Model AM012 Magnetic Flowmeter Calibrator

IM 1E6K2-E

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1. INTRODUCTION

The Model AM012 Magnetic Flowmeter Calibrator was accurately adjusted prior to shipment.

This manual covers the specifications, installation, and operation of the AM012.

The specifications and relevant components covered by this manual are limited to those of the standard model under the specified model number. In addition, some of the standard specifications are subject to change without notice for enhancement purposes.

Should the instrument fail, please provide a component description and history of the failure together with the instrument model and serial numbers. The inclusion of any relevant data and simplified drawings will be greatly appreciated.

If any unauthorized repairs are attempted without specific authorization from YOKOGAWA Electric Corporation, the user assumes full responsibility for the instrument's performance.

If any problems or questions should arise, please contact your nearest YOKOGAWA agent.

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2. HANDLING PRECAUTIONS AND REQUISITES

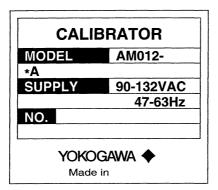
The Model AM012 Magnetic Flowmeter Calibrator is thoroughly tested at the factory before shipment. However, when the instrument is delivered, make a visual check to ascertain that no damage occurred during shipment.

This section describes important precautions and requisites to be observed when handling the instrument. Carefully read this manual before using the instrument.

If there are any problems or questions, please contact the nearest YOKOGAWA service center or the dealer from whom the instrument was purchased.

2.1 Model Name and Specifications

The Model name and main data are indicated on the name plate attached at the rear of the case (see Figure 2.1).



180 — 264V AC at 200V series

Figure 2.1 Data Plate

Verify that the data are the same as those specified at the time when it was ordered, referring to the Model and Suffix Codes in Section 3.2.

When contacting us, please indicate the Model and the instrument serial number.

2.2 Handling and Storing Precautions and Requisites

Precautions and requisites to be taken when handling and storing this instrument:

- (1) Prevent excessive shock to the instrument.
- (2) Protect the instrument from water and precipitation.
- (3) Calibrate the instrument at normal temperature and humidity.
- (4) Avoid installation or storage of the instrument in a corrosive atmosphere.
- (5) Store the instrument in a location:
 - free from water and precipitation.
 - relatively free from vibration and shock.
 - where the ambient temperature is between 0°C and 40°C and the humidity is between 5% and 80% relative humidity (well-ventilated and without condensation).

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GENERAL

The AM012 Calibrator is a standard signal generator used to check or calibrate the AM11 Magnetic Flow Converter, ADMAG AE Magnetic Flowmeter, ADMAG CA Magnetic Flowmeter, AM12 Magnetic Flow Converter, AM100A/B or AM200A/B Magnetic Flowmeter, YMA11 Magnetic Flow Converter and Compact YEWMAG Magnetic Flowmeter (CYM for short), styles A and B.(Style A or style B is indicated on the name plate: style A as *A and B as *B.)

The excitation load is incorporated in the calibrator, so the converter can be checked or calibrated without using a flow detector.

Span can be set from 0 to 10.99 m/s. The output signal related to the span can be set to 0, 25, 50, 75 and 100% using the output (%) knob.

3.1 **Standard Specifications**

• AM012

Case : Material : Unsaturated polyester resin

Dimensions: $110mm (H) \times 235mm (W) \times 364mm (D)$

Color : Light grayish green

Wiring cable : Special cables supplied are:

> AM012 power cord, signal and excitation cables CYM signal cable and excitation cable (optional)

Range setting : 0 to 10.99 m/s (minimum scale 0.01 m/s) with the span-

setting dial.

CHECK, 0, 25, 50, 75, 100% with output (%) knob.

Accuracy : $\pm 0.04\%$ of set value (span 0.1 m/s or greater)

+0.04 mm/s (span less than 0.1 m/s)

Power supply requirements : 90 to 132 V AC or 180 to 264 V AC, 47 to 63 Hz

Ambient temperature limits : 0 to 40°C

Weight : 4.2kg

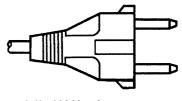
Power cord plug : Three types of plugs are available (select any one of the

following three):

(-1)For 100 V AC (for domestic use) (-2)For 100 V AC (UL Standard) (-3)For 200 V AC (CEE Standard)







(-1) 100 V series (for domestic use)

100 V series (conforms to UL standard)

200 V series (conforms to CEE standard)

Figure 3.1 Power Cord Plugs

● Junction box for ADMAG AE and ADMAG CA

Case : Material : Stainless steel

Dimensions: 140.5mm(H)×112.4mm(W)×112.4mm(D)

Color : Light gray

Power supply requirements : 80 to 264V AC / 80 to 130V DC or 24V DC

Ambient temperature limits : 0 to 40°C

Weight : 1kg

• Junction box for ADMAG SE

Case : Material : Stainless steel

Dimensions: 140.5mm(H)×112.4mm(W)×112.4mm(D)

Color : Light gray

Power supply requirements : 100V AC, 230V AC or 24V DC

Ambient temperature limits : 0 to 40°C

Weight : 1kg

3.2 Model and Suffix Codes

Model	odel Suffix Code		x Code	Description
AM012				Magnetic flowmeter calibrator
Power code	-1·· -2·· -3··			100 V series (for domestic use) 100 V series (UL standard) 200 V series (CEE standard)
Style code	*A			Style A
Options			/CYM /AE /SE	CYM cable Junction box for ADMAG AE and ADMAG CA Junction box for ADMAG SE

3.3 Options

CYM cables : Signal and excitation cables for CYMs (option code CYM) are avail-

able optionally to calibrate the Compact YEWMAG.

Junction box for ADMAG AE and ADMAG CA:

Junction box are available optionally to calibrate the ADMAG AE and

ADMAG CA.

Junction box for ADMAG SE:

Junction box are available optionally to calibrate the ADMAG SE.

3.4 Accessories

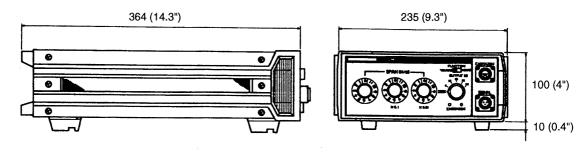
- One power supply cord (types of plugs vary depending on MS code.)
- One fuse (1 A)
- · One signal cable
- One excitation cable
- Cable for CYM (When /CYM is selected)
- Junction box (When /AE or /SE is selected)
- Special cable for ADMAG SE (When /SE is selected)

The cables are stored in a cord container on the rear panel. To open the container cover, pull the container cover knob forward.

3.5 External Dimensions

All dimensions in millimeters:

• AM012



• Junction box for ADMAG AE

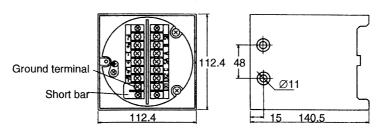


Figure 3.5 External Dimensions

3.6 Component Identification

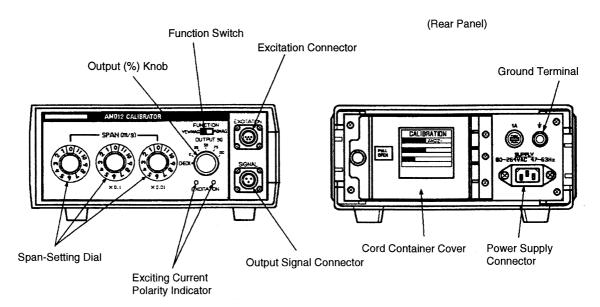


Figure 3.6 Component Identification

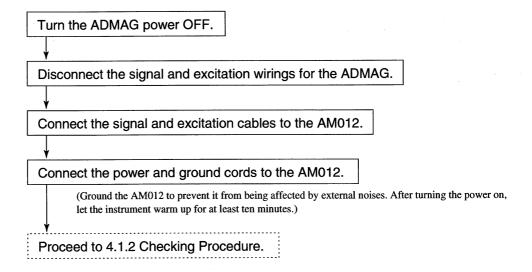
4. OPERATION

This chapter describes calibration procedures when the AM012 calibrator is used with: AM11(in Section 4.1), ADMAG AE, ADMAG CA(in Section 4.2), ADMAG SE(in Section 4.3), AM12, AM100A/B, AM200A/B(in Section 4.4), YMA11(in Section 4.5), Compact YEWMAG (CYM)(in Section 4.6)

Refer to each section to perform the desired calibration.

4.1 When AM012 is used with AM11

4.1.1 Interconnections



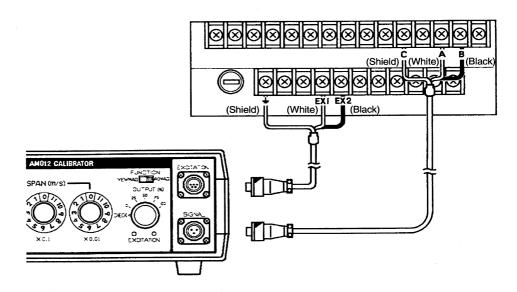


Figure 4.1.1 Interconnection Diagram

4.1.2 Checking Procedures

Change the AM11 set values.

- Set the B19 MAGMETER to CALIBRATOR
- Set both the B30 (LOW MF) and B31 (HIGH MF) meter factors to 1.0000. (Before changing the meter factors, write down the previous values.)
 See Section 4.1.3, Meter Factor Setting.

Turn the AM11 power ON.

Two excitation lamps will flash alternately. (See Note 1 below)
After turning ON the power, let the instrument warm up for at least three minutes.

Span set on the AM012.

Set the flow velocity of the span with the AM012 span dial. Firstly, be sure to confirm that the "B20 SIZE UNIT" parameter of AM11 is set to "mm". The flow velocity(m/s) can be checked with "B40 VELOCITY CHK" parameter of AM11.

Change FUNCTION.

Slide the AM012 FUNCTION switch to the ADMAG position.

Check the zero point.

Set the output (%) knob to 0% to check the zero point. To check the span accurately, record the indicated value. (See Note 2 below)

Check the span and output accuracy.

Turn the output (%) knob to 25%, 50%, 75% and 100% in turn to check the indicated values. (Subtract the zero point value from the indicated value to check the output accuracy.) When the knob is set to CHECK, common mode noise rejection can be checked (see Note 3 below).

Return the AM11 set values to their initial values.

- Return the B19 MAGMETER to ADMAG
- Return both the B30 (LOW MF) and B31 (HIGH MF) meter factors to their initial values which were previously recorded.

Turn the AM11 power OFF.

Remove the power supply and ground cords from the AM012.

Remove the signal and excitation cables from the AM012.

Connect the AM11 signal and excitation cables

End

Note 1: If no exciting current flows, the two excitation lamps do not flash correctly.

Note 2: When the flowmeter is completely filled with liquid that is at a standstill, make an automatic ADMAG zero adjustment. If stopping the liquid flow is not possible, do not make an automatic ADMAG zero adjustment.

Note 3: A common mode noise signal equivalent to a set value with the span-setting dial is output from the AM012.

4.1.3 Meter Factor Setting

The meter factors can be set using four AM11 converter keys. Data can be set with the M10 TUNING in the ENABLE position. Set the display menu to B30 LOW MF with the [SHIFT] and [INC] or [DEC] key. Then set the meter factor to 1.0000 with the [SHIFT] and [INC] or [DEC] and [SET] keys.

ADMAG requires two meter factors. So, set the meter factor to 1.0000 for B31 HIGH MF, too. For details, refer to the AM11 Instruction Manual IM 1E6C1-01E, or IM 1E6C1-02E.

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4.2 When AM012 is used with ADMAG AE and ADMAG CA

When using the AM012 calibrator with the ADMAG AE or ADMAG CA, remove the amplifier only from the converter and put it in the dedicated junction box for calibration. If /AE is selected for the optional specifications, this junction box is provided. The junction box can also be obtained separately.

4.2.1 Interconnections

Connection of the AM012 signal and excitation cables See Figure 4.2.1 for details of the connection. Connect the signal and excitation cables to the connection box. See Figure 4.2.1 for details of the connection. Connect the power and ground cables to the AM012. Connect the power cable to the AM012. Ground the terminal of the AM012 to protect it from external noise. After turning the power on, let the instrument warm up for at least ten minutes. (Shield) (White) (Power (Black) supply) (Shield) (White) (Black) **Figure 4.2.1 Interconnection Diagram**

Remove the amplifier unit from the converter.

- How to remove the amplifier unit
 - (1) Turn the ADMAG AE or ADMAG CA power off.
 - (2) Remove the cover of the converter.
 - (3) Loosen the four screws (M4) which secure the amplifier as shown in Figure 4.2.2.
 - (4) Draw out the amplifier forwards a little, and disengage the connectors as shown in Figure 4.2.3
 - (5) Place the removed amplifier on an insulating pad.

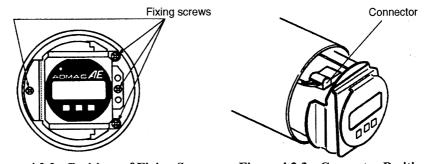


Figure 4.2.2 Positions of Fixing Screws

Figure 4.2.3 Connector Position

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Place the amplifier unit in the junction box.

- Only the amplifier is housed in the connection box.
 - Insert the connector pins of the amplifier into the two connectors on the terminal board of the junction box, aligning the holes of the plate with the positioning pins as shown in the figure.
 - (2) Engage the connectors to the amplifier. (See Figure 4.2.3.)
 - (3) After checking that the connections are secure, firmly tighten the fixing screws.

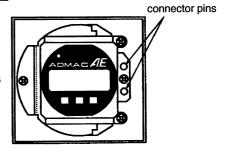


Figure 4.2.4 Connector Position

Proceed to 4.2.2 Checking Procedure.

4.2.2 Checking Procedure

Change Function.

Slide the AM012 FUNCTION switch to the ADMAG position.

Turn on the connection box power.

Two excitation lamps will flash alternately at regular intervals. (See Note 1) After turning on the power, let the instrument warm up for at least three minutes.

Span setting

Set the flow velocity of the span with the AM012 span dial. Firstly, be sure to confirm that the "06 SIZE UNIT" parameter of converter is set to "mm". The flow velocity(m/s) can be checked with "13 VELOCITY CHK" parameter of the converter.

Changing the settings of ADMAG AE/CA

Set the two meter factors of 08 (LOW MF) and 09 (HIGH MF) to 1.0000. (Before changing the settings, record the previous values.)

Check the zero point

Turn the output knob to 0% to check the zero point. To check the span accurately, record the indicated value. (See Note 2.)

Check the span and output accuracy

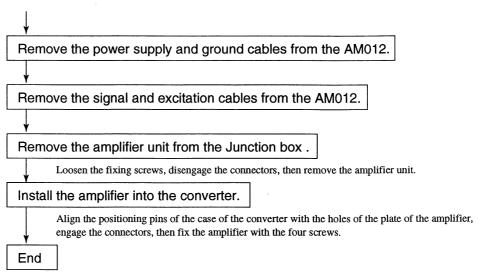
Turn the output knob to 25%, 50%, 75% and 100% in turn and check the indicated values. (Subtract the zero point value from the indicated value to check the output accuracy.) Set the knob to CHECK to check the common mode noise rejection. (See Note 3.)

Return the ADMAG AE/CA set values to their initial values.

Return the two meter factors of B30 (LOW MF) and B31 (HIGH MF) to the value recorded before the change.

Turn off the ADMAG AE/CA power.

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- Note 1: If no exciting current flows, the two excitation lamps do not flash correctly.
- Note 2: When the flowmeter is completely filled with liquid that is at a standstill, make an automatic ADMAG zero adjustment. If stopping the liquid flow is not possible, do not make an automatic ADMAG zero adjustment.
- Note 3 : A common mode noise signal equivalent to a set value with the span-setting dial is output from the AM012.

4.3 When AM012 is used with ADMAG SE

When calibrating SE, remove the amplifier only from the magmetic flowmeter and wiring by special cable, then put it in the dedicated junction box for calibration. If SE is selected for the optional specifications, this junction box and special cable is provided. The junction box can also be obtained separately.

4.3.1 Interconnections

Remove the amplifier unit from the flowmeter

- (1) Turn the ADMAG SE power off.
- (2) Remove the cover of the converter.
- (3) Loosen the three screws which secure the amplifier as shown in Figure 4.3.1.
- (4) Draw out the amplifier forwards a little, and disengage the connectors for signal line and excitation cable as shown in Figure 4.3.2.
- (5) Placed the removed amplifier on an insularing pad.

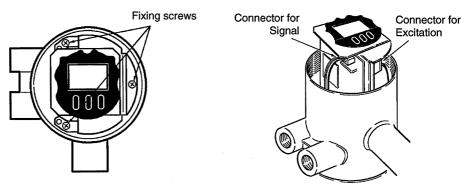


Figure 4.3.1 Positioning of Fixing Screws

Figure 4.3.2 Connector Position

Wiring by special cable to the amplifier

Connect attached special cable (excitation cable and signal cable) to the amplifier. See Figure 4.3.3 for details of the connection.

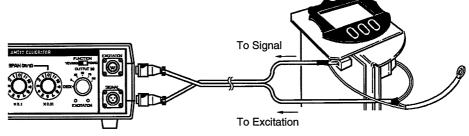


Figure 4.3.3 Interconnetion Diagram

Connection of the special cable to the AM012

Connect the special cable to the AM012. See Figure 4.3.3 for details of the connection.

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Wiring of power code to the Junction box

Wire power connection terminal (L+, N-) of the terminal board of the junction box for power code. (Refer to Figure 4.3.4)

Place the amplifier unit in the Junction box

Only the amplifier unit is housed in the junction box. Insert the connector pins of the amplifier into the connectors of the junction box, aligning the holes of the plate with the two positioning pins. After checking the connections are secure, firmly tighten the fixing screws. Then fix C terminal of the cable to the screws as shown in the 4.3.5 figure.

Connect the power and ground cables to AM012

Connect the power cable to the AM012. Ground the terminal of the AM012 to protect it from external noise. After turning the power on, let the instrument warm up for at least ten minutes.

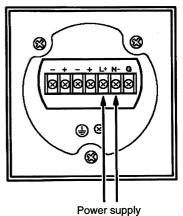


Figure 4.3.4 Connector position

To C terminal

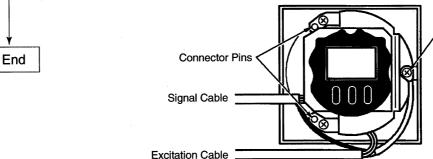


Figure 4.3.5 Connector position

4.3.2 Checking procedure

Change Function.

Slide the AM012 FUNCTION switch to the ADMAG posiotion.

Turn on the Junction box power.

Turn on the rated supply voltage of the amplifier.

Two excitation lamps will flash alternately at regular intervals. (See Note 1) After turning on the power, let the instrument warm up for at least three minutes.

Span setting

Set the flow velocity of the span with the AM012 span dial. Firstly, be sure to confirm that the "B06 SIZE UNIT" parameter of converter is set to "mm". The flow velocity can be checked with "B13 VELOCITY CHK" parameter of the converter.

Changing the setting of ADMAG SE

Set the meterfactors of B08 MF to 1.0000. (Before changing the settings, record the previous values.)

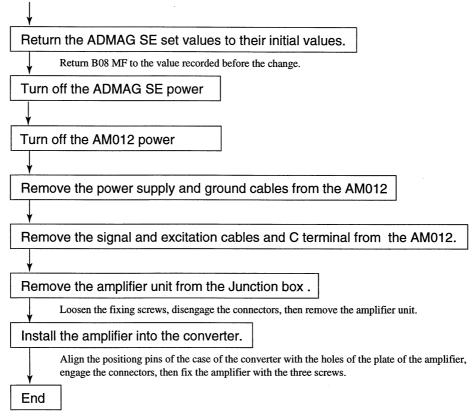
Check the zero point

Turn the output knob to 0% to check the zero point. To check the span accurately,record the indicated value. (See Note 2.)

Check the span and output accuracy

Turn the output knob to 25%, 50%, 75% and 100% in turn and check the indicated values. (Subtract the zero point value from the indicated value to check the output accuracy.) Set the knob to CHECK to check the common mode noise rejection.(See Note 3.)

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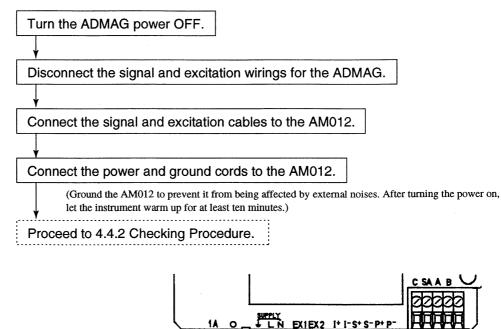


- Note 1: If no exciting current flows, the two excitation lamps do not flash correctly.
- Note 2: When the flowmeter is completely filled with liquid that is at a standstill, make an automatic zero adjustment. If stopping the liquid flow is not possible, do not make an automatic zero adjustment.
- Note 3: A common mode noise signal equivalent to a set value with the span-setting dial is output from the AM012.

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4.4 When AM012 is used with AM12 and AM100/200

4.4.1 Interconnections



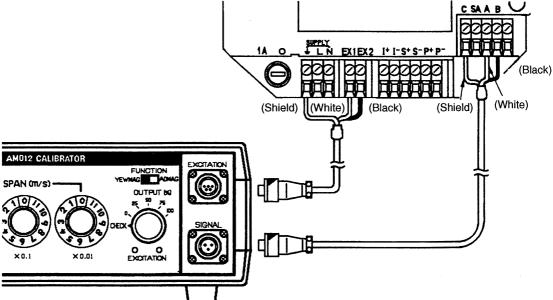


Figure 4.4.1 Interconnection Diagram

4.4.2 Checking Procedures

Change FUNCTION. Slide the AM012 FUNCTION switch to the ADMAG position. Turn the ADMAG power ON. Two excitation lamps will flash alternately. (See Note 1 below) After turning ON the power, let the instrument warm up for at least three minutes. Span set on the AM012. Find the flow velocity (m/s) from the ADMAG flow span, and set the flow velocity with the AM012 span dial. See Section 4.4.3, "Span (Flow Velocity) (m/sec) Calculation." Change the ADMAG meter factor. Set both the B30 (LOW MF) and B31 (HIGH MF) meter factors to 1.0000. (Before changing the meter factors, write down the previous values.) See Section 4.1.3, "Meter Factor Setting." Check the zero point. Set the output (%) knob to 0% to check the zero point. To check the span accurately, record the indicated value. (See Note 2 below) Check the span and output accuracy. Turn the output (%) knob to 25%, 50%, 75% and 100% in turn to check the indicated values. (Subtract the zero point value from the indicated value to check the output accuracy.) When the knob is set to CHECK, common mode noise rejection can be checked (see Note 3 below). Return the ADMAG set values to their initial values. Return both the B30 (LOW MF) and B31 (HIGH MF) meter factors to their initial values which were previously recorded. Turn the ADMAG power OFF. Remove the power supply and ground cords from the AM012. Remove the signal and excitation cables from the AM012. Connect the ADMAG signal and excitation cables. End

- Note 1: If no exciting current flows, the two excitation lamps do not flash correctly.
- Note 2: When the flowmeter is completely filled with liquid that is at a standstill, make an automatic ADMAG zero adjustment. If stopping the liquid flow is not possible, do not make an automatic ADMAG zero adjustment.
- Note 3 : A common mode noise signal equivalent to a set value with the span-setting dial is output from the AM012.

4.4.3 Span (Flow Velocity) (m/sec) Calculation

Three types of flow velocity calculations are described below.

The parameters required for the calculations are listed in Table 4.4.1.

Table 4.4.1 Parameter Menu

Parameter Menu	Name	Abbreviation
B24 FLOW SPAN	Measurement flow span	F _S
B21 NOMINAL SIZE	Flowmeter nominal size	D
B22 FLOW UNIT	Flow unit	U_Q
B23 TIME UNIT	Time unit	U _T

(1) For Flow Units

(i) When a Flowmeter Nominal Size Unit is mm.

Set the B20 SIZE UNIT in "mm" and B21 NOMINAL SIZE with "D".

$$V[m/s] = \frac{F_S \times U_Q}{(D/2 \times 10^{-3})^2 \times \pi \times U_T}$$

where

F_S: B24 FLOW SPAN

D: B21 NOMINAL SIZE

 $\begin{array}{ll} U_Q\colon \ \mbox{B22 FLOW UNIT} \\ U_T\colon \ \mbox{B23 TIME UNIT} \end{array}$

Table 4.4.2 Flow Unit

B22 FLOW UNIT	$U_{\mathbf{Q}}$
K m ³	10^{3}
m ³	1
1	10 ⁻³
cm ³	10 ⁻⁶
M gal	3.78541×10^{3}
K gal	3.78541
gal	3.78541×10 ⁻³
m gal	3.78541×10 ⁻⁶
K bbl	1.58987×10^2
bbl	1.58987×10 ⁻¹
m bbl	1.58987×10 ⁻⁴
μ bbl	1.58987×10 ⁻⁷

Table 4.4.3 Flow Unit

B23 TIME UNIT	$\mathbf{U_T}$
/d	86400
/h	3600
/m	60
/s	1

(ii) When the Flowmeter Nominal Size is expressed in inches.

When the flowmeter nominal size is expressed in inches, convert the units in inches to mm and obtain the flow velocity (see Table 4.4.4).

Table 4.4.4

Nominal Size in inches	Nominal Size in mm
0.1 (1/10)	2.5
0.20 (1/5)	5
0.40 (3/8)	10
0.50 (1/2)	15
1.00 (1)	25
1.50 (1-1/2)	40
2.00 (2)	50
3.00 (3)	80
more than size 4 inches (shown by n)	25×n

(2) For Units in Feet (ft)

 $V (m/sec) = Fs \times 0.3048$

where Fs: B24 FLOW SPAN

(3) For Units in [m/sec]

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V [m/sec] = Fs

where Fs: B24 FLOW SPAN

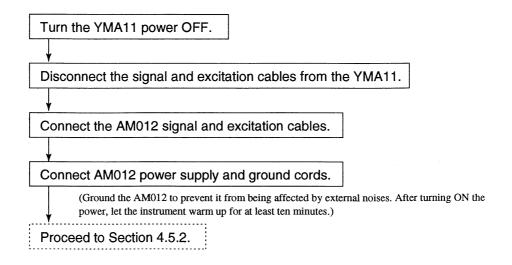
4.4.4 Meter Factor Setting

The meter factors can be set using four ADMAG converter keys. Data can be set with the M10 TUNING in the ENABLE position. Set the display menu to B30 LOW MF with the [SHIFT] and [INC] or [DEC] key. Then set the meter factor to 1.0000 with the [SHIFT] and [INC] or [DEC] and [SET] keys.

ADMAG requires two meter factors. So, set the meter factor to 1.0000 for B31 HIGH MF, too. For details, refer to the AM12A/B Instruction Manual IM 1E6C0-E, or the AM100A/B and AM200A/B Instruction Manual IM 1E6B0-1E.

4.5 When AM012 is used with YMA11

4.5.1 Interconnections



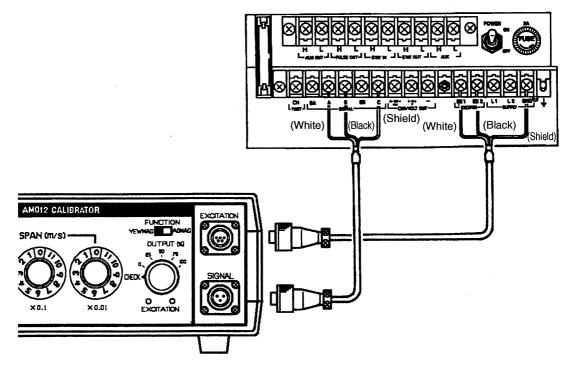


Figure 4.5.1 Interconnection Diagram

4.5.2 **Checking Procedures**

Change FUNCTION. Set the AM012 function switch in the YEWMAG position Turn the YMA11 power ON. Two excitation lamps will flash alternately. After turning ON the power, let the instrument warm up for at least three minutes. Set span on the AM012. Find the flow velocity (m/s) from the YMA11 flow span, and set the flow velocity using the AM012 span-setting dial. See Section 4.5.3, "Span (Flow Velocity) Calculation." Change the YMA11 set values. Set auxiliary data item 12 (meter factor) to 0.5. Before changing the set values, record the Set auxiliary data item 13 (exciting current) to 0.7. \(\) current values. See Section 4.5.4, "Meter Factor and Exciting Current Setting." Check the zero point. Turn the output (%) knob to 0% and check the zero point. If accurate span checking is required, record the indicated value. (See Note 2 below.) Check the span and accuracy. Turn the output (%) knob to 25%, 50%, 75% and 100% in turn and check the indicated values. (To obtain accurate output, subtract the zero point value from the above indicated values.) When the dial is set to CHECK, common mode noise rejection can be checked (see Note 3 below). Return the YMA11 set values to their initial values. Return auxiliary data items 12 (meter factor) and 13 (exciting current) to their previous values. Turn the YMA11 power OFF. Remove the power supply and ground cords from the AM012. Remove the signal and excitation cables from the AM012. Connect the YMA11 signal and excitation cables. End

- Note 1: If no exciting current flows, the two excitation lamps do not flash correctly.
- Note 2: When the flowmeter is completely filled with liquid that is at a standstill, make an automatic ADMAG zero adjustment. If stopping the liquid flow is not possible, do not make an automatic ADMAG zero
- Note 3: A common mode noise signal equivalent to a set value with the span-setting dial is output from the AM012.

4.5.3 Span (Flow Velocity) (m/sec) Calculation

The flow velocity is affected by the six parameters listed below:

Table 4.5.1 Parameter Menu and Name

Auxiliary Parameter No.	Name	Abbreviation
2—I	Nominal size unit	I
3—N	Flow unit	N
3—P	Time unit	P
4 to 7	Flow span	Q
8	Unit conversion factor	К
1	Nominal size	D

If the flowmeter size is expressed in inches, see (ii) on the next page.

(i) If the flowmeter nominal size (D) is expressed in mm:

Assign the required values to equation (1), and obtain the flow velocity.

$$v[m/s] = \frac{K \times Q \times N}{(D/2 \times 10^{-3})^2 \times \pi \times P}$$
(1)

where K: Set value for auxiliary parameter No. 8.

Q : Flowrate span to be calibrated, selected from among auxiliary

parameter Nos.4 to 7.

P : Values listed in Table 4.5.2.N : Values listed in Table 4.5.3.

D : Nominal size set to auxiliary parameter No. 11.

v : Flow velocity span

Table 4.5.2 Flow Time Units

Flow Time Units	P
0[/h]	53600
1[/min]	60
2[/sec]	1

Table 4.5.3 Flow Units

Flow Unit Settings	N
0[m³]	1
1[1]	10 ⁻³
2[cm ³]	10 ⁻⁶
3[10 ³ U.S.gallon]	3.78541
4[10°U.S.gallon]	3.78541×10 ⁻³
5[10 ⁻³ U.S.gallon]	3.78541×10 ⁻⁶
6[10 ³ bbl]	1.58987×10 ²
7[100bbl]	1.58987×10 ⁻¹
8[10 ⁻³ bbl]	1.58987×10 ⁻⁴

Example 1:

When flow units are expressed in m³/h and the unit conversion factor is 1:

$$v[m/s] = \frac{1 \times Q \times 3600 \times 1}{(D/2 \times 10^{-3})^2 \times \pi}$$
$$= \frac{353.68 \times Q[m^3/h]}{D^2[mm]} \dots \dots (a)$$

Example 2:

When flow units are expressed in l/min and the unit conversion factor is 1:

$$v[m/s] = \frac{1 \times Q \times 10^{-3}}{(D/2 \times 10^{-3})^2 \times \pi}$$
$$= \frac{21.221 \times Q[1/min]}{D^2[mm]} \dots (b)$$

Assign the necessary values to equations (a) and (b) above and derive the span (flow velocity).

(ii) When the Flowmeter Nominal Size is expressed in inches:

Convert the flowmeter size expressed in inches to mm and obtain the flow velocity (m/sec) (see Table 4.5.4 and unit converting procedures (i) above.

Table 4.5.4

Nominal Size in inches	Nominal Size in mm
0.1 (1/10)	2.5
0.15 (5/32)	4
0.25 (1/4)	6
0.50 (1/2)	15
1.00(1)	25
1.50 (1-1/2)	40
2.00 (2)	50
3.00 (3)	80
More than 4 inches (shown by n)	25×n

Example 1: When the flowmeter nominal size is 0.5 inches:

From the table above, we can obtain an approximate flowmeter size of 15 mm for 0.5 inches. Derive the flow velocity using equation (1) above.

Example 2: When the flowmeter nominal size is 4 inches:

From the above table, we can also obtain an approximate flowmeter size of 100mm (25×4=100) for 4 inches. Derive the flow velocity using equation (1) above.

4.5.4 Meter Factor and Exciting Current Setting

Set the ENABLE/INHIBIT switch to ENABLE and auxiliary data item 27 to 77.

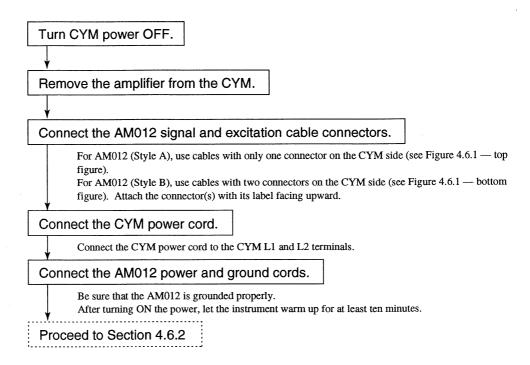
Use the data selection switch $[\blacktriangle]$, $[\blacktriangledown]$ to call up auxiliary data item 12 (meter factor). Then press the [SHIFT], [INCR], [SET] keys and set item 12 to 0.5. Next, call up auxiliary data item 13 (exciting current) and set it to 0.7.

For details, see the YMA11 Instruction Manual IM 1E4B0-01E, Section 5.4.

4.6 When AM012 is used with Compact YEWMAG

When the AM012 and Compact YEWMAG (CYM for short) are combined, special connectors are needed. Specify the (/CYM) options, and cables with special connectors are supplied.

4.6.1 Interconnections



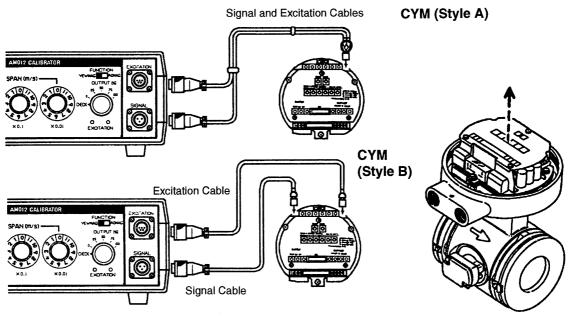
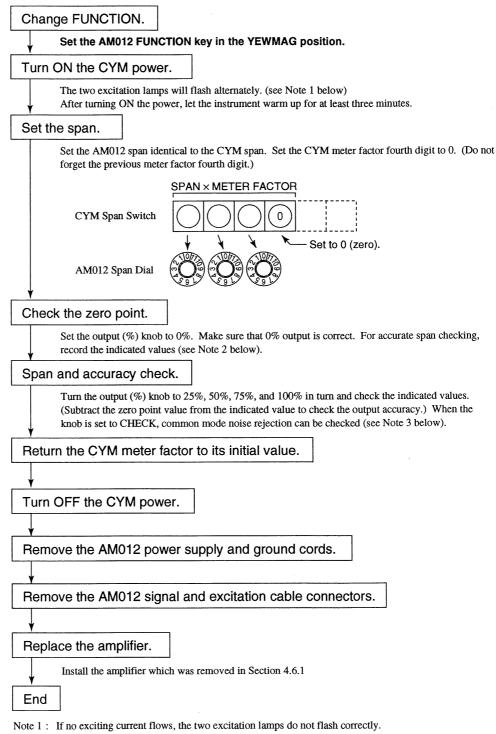


Figure 4.6.1 Interconnection Diagram

4.6.2 Checking Procedures



Note 2: When the flowmeter is completely filled with liquid that is at a standstill, make an automatic CYM zero adjustment. If stopping the liquid flow is not possible, do not make an automatic CYM zero adjustment.

Note 3: A common mode noise signal equivalent to a set value with the span-setting dial is output from the AM012.