screen.

② Short the Max master and GND.

③ When Max master calibration becomes OK,
Measured value shifts to Max Master value.


They are turned off.

1 0 . List of settings

Setting list

Page	No	設定項目名	Label	设定项目名称	設定値
1/2	1	極性	Polarity	极性	□ 1． ＋ □ 2． －
	2	測定レンジ	Range	选择量程	□ 1． 10 μm(H) □ 2． 20 μm(H) □ 3． 20 μm □ 4． 50 μm □ 5． 100 μm □ 6． 200 μm
	3	表示分解能	Resolution	分辨率	□ 1． 0.1 μm □ 2． 1 μm
	4	シフト単位	Shift Unit	公差中间单位	□ 1． μm □ 2． mm
	5	シフト値	Shift Value	公差中间值	
	6	上限判定限界値	+NG/ OK	上限超差值	
	7	下限判定限界値	OK/-NG	下限超差值	
	8	大範マスタ	Max Master	上限标准件值	
2/2	9	小範マスタ	Min Master	下限标准件值	
	10	Language(言語)	Language	Language(语言)	□ 1． ENGLISH □ 2． JAPANESE □ 3． CHINESE
	11	終了	END	结束	

Warranty

After purchasing, fill in the product model, serial number, date of purchase, and customer information and keep it in a safe place.

① Model number	⑤ Warranty period
	from purchased date
② Serial number	One year
③ Purchased date (yyyy/mm/dd)	

⑥ Customer	Company name or name of purchaser
	Address
	TEL:
	FAX:

Warranty regulations

During the warranty period, we will repair the product at free of charge only in case of failure that occurs at our responsibility.

Please present or attach this warranty sheet when requesting no charge repair.

- The product warranty area is limited within Japan.
- The warranty covers only the purchased product itself.

The following costs and damages are not covered by the warranty

1) Transportation costs associated with this product
2) Cost of removal, installation and other incidental work when the product is connected to or incorporated in another device.
3) Consequential damage to the user due to a failure of this product, such as loss of usage opportunities and/or downtime of the operation
4) Any other consequential or incidental damage.

There is a charge for repairs caused by the following cases

1))In case of using under undesignated operational conditions such as with the special regulator specifications, the special air supply piping and etc. In case of using under the operational circumstances such as a high temperature/high humidity, near magnetic field, and improper supply air conditions.
2) Failure caused by the equipment systems where the product is built-in.
3) In case of modification or repair by the other company.
4) In case of natural disaster, fire, abnormal voltage, etc.
5) Failure caused by improper handling not following the cautions in the operation manual or failure caused by insufficient maintenance.
6) In case of a consumable part is deteriorated and needs to be replaced.

※ Repair support period for measuring and control devices
The measuring and control devices can be repairable within a period of 3 years from the date of discontinuation.

The major spare parts for repairs are also available in the same period.
Electronic parts may have some difficulties for procurement and production due to its short life cycle.

Please note repair may not be possible even during the period.

※ Repair request
Please contact your local distributor for repair requests.

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メモページ

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