I-01660

1. Preface

Thank you for purchasing our digital panel meter 482F series.

Before use, read this manual carefully and thoroughly, and keep this manual available for routine reference.

Please check contents of the package you received as outlined below.

(1) 482F itself   (2) Unit label   (3) This manual

(4) In case that the instrument is with optional BCD output, a connector is also attached.

For safe use of this product, please observe the following warning and caution.

In order to help the users' safe use of the products, the following symbol marks are used in this manual.

⚠ **WARNING** — This is the warning to avoid the danger when it is assumed that such danger as may cause fatal accident or severe injure to a user occurs in case that the product is mishandled.

⚠ **CAUTION** — This is the caution to avoid the danger when it is assumed that such danger as may cause minor injure to a user or generate only physical obstacle occurs in case that the product is mishandled.

⚠ WARNING

● **There is no power on-off switch on the model 482F. It immediately starts to operate after turning the power.**

● **Do not touch terminals when turning the power on.**

⚠ CAUTION

Preserve followings for your safety.

● **The rated data is, however, defines with more than 15 minutes warming-up times.**

● **When the product is installed in the cabinet, perform the appropriate heat radiation to keep less than 50 ^{o}C in it.**

● **Avoid the close-contacted mounting of the meter.   The rise of internal temperature affects the life of product.**

● **Do not install under the following conditions.**

   ●**Where it is exposed to direct sunlight, dust, corrosive gases, rain, etc.**

   ●**Where ambient temperature or humidity is high.**

   ●**Where it is exposed to excessive noise or static electricity.**

   ●**Where there is constant vibration or shock**

● **Store the instrument within the specified temperature range for storage (-20~70 ^{o}C).**

● **When the front panel or the case becomes dirty, wipe it with soft cloth.**

For heavy dirt, wipe it lightly with the soft cloth wetted with the neutral cleaner thinned by water, and   finish the cleaning with dry cloth.   Do not use organic solvent like benzene or paint thinner as they may deform or discolor the case.

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2. Standard Specifications
2.1 Model Name

```
482F-  -  -  -  -
       1  2  3  4  5
```

1 Measuring Input

Model	Measuring Range	Input Resistance	Accuracy *	Overload
482F-22	99.99mVrms	10M	± (0.2% of rdg + 10digits)	AC10V
482F-23	999.9mVrms	10M	± (0.2% of rdg + 10digits)	AC100V
482F-24	9.999Vrms	10M	± (0.2% of rdg + 10digits)	AC700V
482F-25	99.99Vrms	10M	± (0.2% of rdg + 10digits)	AC700V
482F-26	699.9Vrms	10M	± (0.3% of rdg + 10digits)	AC700V
482F-32	99.99μArms	1k	± (0.5% of rdg + 10digits)	AC10mA
482F-33	999.9μArms	100	± (0.5% of rdg + 10digits)	AC50mA
482F-34	9.999mArms	10	± (0.5% of rdg + 10digits)	AC150mA
482F-35	99.99mArms	1	± (0.5% of rdg + 10digits)	AC500mA
482F-36	999.9mArms	0.2	± (0.7% of rdg + 10digits)	AC2A
482F-37	5.000Arms	0.01	± (0.7% of rdg + 10digits)	AC10A

   * Accuracy: Defined at $23^{o}C \pm 3^{o}C$, 45~75%RH.
               This definition is applied to the sine wave input of 5% or higher of the full scale.
   Frequency range: Sine wave of 40Hz~1kHz
   Temperature coefficient: $\pm 300ppm/^{o}C$ (Defined at $0~50^{o}C$)

2 Power Source Voltage

Code	Power Source Voltage
3	AC100V (90~132V)
5	AC200V (180~250V)
9	DC24V± 10%

3 Data Output

Code	Specifications
Blank	No output
BP	BCD output (TTL level positive logic)
BN	BCD output (TTL level negative logic)
DP	BCD output (transistor output, source type)
DN	BCD output (transistor output, sink type)

4 Decimal Point

Code	Description
Blank	Front setting
1	Remote control

5 Display Color

Code	Description
Blank	Red LED
G	Green LED

2.2 General Specifications

|	
Display	: 0~9999 red or green LED (character height 14.2mm) with zero-suppress function.
Scaling Function	: Full scale display 1000~9999.
	Coarse adjustment: Changeable in 4 steps by pin header
	Fine adjustment: MAX volume
Decimal Point	: Optional (front setting or remote control).
Over-range indication	: Display becomes intermittent when exceeded 9999.
Hold Function	: Measured data is held (without isolation).
Resolution	: 1/10000
Sampling Rate	: 2.5 times/sec.~0.2 times/sec. variable.
Response to input	: Approximately 1 sec.
Crest factor	: 4 [482F-23: 3.5
	482F-26: Up to peak 1000V
	482F-37: 2]
Rectification circuit	: Effective value operation method.
Input Type	: Single ended, floating input.
A/D Conversion	: Dual slope integration system.
Power Source Line Penetrating Noise	: 1000V
Withstanding Voltage	: Input terminal - Case : AC1500V for 1 min.
	Power terminal - Case : AC1500V for 1 min.
	Power terminal - Input terminal : AC1500V for 1min.
Insulation Resistance	: DC500V 100M or more.
Power Source Voltage	: AC90~132V or 180~250V 50/60Hz
	DC24V± 10%
Power Consumption	: AC power source ... approx. 3VA
	DC power source ... approx. 60mA
Operating Temperature	: $0~50^{o}C$
Storage Temperature	: $-20~70^{o}C$
Weight	: AC power source models ... approx. 350g
	DC power source models ... approx. 250g
Mounting Method	: Fastening from rear of the panel by metal brackets.

2.3 Unit Labels (attached)

Labels of different units are attached to the instruments.　Select and adhere the label of required unit:

V, mV, kV, W, A, mA,µ A, kW, %, ^{o}C, m, mm, rpm, ppm, Pa, Torr, g, mN, kg, N, m/min, mmHg, J, m^3/h, kPa, MPa
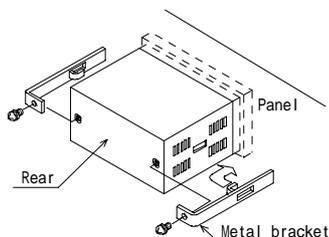
Actual characters of the units printed on the stickers may be different from the above characters.

2.4 Dimensions

Models with Data Output

Middle row connector: For remote control DP models (option)

Unit:mm
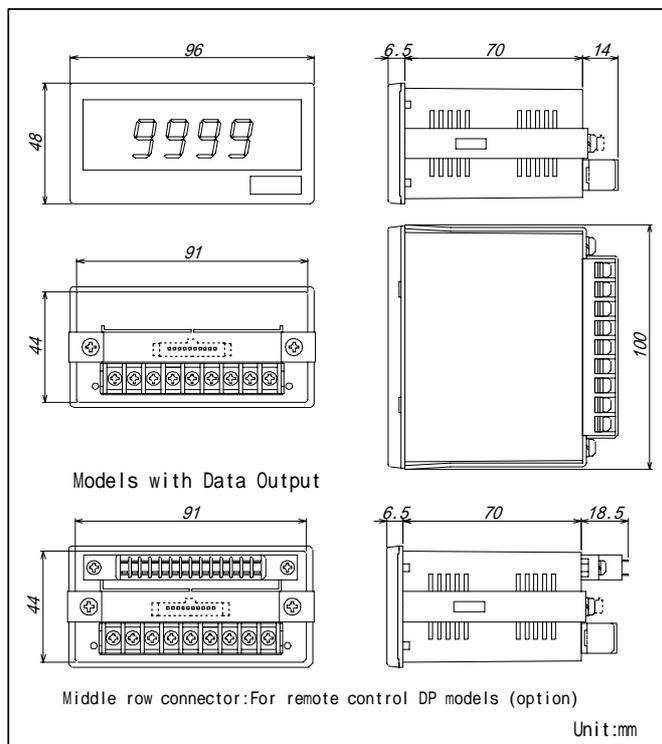
2.5 Installation

Remove the metal bracket s at both sides, insert the instrument from the front and fix it by the brackets.

Panel
Rear
Metal bracket

Fixing pitch

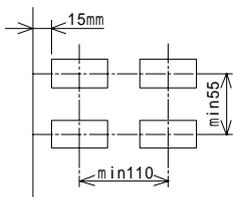Cut the panel to mount the case in accordance with the illustration.
Panel cut dimension: 92 $^{+0.8/-0}$ × 45 $^{+0.6/-0}$ mm
Recommended panel thickness is 0.6 to 6mm.
For light panel, such as aluminum, should be 1.5mm or more to avoid deform.
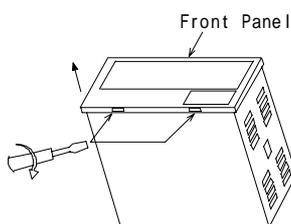Fasten torque of the mounting bracket is 0.25 to 0.39Nm.

⚠ CAUTION

● **Do not overtighten the mounting bracket.**
● **When plural mounting, pay attention to ventilation to cool down in the panel.**

2.6 Removal of Front Panel

Insert (-) screwdriver into the dips at the low end of instrument and remove the front panel.
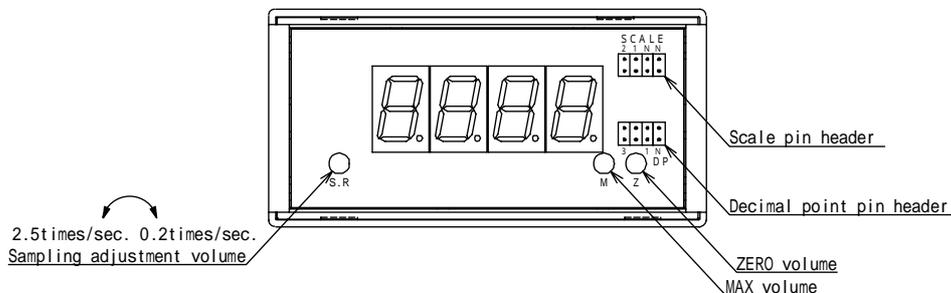

Front Panel

Wrench the panel open with(-)screwdriver

2.7 Removal of Board

Remove the screws of rear terminal block (remove the connector if the instrument is the model with data output).

Remove the front panel and take the board out, slightly and gently expanding the case up and downward.

When getting the board back into the case, insert it pressing softly the lower side of the display board.

In case that the instrument is with the remote control function for decimal point, be careful that the connector lead wire does not coil around the rear terminal block.

## 2.8 Function of Front Panel Inside

● **Scaling function**

The display at full scale input is variable to 1000~9999 by the setting of pin header for scaling inside the front panel, and the adjustment of MAX volume.

Scale Pin Header Position				Adjustable range of MAX volume at full scale input
2	1	N	N	
				1000~2500
				2501~5000
				5001~7500
				7501~9999

● **Decimal point display**

Display of decimal point at 10^1, 10^2 or 10^3 can be selected by the decimal point adjustment pin header inside the front panel.
Note: This function is not provided if the decimal point is of remote control.

DP Pin Header Position	DP Display Position
3	DP3
2	DP2
1	DP1
N	
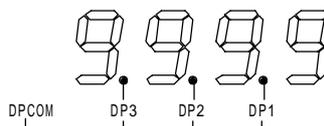
● **Variable sampling rate**

Sampling rate is variable to 2.5 times/sec.~0.2 times/sec. by the volume provided inside the front mask. When the display readings are illegible due to unstable input, for example, a prolonged sampling rate facilitates stability of display readings.

● **ZERO volume**

Volume for zero point adjustment.

3. Terminals and Explanation

> ### ⚠ WARNING
>
> - **To avoid an electrical shock, turn the power off when wiring.**
> - **Do not wire with moistened hands.   Locate away from the wet place.**
> - **Do not touch terminals when turning the power on.**

> ### ⚠ CAUTION
>
> - **Power supply and load should be within the suitable range.**
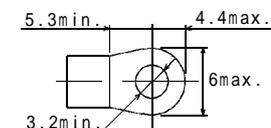> - **Do not miswiring.**

3.1 Terminals and Connector Arrangement

● **Lower Row Terminals**   (   )=DC power source models.

Terminal Code	IN Hi	IN Lo	COM	HOLD	NC	NC	GND(NC)	P2(+)	P1(-)
	1	2	3	4	5	6	7	8	9
Function	+		Common	Hold			Ground	Power Supply	
	Input								

Terminal screws: M3
Fastening torque: 0.46~0.62N m
Crimp terminal: As shown on the right.

● **Middle Row Connector**   (In case of remote controllable decimal point)

Terminal Code	DPCOM	DP1	DP2	DP3	NC	NC	NC	NC	NC	NC
	1	2	3	4	5	6	7	8	9	10
Function	Common	10^1 dig.	10^2 dig.	10^3 dig.						
	Decimal Point									

● **Coloring of attached lead wire (lead wire length 1m)**
  Brown : DPCOM   Orange : DP2
  Red   : DP1   Yellow : DP3

● **Upper Row Connector**
 TYPE BP, BN, DP, DN

Function		Pin No.		Function
NC		1	2	NC
NC		3	4	NC
NC		5	6	DATA COM
SYNC		7	8	HOLD
OVER		9	10	OUTPUT ENABLE
NC		11	12	NC
$\times 10^3$	8	13	14	8	$\times 10^2$
	4	15	16	4	
	2	17	18	2	
	1	19	20	1	
$\times 10^1$	8	21	22	8	$\times 10^0$
	4	23	24	4	
	2	25	26	2	
	1	27	28	1	

Connector: 1150N-028-009T

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3.2 Explanation of Lower Row Terminals

● **Measurement Inputs (IN Hi, IN Lo)**

Connect the side, which is closer to the grounding potential of measuring input, to IN Lo.

Make an independent wiring respectively for the input and power source line.

If the wiring of input and power source line are made in parallel, it may cause unstable reading.
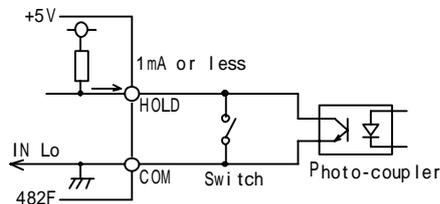
● **Common (COM)**

Common terminal for hold.

● **Hold (HOLD)**

The measured data are held by making a short-circuit between
HOLD and COM terminals.

    The input is not isolated, so make an insulation of it with
use of photo-coupler, switch, relay, etc.

    (When the input is used in floating, be sure to apply
this solution)

● **NC**

NC are the open terminals but do not use them as a relay terminal.

● **Ground (GND)**

In case of fear that the noise is frequently generated on the power source line, it is effective to earth the ground terminal directly to the ground. If the instrument is not affected by environmental noise, the grounding can be omitted. In this case, take care for the ground terminal not to touch other input terminals, as it is charged with neutral electric potential of power source voltage.

● **Power Supply (P1(-), P2(+))**

The power source voltage to be supplied to the instrument is specified on the terminal plate at the delivery from factory.

   100V AC .... Use the instrument within the range 90~132V AC.

   200V AC .... Use the instrument within the range 180~250V AC.

For the AC power source models, the voltage 90~132V AC or 180~250V AC can be selected by changing a soldering of jumper connection provided on the internal board. When the power source voltage is changed, do not forget to change an indication of voltage on the terminal plate accordingly.

Operating Voltage	Jumper Connections		
	1	2	3
AC90~132V	Short-circuited	Open	Short-circuited
AC180~264V	Open	Short-circuited	Open

   24V DC: Use the instrument with 24V DC± 10%.

Connect +24V to P2(+), and 0V to P1(-).
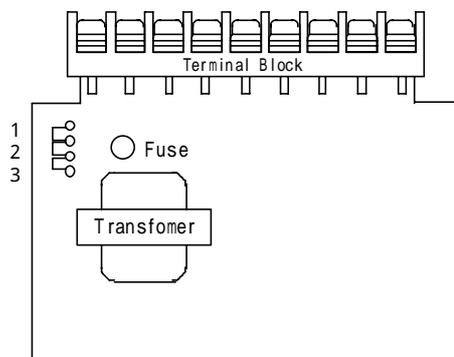
⚠ CAUTION

● **Do not use the product with the voltage out of the rated range as it may cause breakage
of the products.**

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3.3 Explanation of Middle Row Connector

● **Remote Control of Decimal Point (DP1~DP3, DPCOM)**

Decimal point can be displayed at an arbitrary position by setting the decimal point
setting switch inside the front panel to the remote control mode. Make a short-circuit
between the decimal point 10^1~10^3 (DP1~DP3) and DPCOM. (Active "L")

Do not make a duplicated setting of DP1~DP3.

    The DP pins are not isolated from the measuring input, so make an insulation
of it with use of photo-coupler, switch, etc.

    (When the input is used in floating, be sure to apply this solution. Also, in case that the plural numbers of the
instruments are used, make the insulation of DP pins individually for each instrument.)
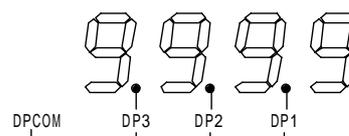
● **NC**

NC pins are open pins.

3.4 Explanation of Upper Row Connector

TTL Level Output

● **Rated Input & Output**

Signal Code		TYPE-BP	TYPE-BN	Rate
Output	$\times 10^0 \sim \times 10^3$	Positive logic	Negative logic	TTL level Fo=2 CMOS compatible
	OVER	"H" at over	"L" at over	
	SYNC	"L" pulse of 10ms		
Input	HOLD	Held by short-circuit ("L")		IIL -1mA "L"=0~0.8V, "H"=3.5~5V
	ENABLE	Allowed by open ("H"), Prohibited by short-circuit ("L")		

● **Measured Data Output ($10^0 \sim 10^3$)**
Parallel BCD (1-2-4-8) code, latch output.   The output is Tri-state type, so a connection to the data bus is easy.

● **Over-range Output (OVER)**
It is output at the pin 9 when the display is over-range.

● **Synchronization Signal Output (SYNC)**
"L" pulse of 10ms which is synchronized with the display cycle is output at the pin 7.   Read in the data at the rising point of this SYNC. In case of connection to the multiple data bus, the wired OR connection is possible.

● **Data Enable Input (OUTPUT ENABLE)**
When the pin 10 is opened, the data (including OVER) and SYNC are output.
When it is short-circuited with the DATA COM (pin 6), the data (including OVER) becomes "high impedance" state.
In this state, the output of SYNC is prohibited and the connection to data bus is easy.

● **Hold (HOLD)**
By short-circuiting the pints 8 and DATA COM (pin 6), the display value and data at the time of short-circuit are held.
When it is opened again, the measurement is recommenced.

● **Data Common (DATA COM)**
Pin 6 is common for the measured data, OVER, SYNC, HOLD, OUTPUT ENABLE.

● **NC**
They are open pins but do not use them as relay terminal.

   Data output and control signals are unified to the TTL level, so ensure not to apply the voltage DC5V or higher.
   Arrange the wiring of data output and control input/output signal lines apart from the power source line, relays or magnet switches, etc. of big capacity, as well as the input line.

Transistor Output

In case that the BCD output is connected to one PC, the wired OR connection of measured data (including OVER), SYNC is possible.

● **Rated Input & Output**

Signal Code		Item	TYPE-DP	TYPE-DN
Output	$\times 10^0 \sim \times 10^3$	Output type	Source type	Sink type
	OVER SYNC	Output	DC30V 30mA MAX, Saturated voltage 1.6V	
Input	HOLD ENABLE	Signal level	Input power source = 1mA or less OFF(H)=3.5V~5V, ON(L)=0~1.5V	

● **Measurement Data ($10^0 \sim 10^3$)**
Parallel BCD (1-2-4-8) code, latch output.
Transistor ON with the measured data "1".   Transistor OFF with the measured data "0".

● **Over-range Output (OVER)**
It is output at the pin 9 when the display is over-range.   Transistor ON with the over-range display.

● **Synchronization Signal Output (SYNC)**
"ON" pulse of 10ms which is synchronized with the display cycle is output at the pin 7.   Read in the data at the rising point (ON   OFF) of this SYNC.

● **Data Enable Input (OUTPUT ENABLE)**
When the pin 10 is opened, the data (including OVER) and SYNC are output.
When it is short-circuited with the DATA COM (pin 6) , the data (including OVER) becomes "OFF" state.
In this state, the output of SYNC is prohibited and the connection to data bus is easy.

● **Hold (HOLD)**
By short-circuiting the pints 8 and DATA COM (pin 6), the display value and data at the time of short-circuit are held.
When it is opened again, the measurement is recommenced.

● **Data Common (DATA COM)**
Pin 6 is common for the measured data, OVER, SYNC, HOLD, OUTPUT ENABLE.

● **NC**
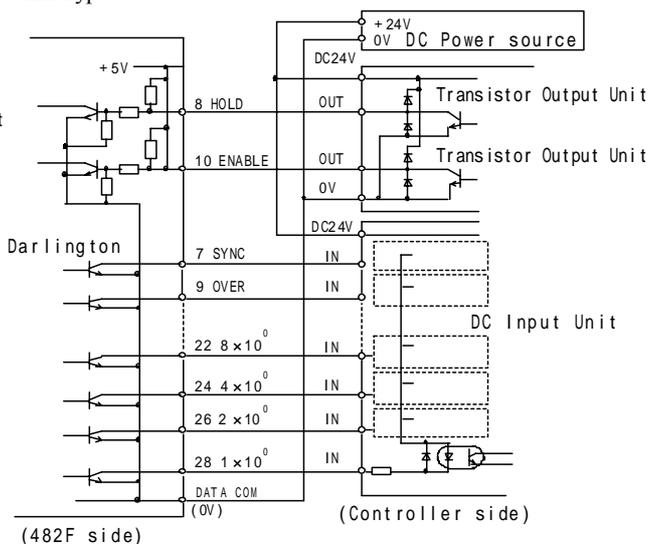They are open pins but do not use them as relay terminal.

   Arrange the wiring of data output and control input/output signal lines apart from the power source line, relays or magnet switches, etc. of big capacity, as well as the input line.

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3.5 Connection Examples

Source Type

(482F side)　(24V)　(Controller side)

Sink Type
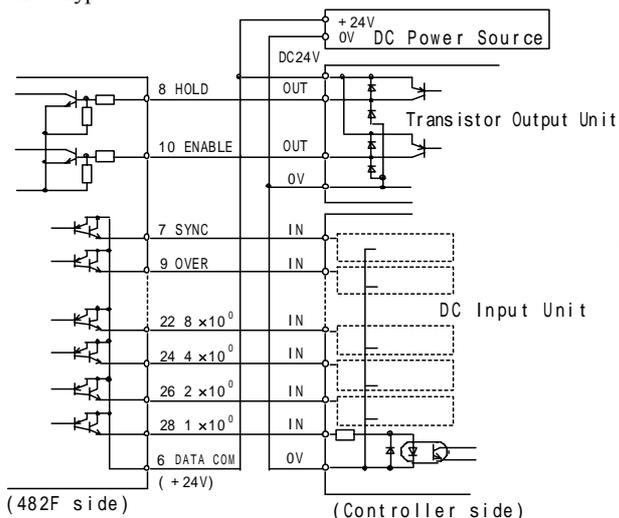
(482F side)　(0V)　(Controller side)
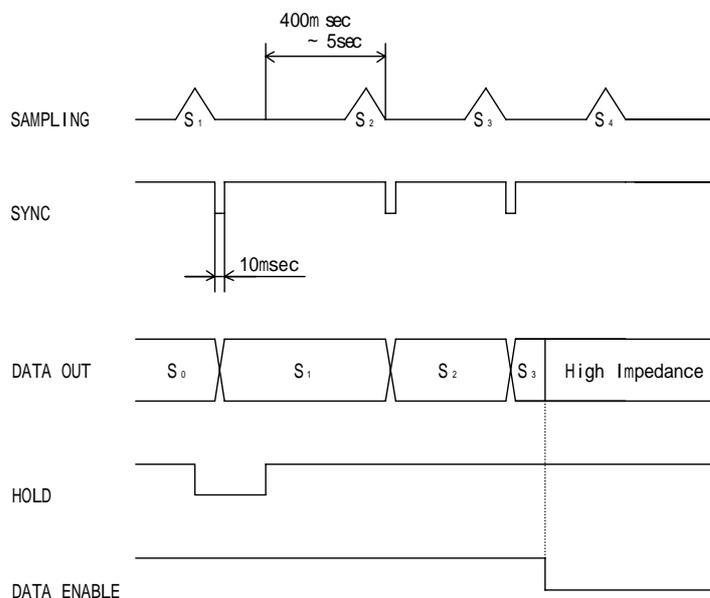
3.6 Timing Chart

● BCD Data and LATCH

4. Calibration

In order to maintain long term accuracy, periodical calibration at an interval of about one year is recommended.
Make a calibration of the instrument with the ZERO and MAX volumes inside the front mask. Also, make a calibration in the ambient condition of $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$, 75%RH or less.

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