Instruction Manual

Pulse Counter Model 460A

Please take care that this instruction manual is certainly delivered to the person in charge of operating it. For safety and proper use of this product, please observe the following caution and also read the instruction manuals to follow before the initial operation.

⚠ WARNING

To avoid an electrical shock, preserve followings.
● **Turn the power off when wiring.**
● **Ensure firm and tight connections to the terminals.**
● **Do not touch terminals when turning the power on.**
● **Locate away from the wet place.**

⚠ CAUTION

Do not install the product in the following conditions.
● **Where it is exposed to direct sunlight.**
● **Where ambient temperature or humidity is high.**
● **Where it is exposed to excessive noise or static electricity.**
● **Where there is constant vibration or shock.**

● **Check at Delivery**

・When the product is delivered to you, please check that its specifications conform to your requirement and that there is no damage in transit. This product is carefully inspected before delivery from factory under our strict quality control program, but if you find any defect or inconvenience, please inform us of the model name, serial number etc. of the product.

● **Cautions for Use**

・No power on-off switch is provided on the model 460A so it immediately starts to work when connected to the power source. The rated data of this instrument is, however, defined with the pre-heating for 15 minutes or more.

・When the product is installed in the cabinet, perform the appropriate heat radiation to keep less than $50\,^{\circ}C$ in it.

■Standard Specifications

●Model Name   460A -□-□-□-□
                        1   *2*   *3*   *4*

【1】**Input Signal**

Code	Specifications
1	ON-OFF pulse
2	Voltage pulse

【2】**Power Supply**

Code	Power Source Voltage
A	AC100～240V
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】**Display Color**

Code	Description
Blank	Red LED
G	Green LED

■General Specifications

|	
Display	: 0~999999 red or green LED (character height 15mm) with zero-suppress function.
	Decimal Point can be arbitrarily set (front setting or remote control).
	Over-range indication by blinking of LED at lower left of the display section.
Counter Input	: ON-OFF pulse: No voltage contact or open collector (NPN). Counts with ON.
	Contact capacity DC12V 10mA
	Voltage pulse: Counts at rising from "L" to "H".
	"L"=0~2V, "H"=4.5~30V Input resistance approximately 5kΩ.
Maximum counting speed	: 10Hz/5kHz (10cps/5kcps) by selection of input terminal.
Minimum pulse width	: 50ms at 10Hz(cps)
	0.1ms at 5kHz(kcps)
Pulse coefficient	: 1/2, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 0.001, 0.01, 0.02, 0.1, 0.2
Memory retention	: By non-volatile memory for approximately 10 years.
Sensor power	: DC12V±5% 100mA

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BCD data output	:	**TTL level, isolation output** (BP: positive logic, BN: negative logic)

                Data output   : Parallel BCD code, latch output, TTL level (CMOS compatible), Fo=2
                Control output : OVER (at over: logic1)
                Control input   : LATCH, RESET, Decimal Point (Active "L"), Data Enable (Active "H")

            Transistor, isolation output (DP: Source type, DN: Sink type)
                Output capacity : DC30V 30mA Max
                Data output   : Parallel BCD code, latch output,
                                      transistor "ON" with "1", transistor "OFF" with "0"
                Control output : OVER (at over: "ON")
                Control input   : LATCH, RESET, Decimal Point (Active "ON"), Data Enable (Active "OFF")

|		
Withstanding Voltage	:	Input terminals - Case AC1500V for 1 min.
		Power supply terminals - Case AC1500V for 1 min.
		Power supply terminals - Input terminals AC1500V for 1min.
		Input terminals - Data output terminals AC500V for 1min.
Insulation Resistance	:	DC500V 100MΩ or more
Power Source Voltage	:	AC100~240V 50/60Hz
		DC24V
Tolerance of Source Voltage	:	AC90~250V
		DC24V$\pm$10%
Operating Temperature	:	0~50°C
Power Consumption	:	AC100V…..approx. 9VA
		AC200V…..approx. 12VA
		DC24V…... approx. 200mA
Weight	:	Approx. 500g
Mounting Method	:	Fastening from rear of the panel by metal brackets.

■Unit Stickers (attached)

Labels of different units are attached to the instruments. Select and adhere the label of required unit:
m^3, Nm^3, l, kl, Nl , Nkl, W, kW, W·s, W·h, kW·h, J, kJ, MJ, GJ, T, t, kg, g, m, km, A·h, kA·h, MW·h, W·min.

■Dimensions

DATA OUTPUT TYPE

PANEL CUTOUT : $92^{+0.8}_{0} \times 45^{+0.6}_{0}$ Unit:mm
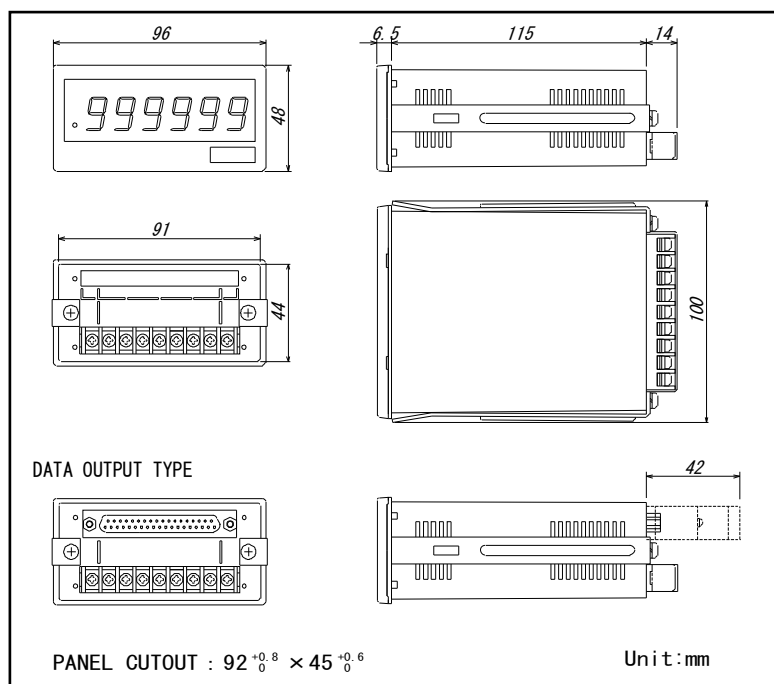
■Installation

Remove the metal brackets at both sides, insert the instrument from the front and fix it by the brackets.
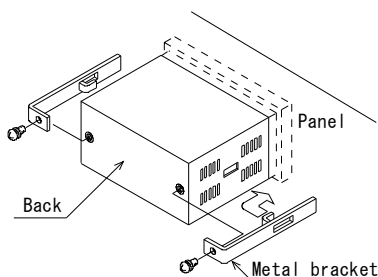
Panel cut-out dimension: $92^{+0.8}/_{0} \times 45^{+0.6}/_{0}$ mm
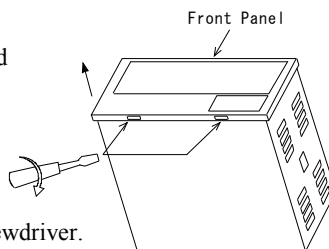Allowable panel thickness: 0.6~6mm
Note: Recommended thickness for the panel of aluminum is
           1.5mm or more to avoid deformation of the panel.
           Optimum torque of fixing screws: 0.25~0.39N·m

■Removal of Front Panel

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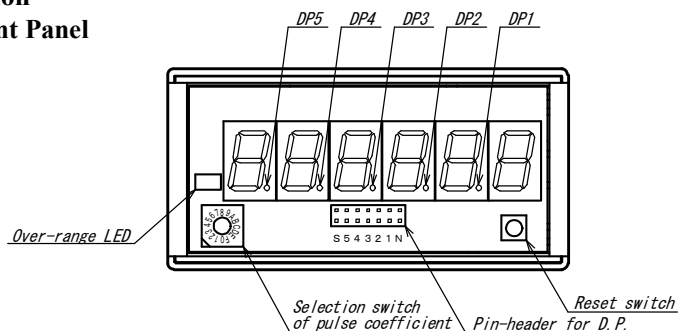of instrument and remove the front panel.

Front Panel

Wrench the panel open with (-) screwdriver.

■Solution for Black-out

The memory of the count data is retained by non-volatile memory.
During the black-out and power OFF, however, no count is made.
Data retention is for approximately 10 years.

■Setting of Each Function

● Internal Layout of Front Panel

DP5 DP4 DP3 DP2 DP1

Over-range LED

S 5 4 3 2 1 N

Selection switch
of pulse coefficient

Pin-header for D. P.

Reset switch

● Pulse Coefficient

The numbers of count per 1 pulse is adjustable in the range 0.001~10 counts by the dip switch inside the front mask.

No.	Pulse Coefficient	Numbers of Input Pulse	Numbers of count
0	0.5	2	1
1	1	1	1
2	2	1	2
3	3	1	3
4	4	1	4
5	5	1	5
6	6	1	6
7	7	1	7
8	8	1	8
9	9	1	9
A	10	1	10
B	0.001	1000	1
C	0.01	100	1
D	0.02	50	1
E	0.1	10	1
F	0.2	5	1

● Setting of Decimal Point

A decimal point at 10^1 digits ~ 10^5 digits can be lit up by changing the pin-header inside the front mask.

Position of pin header for decimal point	DP lit up position
N	No decimal point
1	DP1
2	DP2
3	DP3
4	DP4
5	DP5
S	When set from the data output connector.

● Over-range LED

In case that the counter exceeds 999999, the over-range LED at the display section is lit up.
The count is however continued.
The over-range LED is turned off with a reset input.

● Reset Switch

A press of the reset switch inside the front mask resets the count to 0.

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■Terminal Arrangement
● Lower Row Terminals

Note: ( )=DC power source models.

Terminal Code	INPUT1	INPUT2	+12V	COM	LATCH	RESET	GND(NC)	P2(+)	P1(-)
	1	2	3	4	5	6	7	8	9
Function	10Hz	5kHz	Sensor Power	Common	Latch	Reset	Ground	Power supply	
	Input								

Terminal screws: M3
Fastening torque: 0.46~0.62N・m

Crimp terminal: As shown on the right.

5.3min.　　4.4max.
φ3.2min.　6max.
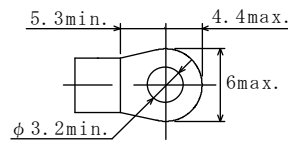
● Upper Row Connector

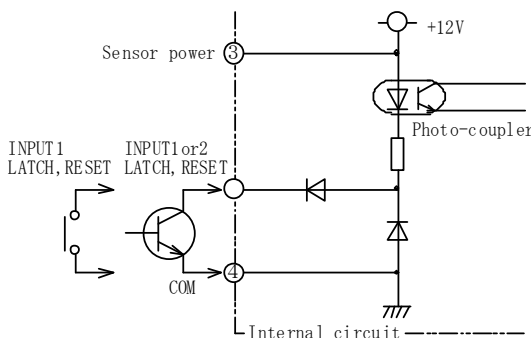| Function		Pin No.			Function
$\times 10^1$	1	1	20	1	$\times 10^0$
	2	2	21	2	
	4	3	22	4	
	8	4	23	8	
$\times 10^3$	1	5	24	1	$\times 10^2$
	2	6	25	2	
	4	7	26	4	
	8	8	27	8	
$\times 10^5$	1	9	28	1	$\times 10^4$
	2	10	29	2	
	4	11	30	4	
	8	12	31	8	
D1		13	32	1	$\times 10^6$
D2		14	33	2	
D4		15	34	4	
OUTPUT ENABLE		16	35	8	
LATCH		17	36	OVER	
RESET		18	37	DATA COM	
DATA COM		19			

Connector:〔Dsub37P〕XM3A-3721

## ■Explanation of Lower Row Terminals
● Counter Input (INPUT1, INPUT2)
In case that the counter is used with low speed counting, use the INPUT1, and with high speed counting the INPUT2.
When used with the contact, the counting should only be low speed, and when used with the high speed counting, use an open collector or else.

Case of ON-OFF pulse input　　　　　　　　　　Case of voltage pulse input
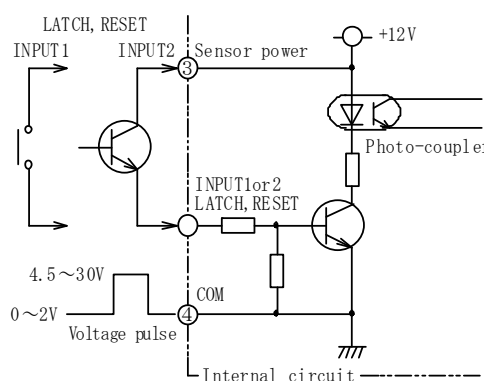
● Latch
When the latch signal is input, the display and the BCD output data are held.　While they are held, the counting itself is continued, so the updated current value of the count is displayed when the latch input is cancelled.

Input signal　　　: 　In case of ON-OFF pulse, make a short-circuit between the LATCH terminal and COM terminal.
　　　　　　　　　　 No-voltage contact or open collector (NPN).
　　　　　　　　　　 Latching by contact ON.　Contact capacity DC12V 10mA
　　　　　　　　In case of voltage pulse, apply a voltage input to the LATCH terminal and COM terminal.
　　　　　　　　　　 Latching by "H"
　　　　　　　　　　 "L"=0~2V, "H"=4.5~30V
　　　　　　　　　　 Input Resistance　Approximately 5kΩ
　　　　　　　　When the sensor power supply is used, make a short-circuit between the sensor power supply ③ and
　　　　　　　　LATCH terminal ⑤.

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● **Reset**

The input of the reset signal resets the count to 0 (zero).

    Input signal   :   In case of ON-OFF pulse, make a short-circuit between the RESET terminal and COM terminal.

                   No-voltage contact or open collector (NPN).

                   Reset by contact ON.   Contact capacity DC12V 10mA

            In case of voltage pulse, apply a voltage input to the RESET terminal and COM terminal.

                   Reset by "H"

                   "L"=0~2V, "H"=4.5~30V

                   Input Resistance   Approximately 5kΩ

                   Min. pulse width : 10ms or more

            When the sensor power supply is used, make a short-circuit between the sensor power supply ③ and RESET terminal ⑥.

● **Sensor power source (+12V)**

Make a connection with correct polarity and without short-circuit.   COM terminal is the 0V side.

   12V±5%100mA   Ripple 5% or less

● **Common (COM)**

Common of INPUT1, INPUT2, LATCH, RESET and +12V.

● **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 meter is not affected by environmental noise, the earthing can be omitted.   In this case, take care that the ground terminal does not touch other terminals, as it is charged with the neutral electric potential of power source voltage.

Note : There is the danger of electric shock if the ground terminal is not grounded.

● **Power supply (P1(-), P2(+))**

Power supply voltage is specified on the terminal plate at the time of delivery from factory.

○AC power source   Use the meter within the range AC90~250V.

○DC24V   Use the meter with DC24V±10%.

Connect +24V of DC power sour to P2(+) and 0V side to P1(-).

■**Maintenance**

Store the instrument within the specified storage temperature (-20~70°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.

■**Explanation of Upper Row Connector**

   TTL Level Output

● **Rated Input & Output**

Signal	Code	TYPE-BP	TYPE-BN	Rate
Output	$\times 10^0 \sim \times 10^6$	Positive logic	Negative logic	
	OVER	"H" at over	"L" at over	TTL level Fo=2
Input	LATCH	Held by short-circuit ("L")		"L"=0～0.8V, "H"=3.5～5V
	RESET	Counter is reset by short-circuit ("L")		$I_{IL} \leqq -1mA$
	D1, D2, D4	Decimal point are lit up by short-circuit ("L")		
	ENABLE	Allowed by open ("H"), prohibited by short-circuit ("L")		

● **Measured Data Output ($\times 10^0 \sim \times 10^6$)**

Parallel BCD (1-2-4-8) code, latch output.   The output is Tri-state type, so a connection to the data bus is easy.

The times of count-over of the 6 digits counter ($10^0 \sim 10^5$) is output by BCD code at the 10^6 digit.

● **Over-range Output (OVER)**

When the display is over-range, the output is made at the pin ㊱.

Note : It is retained until the reset.

● **Data Enable Input (OUTPUT ENABLE)**

When the pin ⑯ is opened, the data and OVER are output.

When it is short-circuited with the DATA COM (pin ⑲, ㊲), the data and OVER becomes "high impedance" state.

In this state, the output of SYNC is prohibited, so the connection to data bus is easy.

● **Decimal point input (D1, D2, D4)**

By setting the pin header for the decimal point located inside the front panel to S (setting from the data output connector), the decimal point can be lit up at the desired position by the external control.

For the D1, D2 and D4, the decimal point is input by coding.

D4	D2	D1	The position of a decimal point
"H"	"H"	"H"	999999
"H"	"H"	"L"	99999.9
"H"	"L"	"H"	9999.99
"H"	"L"	"L"	999.999
"L"	"H"	"H"	99.9999
"L"	"H"	"L"	9.99999

● **Remote latch input (LATCH)**

Same function as the LATCH input terminal on the terminal blocks.

By short-circuiting the pins ⑰ and DATA COM (pin ⑲, ㊲), the display and BCD data output are held.

● **Remote reset Input (RESET)**

Same function as the RESET input terminal on the terminal blocks and the reset switch inside the front panel.

A short-circuit between pins ⑱ and DATA COM (pin ⑲, ㊲) resets the count.

● **Data Common (DATA COM)**

Pin ⑲, ㊲ are common for the measured data output, OVER, D1, D2, D4, LATCH, RESET and OUTPUT ENABLE.

Note: 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

● **Rated Input & Output**

	Signal Code	Item	TYPE-DP	TYPE-DN
Output	$\times 10^0 \sim \times 10^6$	Output type	Source type	Sink type
	OVER	Output capacity	DC30V 30mA MAX, saturated voltage 1.6V or less	
Input	LATCH RESET D1, D2, D4 ENABLE	Signal level	Input power source = 1mA or less OFF (H)=3.5V~5V, ON(L)=0~1.5V	

● **Measurement Data Output ($\times 10^0 \sim \times 10^6$)**

Parallel BCD (1-2-4-8) code, latch output.

Transistor ON with the measured data "1".   Transistor OFF with the measured data "0".

The times of count-over of the 6 digits counter ($10^0 \sim 10^5$) is output by BCD code at the 10^6 digit.

● **Over-range Output (OVER)**

When the display is over-range, the output is made at the pin ㊱.

Transistor ON when the display is over-range.

Note : It is retained until the reset.

● **Data Enable Input (OUTPUT ENABLE)**

When the pin ⑯ is opened, the data and OVER are output.

When it is short-circuited with the DATA COM (pin ⑲, ㊲) , the data and OVER becomes "OFF" state.

In this state, the output of SYNC is prohibited, so the connection to data bus is easy.

● **Decimal point input (D1, D2, D4)**

By setting the pin header for the decimal point located inside the front panel to S (setting from the data output connector), the decimal point can be lit up at the desired position by the external control.

For the D1, D2 and D4, the decimal point is input by coding.

D4	D2	D1	The position of a decimal point
OFF	OFF	OFF	999999
OFF	OFF	ON	99999.9
OFF	ON	OFF	9999.99
OFF	ON	ON	999.999
ON	OFF	OFF	99.9999
ON	OFF	ON	9.99999

● **Remote latch input (LATCH)**

Same function as the LATCH input terminal on the terminal blocks.

By short-circuiting the pins ⑰ and DATA COM (pin ⑲, ㊲), the display and BCD data output are held.

● **Remote reset Input (RESET)**

Same function as the RESET input terminal on the terminal blocks and the reset switch inside the front panel.

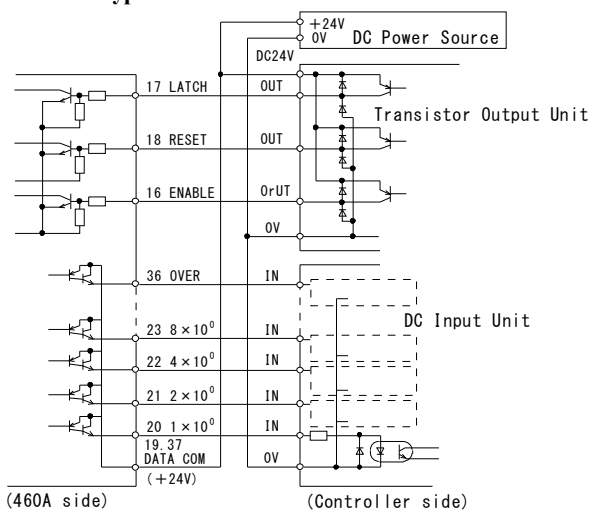A short-circuit between pins ⑱ and DATA COM (pin ⑲, ㊲) resets the count.

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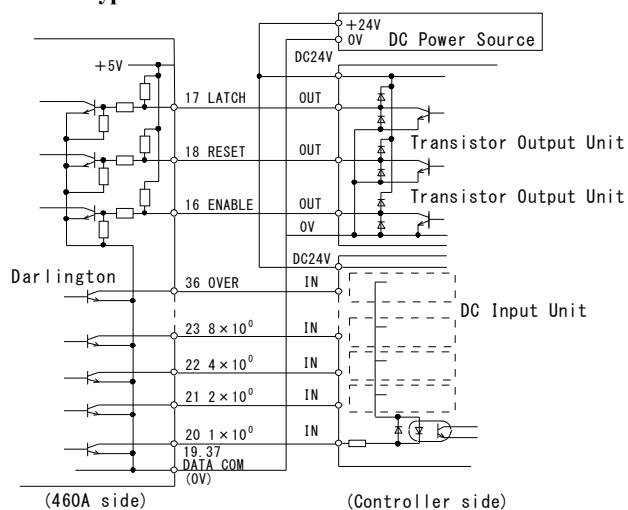
Note: Arrange the wiring of data output and control input/output signal lines apart from the power source line, relays or magnet switches, etc. of big capacity, as well as the input line.

■**Connections**

Source Type

Sink Type

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