

취급설명서

Ultrasonic Flowmeter

2100 Series



SECHANG INSTRUMENTS

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	0~41 inch 0- 12 ft. (offset 13 ft)
가	12 inch
	4- 20mA, 4 relay : SPDT 1A
	2 , 24 LCD, , , ALARM TRIP
	PANEL 5 KEY
	117/230 VAC, 50/60HZ, 10W 12- 36 VDC
	± 0.01%, /0.01 inch, / ± 0.25%
	30m . (300m) / -30 ~ 65 Mounting Bracket.
	NEMA 4X, / 0 ~ 65
	NEMA 4X + +

1 inch = 2.54 cm = 25.4 mm
 1 feet = 0.3048m = 30.48 cm
 1 Gallon (US) = 3.785

I. (Installation)

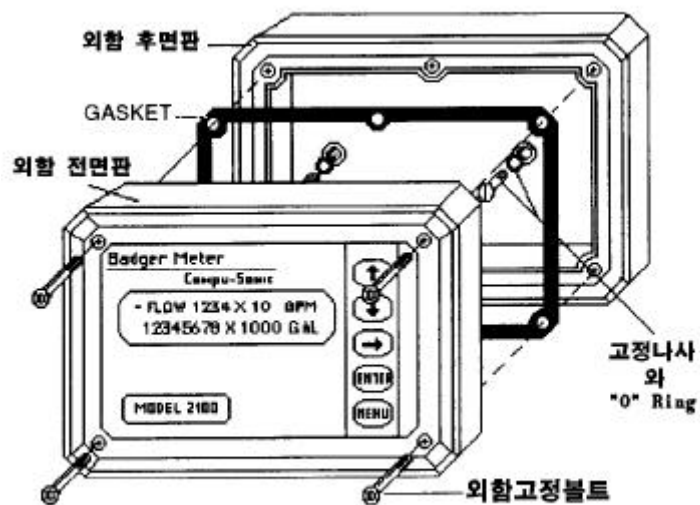
1.

MODEL 2100 NEMA 4X, 7.75" × 5.75" × 4"
 MODEL 2100
 가 METER 가
 , METER

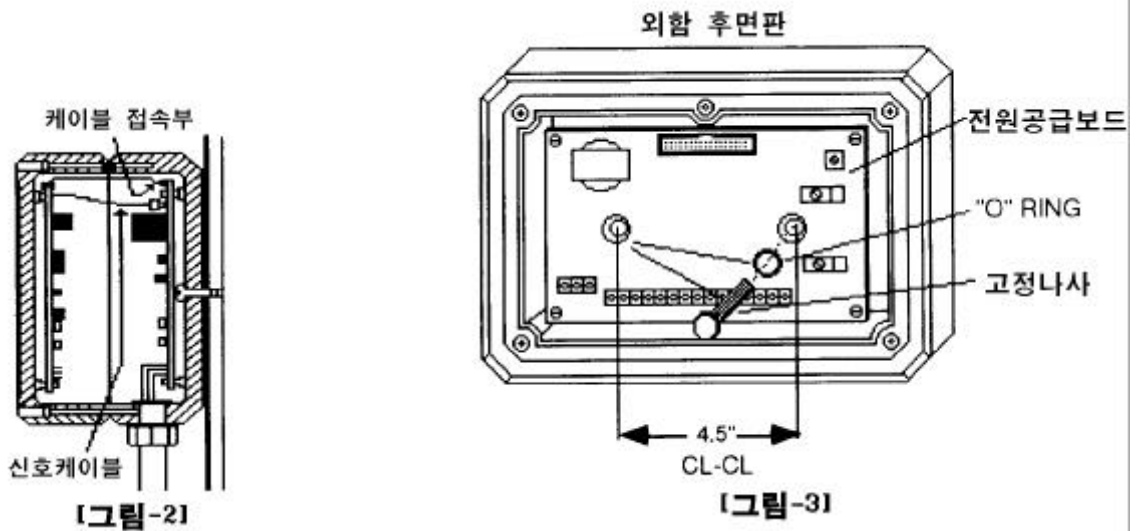
2.

5/32" ALLEN 4 6
 [- 1]

CABLE	RIBBON CABLE	PANEL
PANEL		PANEL
CABLE	[- 2]	
PANEL	4.5" ()	
3/8"	[- 3]	PANEL
가	PANEL	



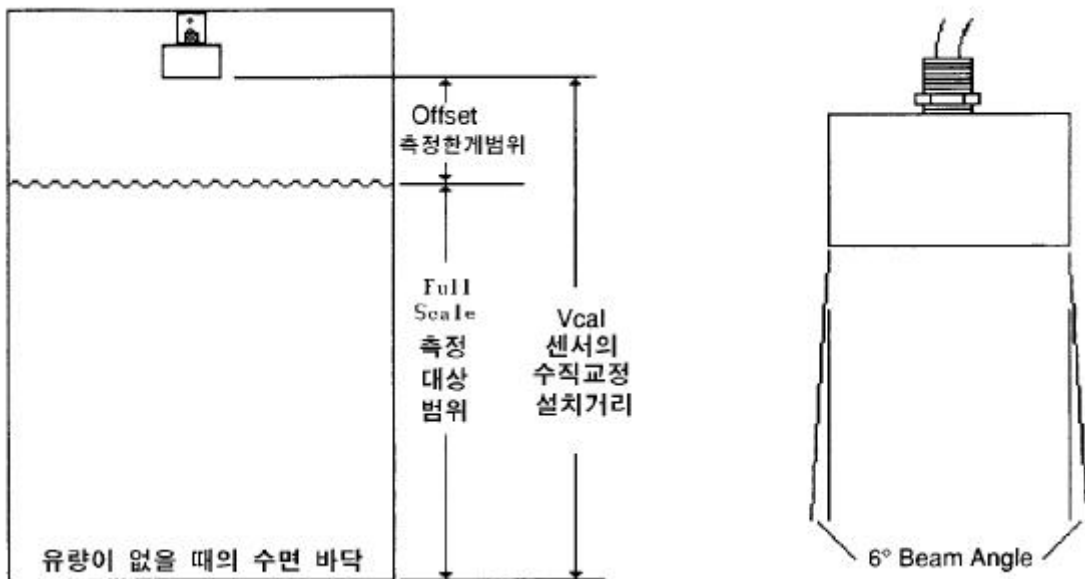
[그림-1]



II.

1.

MODEL	2100	SENSOR	PVC	TRANSDUCER
TRANSDUCER			PVC	RTV
SENSOR				SENSOR
FLANGE가	1/2" NPT	가		SENSOR CABLE
				가
SENSOR	30m가	300m	가	

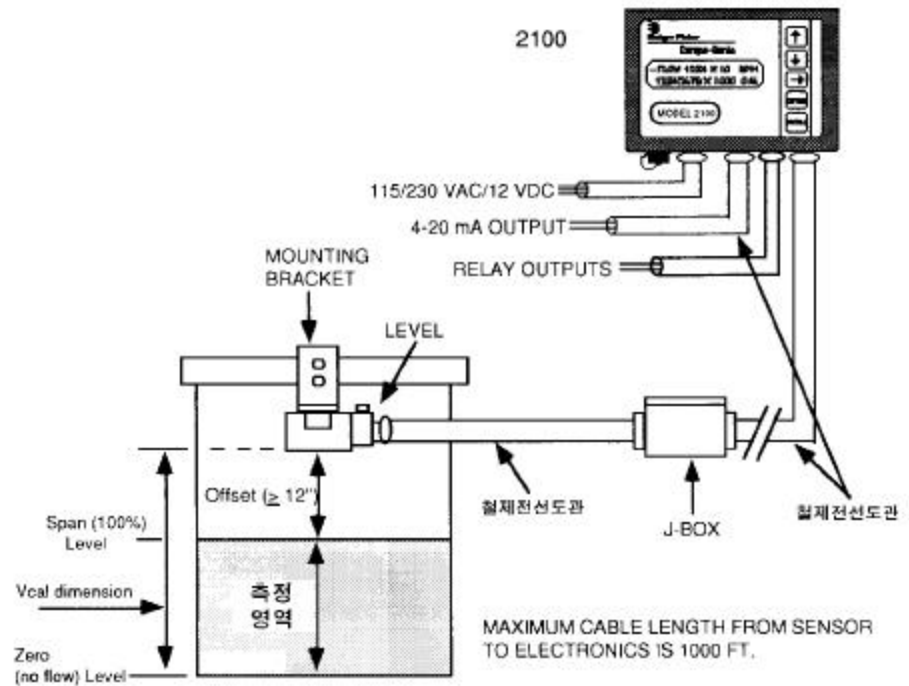


2.

VCAL 가 가 (VCAL)
 (FULL SCALE HEADRISE) (OFFSET)
 HEADRISE) 가 12" (FULL SCALE
 4" 144"

	=		+	
VCAL	=	FULL SCALE HEADRISE	+	OFFSET
	=	4" ~ 144"	+	12"

2100 운용도



III.

1.

MODEL 2 100 . 2
LINE 24 (LCD) , 4-20mA DC , 4 Relay RS 232
Serial Port 가 .

MODEL 2 100 Microprocessor ()
가
1 16 Point
가 . 5 KEY [MENU], [Enter], [↑]
, [↓], [→] .

[MENU] KEY (STATUS MODE) (CALIBRATION
MODE) KEY KEY
[MENU] KEY

[Enter] KEY

[↑] , [↓], [→]

가

2. (Operation)

가 . 4 , SOFTWARE NO.

- BADGER METER -
SOFTWARE REV. -X.XX

3 가 , SERIAL NO.가

- BADGER METER -
SERIAL NUMBER XXXXXXXX

3 가 , 3가

.(, ,)

- FLOW 1234 X 10 M3H
12345678 X 100 M3 .

- FLOW 1234 X 10 M3H
FLUID LEVEL = 9999 mm

- BADGER METER -
FLUID LEVEL = 1234 mm

3가 , “-” , “F” , “F”가 , “F”가 , “F”가 , “F”가
가 ALARM RELAY TRIP
ALARM RELAY가 TRIP
“F”가 MENU KEY가

1) (MENU)

MENU

PRESS UP FOR CALIBRATION
PRESS DOWN FOR STATUS

▶ .
▶ .

2) (STATUS MODE)

ALARM RELAY가 ,

SIMULATION 가

ALARMS TRIPPED
ECHO 4-20 PNT#1

TRIP ALARM SET POINT 가 ALARM

- ▶ ECHO : 가
- ▶ 4-20 : 4-20mA
- ▶ EEPRM : EEPRM
- ▶ OVRR : 가
- ▶ PNT 1 : SET POINT 1
- ▶ PNT 2 : SET POINT 2

MENU

Enter ↵

RELAYS TRIPPED
 RLY#1 RLY#2 RLY#3 RLY#4

RELAY RELAY SET POINT TRIP
 ALARM Enter ↵

FLUID LEVEL = 0380 mm
 DISTANCE = 0434 mm

1 (PARSHALL FLUME) (DISTANCE)
 (FLUID LEVEL) 가

PROGRAM
 MANUAL DATA SHEET (VCAL)
 가
 (FULL SCALE HEADRISE)가 (OFFSET) 가

Enter ↵

RX GAIN XX TEMP.*XX.XX
 SIGNAL

. 01

가 가 , 99 가

5 9

. FLOW 가 ,

Enter ↵

(1) 가 (SELF TEST)

SELF TEST
PRESS UP TO ACTIVATE

가

↑

SELF TEST
EEPROM => TESTING

MICROPROCESSOR EEPROM TEST
"TESTING" "PASSED" "FAILED"

SELF TEST
SENSOR ECHO => TESTING

가 TEST

"TESTING" "PASSED" "FAILED"

SELF TEST

가

MODE

SELF TEST

↑

Enter,↓

Enter,↓

(2)

LEVEL SIMULATION
PRESS UP TO ACTIVE

LEVEL SIMULATION

4-20mA DC , SET POINT RELAY

CONTROL SIMULATION

↑

S FLOW 00 X 10 M3H
LVL=000.0 IN TOT=1000

- BADGER METER -
S FLUID LEVEL = 0000 mm

가 MODEL 2100

SIMULATION

“S”가 가 가
SIMULATION . . .

MODEL 2100

PROGRAM ,

SIMULATION

가 .

4

TEST

SIMULATION

↑

↓

. SIMULATION

PROGRAM

SIMULATION

MENU KEY

. MODEL 2100 STATUS MODE가 .

3) (CALIBRATION MODE)

CALIBRATION MODE 가

MODE . SET POINT

RELAY

CALIBRATION MODE

MENU

PRESS UP FOR CALIBRATION
PRESS DOWN FOR STATUS

↑

SECURITY ID
INPUT 4 DIGIT ID 0000

MODEL 2100 CALIBRATION MODE

4

→

↑

↓

. 4

Enter

LEVEL UNIT
SELECTION = mm (XXXX)

가

FT	feet	(X X .X X)	(X .X X X)
IN	inch	(X X .X X)	(X X X .X)
M	meter	(X .X X X)	
MM	milli meter	(X X X X)	

가 0 X
 , inch(IN) XX.XX XXX.X
 , feet(FT) X.XXX XX.XX inch
 feet 2가
 (↑) (↓) (Enter)

SELECTED FULLSCALE
 HEADRISE = XXXX mm

(MAXIMUM FULL SCALE HEADRISE)
 MODEL 2 100 6" (PARSHALL FLUME) 1000GPM
 HEADRISE 12.61" FULLSCALE 1800GPM HEADRISE
 18.29"

MODEL 2 100 PROGRAM HEADRISE
 가 HEADRISE 120inch 4inch
 HEADRISE (→)
 , (↑) (↓)
 HEADRISE (Enter)

SENSOR
 OFFSET = XXXX mm

OFFSET OFFSET
 156" . OFFSET 12" . OFFSET HEADRISE
 . OFFSET (→)
 가 (↑) (↓)
 (Enter)

OUTPUT DAMPING
XXX SECONDS

↑ ↓

8, 16, 32, 64, 128, 256, 1024

Enter ↵

LOST ECHO DEFAULT
XXX SECONDS

가

8, 16, 32, 64, 128, 256, 512, 1024

↑ ↓

Enter ↵

FLOW LABEL
INITIALS = M3H

:	INITIAL	OPTION	가
	가	.	

- ▶ GPM : Gallons Per Minute (G/min)
- ▶ GPD : Gallons Per Day (G/day)
- ▶ MGD : Million Gallons Per Day (106G/day)
- ▶ CFS : Cubic Feet Per Second (ft³/sec)
- ▶ L/S : Liters Per Second (/sec)
- ▶ M3H : Cubic Metters Per hour (M3/HR)
- ▶ MLD : Million Liters Per day (106 /day)

OPTION 가 3 OPTION

TOTALZER WORD . OPTION , ⇨

↑ ↓

OPTION Enter ↵

METER DISPLAY OPTION
FLOW

↑ ↓ FLOW, LEVEL

FLOW MULTIPLIER
M3H X 100

가 0.001, 0.01, 0.1, 1, 10, 100, 1000, 10000
4 가 ↓

Enter ↵

ELEMENT MAXIMUM CAPACITY
1800 X 1 M3H

1 (PARSHALL FLUME)
FULL SCALE
1 6"
FULL SCALE 1000 GPM 1800 GPM
↵
↓ 4 가
Enter ↵

ELEMENT MAXIMUM CAPACITY
HEADRISE = 2865 mm

(PARSHALL FLUME)
↵ ↑ Enter ↵

1 FACTOR
7가 FACTOR

- ▶ 1.522 = 12" PARSHALL FLUME
- ▶ 1.53 = 9" PARSHALL FLUME
- ▶ 1.538 = 18" PARSHALL FLUME
- ▶ 1.55 = 1", 2", 3", 24", PARSHALL FLUMES, LAGCO FLUMES.
- ▶ 1.58 = 6" PARSHALL FLUME
- ▶ 1.95 = MANHOLE FLUMES
- ▶ 2.5 = V-NOTCH WEIR

Enter ↵

ELEMENT FUNCTION
1.55 PWR

↑ ↓ Enter ↵
H/Q OPTION 1 16

: H/Q (H: ,Q:) OPTION
Enter ↵

ELEMENT MAXIMUM CAPACITY
HEADRISE = 28.65 IN

↑ ↓ Enter ↵

TOTALIZER FUNCTION
ENABLED

Enter ↵

TOTALIZER MULTIPLIER
X 1,000

가 0.01, 0.1, 1, 10, 100, 1000, 10000, 1000000 8
가 ERROR 가 가
↑ ↓ Enter ↵

CONTACT INTEGRATOR
0001 X 1,000 M3H

SAMPLER PULSE RELAY
10,000 GALLON SAMPLE 1,000 SAMPLER가 0010

→

↑

↓

Enter ↵

INTEGRATOR PULSE WIDTH
ON FOR 0002 X .0655 SEC.

PULSE
0.0655
100 milli-second가 , 131 milli-second 0002
PULSE PULSE 30 sec , 33.75
sec 0500

→

↑

↓

Enter ↵

4)

SETPOINT # 01
ON AT XX% OFF AT XX%

LOW HIGH ALARM DEAD BAND
FULL SCALE % , LOW ALARM ON
OFF , ON 30% OFF 35% ALARM
FULL SCALE 30% , FULL SCALE 35%
HIGH ALARM ON OFF , ON
60% OFF 50% ALARM FULL SCALE 60%
, FULL SCALE 50% , SET POINT
#01 ON,OFF SETPOINT #02

SETPOINT # 02
ON AT XX% OFF AT XX%

→

ON OFF

↑

↓

Enter ↵

2 가

RELAY ASSIGNMENT
RELAY 01 => ECHO

ALARM 4 RELAY

가

- ▶ ECHO : 가
- ▶ EEPRM : EEPRM
- ▶ OVER : 가 가
- ▶ 4-20 : 4-20mA
- ▶ CINT :
- ▶ TOTL : 가
- ▶ PNT #1 : SET POINT #1
- ▶ PNT #2 : SET POINT #2

ALARM RELAY #1

Enter,↓

4 RELAY

RELAY

4-20 CURRENT CALIBRATION
PRESS UP TO CHANGE

4-20mA DC

↑

4-20MA CALIBRATION
ZERO WORD =2345

ZERO 4mA

4-20mA

TEST JACK

JACK

+ JACK - 4-20mA TEST POINT가

→

가

↑

↓

ZERO WORD

Enter,↓

4-20MA CALIBRATION
SPAN WORD = C345

20mA

4-20mA

TEST JACK

→

가

↑

↓

SPAN WORD

Enter,↓

4-20mA CALIBRATION
DEFAULT WORD = 2345

JACK . 가 . 가 , 4-20mA
가
4-20mA TEST
가
↑ ↓ , [Enter]

DISTANCE CALIBRATION
PRESS UP TO CHANGE

TRANSMITTER
3 1 가 [↑]

DISTANCE CALIBRATION
NEAR DIST.=> XXXX mm

OFFSET . [Enter]
SENSOR . [↑] [↓]

SECURITY ID
PRESS UP TO CHANGE

0000 . CALIBRATION MODE 가
ACCESS
[↑]

SECURITY ID
INPUT 4 DIGIT ID XXXX

가 . [↑] [↓] [Enter]

- STORING PARAMETERS-
PARAMETERS->PROGRAMMED

MICROPROCESSOR EEPROM DATA가

CALIBRATION MODE

[Enter]

[MENU]

MICROPROCESSOR

5) (OPTIONAL PROGRAMMING SCREENS)

(1) H/Q (H: , Q:)

MODEL 2 100 1

1

13 PAGE

16

ELEMENT FUNCTION

ELEMENT FUNCTION
OPTION

[↑]

[↓]

OPTION

[Enter]

OPTIONAL H CURVE
POINT 0 = FFFF

H/Q (H)

DATA 16

POINT 0

가

가

16 POINT 1

16

FFFF(65535, 10)

100%

% 0 10

가

16

10 10 16

10

16 16

SECHANG INSTRUMENTS

POINT	HEIGHT	% MAX	10	16
POINT 0	0.48"	2	13 11	05 1F
POINT 1	0.72"	3	1966	07AE
POINT 2	1.20"	5	3277	0CCD
POINT 3	1.68"	7	4587	11EB
POINT 4	2.16"	9	5898	170A
POINT 5	2.88"	12	7864	1EB8
POINT 6	3.60"	15	9830	2666
POINT 7	4.32"	18	11796	2E 14
POINT 8	5.04"	21	13762	35C2
POINT 9	6.00"	25	16384	4000
POINT A	7.20"	30	19660	4CCC
POINT B	8.40"	35	22937	5999
POINT C	10.08"	45	2949 1	7333
POINT D	16.08"	67	43908	AB84
POINT E	19.92"	83	54394	D47A
POINT F	24.00"	100	65535	FFFF



. 4
. F

Enter ↵

PROGRAM

DATA POINT

(Q)

. 1

(24" HEADRISE

)

HEADRISE

0.48"(1

)

SECHANG INSTRUMENTS

65536 16 , 1
 가 3000GPM(24") , 0.48" ()
 ZERO POINT) 20 GPM , 20/3000 = 0.006667 0.006667 × 65535 = 436.9
 (DEC) = 01B5 (HEX) POINT 0 = 01B5.

→ ↑ ↓
 . 4 가 Enter J
 . F TOTALIZER FUNCTION

PROGRAM H/Q STATUS MODE FLOW SIMULATION
 가
 MODEL 2100 H/Q OPTION PROGRAM

(2)

가 가
 (TOTALIZER) TOTALIZER WORD PROGRAM
 PROGRAM ELEMENT FUNCTION

TOTALIZER UNIT
 UNIT INITIALS=AAA

↑ ↓
 →
 Enter J

TOTALIZER MULTIPLIER
 X 1,000

↑ ↓
 Enter J

TOTALIZER WORD
 . TOTALIZER WORD
 (TOTALIZER MULTIPLIER)
 _____ × 1,000,000
 1 (MAX.FLOW OF PRIMARY ELEMENT)

= 16 / (HEX IN UNITS/SEC)

)
 = 1800 X 1BPM(BARRELS/MIN)
 = BAR X 100
 TOTALIZER WORD = [100/(1800/60)] × 1,000,000=3333333.33
 16 = 32DCD5(10 16) TOTALIZER
 WORD 0000 0032 DCD5 .

: TOTALIZER WORD 16 0000 0001 0000 .

↑ ↓ , ⇐

. 4 Enter J
 . 4 가 PROGRAM CONTACT ITERATOR .

PROGRAM .

(3) 16 (HEXADECIMAL SYSTEM)

16 . 10 16
 가 . 16 16

	16	
1	1	
2	2	
3	3	
4	4	
5	5	
6	6	
7	7	
8	8	C 10 0 9 ,
9	9	16 0 F가 .
10	A	
11	B	10 9 = 10
12	C	16 F = 10
13	D	
14	E	
15	F	
16	10	

10

가

$$6D4C = 27,980$$

(4) 16 10

6D4C

$$\begin{aligned} & (6 \times 163) + (D \times 162) + (4 \times 161) + (C \times 160) \\ &= (6 \times 4096) + (13 \times 256) + (4 \times 16) + (12 \times 1) \\ &= 27,980 \end{aligned}$$

16 10

가 16 - 1

(5) 10 16

)

$$57420 (10)$$

1. 10 16

$$57420 / 16 = 3588.75$$

2. 16

16

가 (.000)

16 0

$$.75 \times 16 = 12 \text{ ---> } C\text{가}$$

3. 16

16

가

$$3588 / 16 = 224.25$$

4. 3

16

2 3

가 16

가

$$.25 \times 16 = 4 \text{ ---> } 4$$

$$224 / 16 = 14.0$$

$$.0 \times 16 = 0 \text{ ---> } 0$$

$$14 \Rightarrow E$$

5.

SECHANG INSTRUMENTS

.....

$$57420/16 = 3588.75$$

$$.75 \times 16 = 12 \text{ ---} > C$$

$$3588 / 16 = 224.25$$

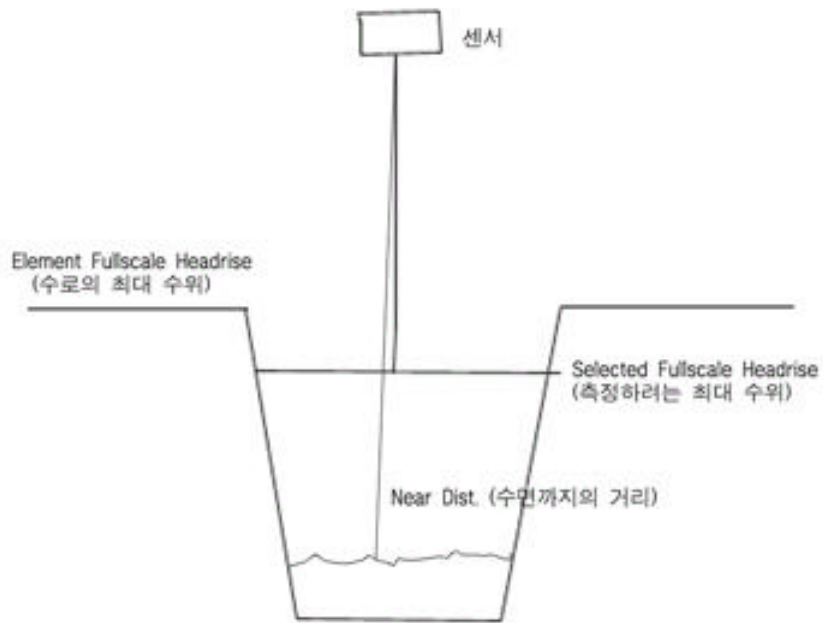
$$.25 \times 16 = 4 \text{ ---} > 4$$

$$224/16 = 14.0$$


$$\left. \begin{array}{l} .0 \times 16 = 0 \text{ ---} > 0 \\ \hline \end{array} \right\} \text{---} > E$$

57420(10) E04C(16)가 .

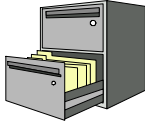
Installation Diagram
Ultrasonic Flowmeter 2100



V-CAL(자료재는 높이)
= Selected Fullscale Headrise + OFFSET

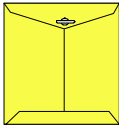


Ultrasonic Flowmeter
2 100



1 : 1996 3 6
2 : 1997 2 5
3 : 1997 6 6

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.
. ,
:



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