

General Specification

EML500 series

GS 80B80M01E 7th

EML500
Electromagnetic Log

General

The EML500 series electromagnetic log conforms to the technical requirements for the performance standard determined by IMO Resolution A824(19) and MSC.96(72) also meet type approval issued by the Transport Ministry of JG

Certificate number of type approval

- JG : No. 3795
- MED

Features

- 1) Small size and light weight compared ordinary models.
- 2) The length of cable between the sensor and the master unit can be extended maximum 300m by adoption of the preamplifier built .
- 3) Full provision of various external interfaces
 - Pulse output (Photo coupler / contact)
 - Digital signal (NMEA0183)
 - Analog signal (0V to 5V DC / 0A to 20mA)
 - Alarm contact output and Digital I/F form GPS
- 4) Reduction in the number of parts by employment of highly integrated circuits including microprocessor, and has no moving parts, thereby achieving high reliability.
- 5) Provision of small size and light weight master indicator for indication of speed and distance, and can be operated by the master indicator. Milepost calibration etc., thereby, installation place of master indicator is not limited.
- 6) Variety of sensors available to meet various instillation requirements. A dual-axis sensor can measure not only the longitudinal, speed but also the transverse speed.
- 7) Built-in self-diagnostic function.
- 8) All indicators can be driven by input signal (NMEA0183) from GPS.

General specification

- Measurement subject : Ship's water speed and distance
- Measurement principle : Faraday's law of electromagnetic induction

Performance specification

- Measurement range
 - Speed : -4kt to +20kt (Note 1)
 - 5kt to +25kt (Note 1)
 - 7kt to +35kt
 - 8kt to +40kt
 - 10kt to +50kt (Note 2)
 - 13kt to +65kt (Note 2)
- (Note 1 MED is attended in case of Single-axis system (range of "-4kn to 20kn" or "-5kn to 25kn").
- (Note 2 Additional engineering is required concerning the installation of the sensor.
- Trance verse speed : 0kt to ±6.5kt (for Dual-axis)
- Distance : 0nm to 9999.99nm



Notified Body No.: 0434

- Single-axis sensor (right)
- Dual-axis sensor (right)
- LR524 Speed indicator : single axis (middle)
- LR523 Master indicator (left)
- LT501 Master unit (left)

Dictation of ship movement : 0 to 359 deg., clockwise from the bow-to-stern line (fixed to 0 deg. if the resultant speed is 0.5kt or less)

- Measuring accuracy

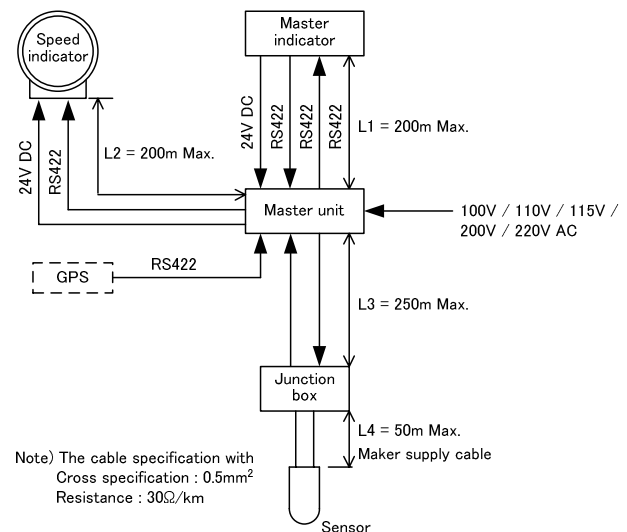
- Speed : - Measurement accuracy
1% of the speed of the ship, or 0.2 knots, whichever is greater.
- Indicate accuracy
±0.15kt with respect to standard signal input (±0.25kt or less if the measuring range is above 50kt)

Distance : ±0.05nm/h or ±1.0% max., whichever is larger
Direction of ship direction : ±2.5 deg. max.

- Response speed

Variable up to 2min for a 0 to FS-step input (0% to 90% response)

- Restriction of the cables between each equipments



Component models of EML500

EML500 is composed of Master unit, Master indicator and Sea-bottom (with sensor).
And if it is necessary, combined with speed indicator and environ equipments.

Basic system models

According to type of Sensor unit, basic system model is set.

Component Models : E M L 5 0 0 - □□□

→ Sensor unit code

System Type		EML500-□□□							備 考		
		HS1	HD1	HV1	RD1	FA1	HV2	FA2			
Master unit	LT501	○	○	○	○	○	○	○			
Master indicator	LR523	○	○	○	○	○	○	○			
Speed indicator (Single-axis)	LR524	○	○	○	○	○					
Speed indicator (Dual-axis)	LR525						○	○			
Dimmer box	LD001A	○	○	○	○	○	○	○			
Junction box	LN052	○	○	○	○	○	○	○			
Sensor unit	Sensor	LS531	○							Φ35sensor with cable	
		LS501		○		○				Only sensor element Φ35	
		LS571			○						Φ70 sensor (Single-axis)
		LS541					○				Φ48 sensor (Single-axis)
		LS542							○		Φ48 sensor (Dual-axis)
		LS572						○			Φ70 sensor (Dual-axis)
	Rodmeter	LS592				○					Not including the sensor
		LS591		○							Not including the sensor
	Sensor cable	LS503		○	○	○	○	○	○		
	Seawater valve	LV033	○	○							For sensors Φ35
		LV071A			○			○			For sensors Φ70
		LV052					○		○		For sensors Φ48
		LV031				○					For sensors Φ35
	Seawater valve flange	LV904		○		○					
	Protection tube	LV905		○							
		LV903				○					
		LV902				△					
	Mounting plate for seawater valve	LV902A-1□	△								
		LV902A-2□		△							
		LV902A-3□		△							
		LV902A-4□			△			△			
		LV902A-5□			△			△			
		LV910					△				
Zinc plate	LV901-1□		△		△						
	LV901-2□	△									
	LV901-3□			△ (Note)			△ (Note)			Note: For Flash-mounted unit (Unnecessary for a protruding unit)	
Sensor installation	Installation type	Single-bottom	Double-bottom	Single-bottom	Double-bottom	Single-bottom	Single-bottom	Single-bottom			
	Standard length of protrusion	50mm	50mm	7mm or 57mm	50mm	13mm or 73mm	7mm or 57mm	13mm or 73mm		Length from bottom plate	

Note : Items marked with a " △ " are ordered from the shipbuilder as standard.

Engineering specification

- Power

100V to 115V AC or
200V to 230V AC $\pm 10\%$ 50/60Hz $\pm 6\%$
(Selectable by the jumper setting in the power supply unit)

- Power consumption

80VA

- Input signal

- Input the detected voltage at sensor
0.242mA/knot (from sensor)
- Input from GPS (for back-up by GPS)
Data format of GPS input can be set by Master indicator.
Connection units : GPS, Other speed sensor
Transmission format: Asynchronous serial data signal
Transmission rate : 4800bps
Data character : Start bit 1 bit
Data bit 8 bit
Stop bit 1 bit
Parity None

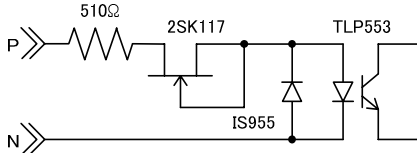
Data format
Recommend format : based on IEC61162-1, VTG, VBW, VHW and etc...
Header character : 6 ASCII letter
(Example : \$GPVTG and etc...)

Position of speed data:

Set data based on the location of commas.

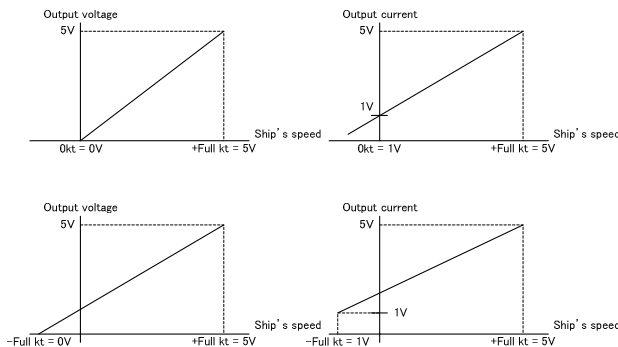
Check sum : Select Use or Unused

Input circuit : Photo coupler

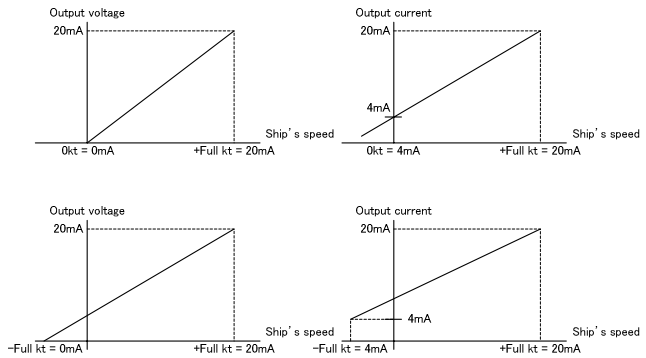


- Output signal

- Analog speed signal : Voltage output (2 circuit)
Output level : Select able from 0V to 5V or 1V to 5V



- Analog speed signal : Current output (4 circuit)
Output level : select able from 0mA to 20mA or 4mA to 20mA



- Distance pulse output : Photo coupler type (8 circuit)

Capacity : Voltage between terminals 24V max
Shink current 5mA max.
Dark current 50 μ A max.
(at 24V between terminals)
Pulse weight 200P/nm

- Distance pulse output : Relay contact type (2 circuit)

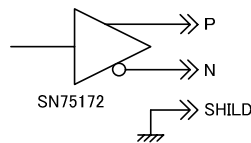
Capacity : Rate loads 30V DC, 1A
(resistance load) 30V AC, 0.5A
Minimum appciate load 10mV DC, 10 μ A
Chattering 1msec max.
Pulse weight 200P/nm

- Serial signal output

Serial signal : based on NMEA0183 (Ver.2.0)
Transmission format : Asynchronous serial data signal
Transmission rate : 4800bps
Transmission period : 1sec
Transmission length : 1.2km
Data character : Start bit 1 bit
Data bit 8 bit
Stop bit 1 bit
Parity None

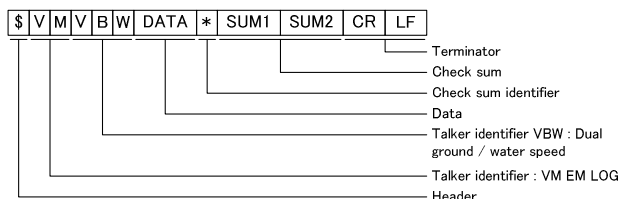
Connected Device : RADAR, ECDIS and etc..

Output circuit : EIA RS-422-A



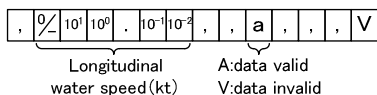
- Data format (based on NMEA0183 Ver.2.0)

VBW sentence

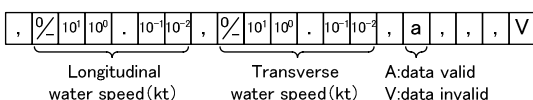


Data block format

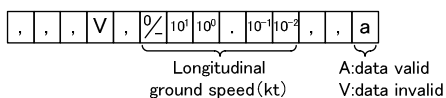
1) for single-axis



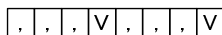
2) for dual-axis



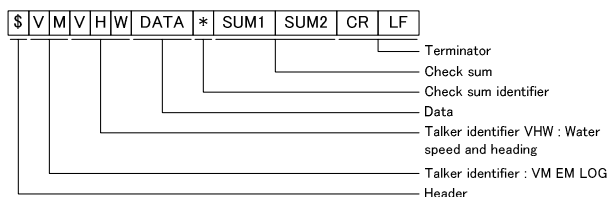
3) When the GPS speed is selected



4) When the system error is detected

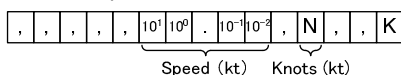


VHW sentence

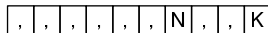


Data block format

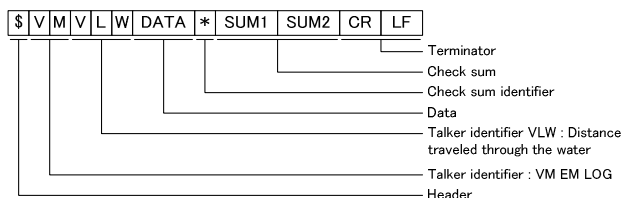
1) at normal operation



2) When the system error is detected

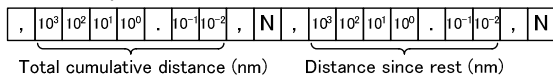


VLW sentence



Data block format

1) at normal operation



2) When the system error is detected



- Checksum

Checksum is the 8-bit exclusive-OR (no start or stop bits) of all characters in the sentence, including “,” delimiters, but not including the “\$” and the “*” delimiters.

- Speed limit output (2 circuits)

Contact : At state of speed limit “Close” (standard)

At state of speed limit “Open”

(Selectable by Dip.SW 9-2(off: close, on: open))

Capacity : Rate loads 30V DC, 1A
(resistance load) 30V AC, 0.5A

Minimum applicable load 10mV DC, 10μA

Chattering 1msec max.

Setting : The higher or lower speed limit can be set by Master indicator.

- Alarm contact output (2 circuits)

Contact : At abnormal “Close” (standard)

At abnormal “Open”

(Selectable by Dip.SW 9-3(off: close, on: open))

Capacity : Rate loads 30V DC, 1A
(resistance load) 30V AC, 0.5A

Minimum applicable load 10mV DC, 10μA

Chattering 1msec max.

Failure alarm - ROM/RAM error

- Low battery (less than 2.1V)

- A/D converter error

- GPS input error

- Communication error between Master unit and Master indicator.

Comportment equipment specification

- Master unit LT501

Receives and converts speed data signals from the sensor. Then transmits the speed and distance to external devices in various signal forms.

- Wiring position : Coaming of under or back

- Installation : Wall or flush mounted type

- Master indicator LR523

Receives digital signals from the master unit, and displays the speed and distance. Both the display and operation panel are on the front of the master indicator. Set data are sent to the master unit in the form of digital signals, and placed in the memory.

- Display function

The speed and distance are displayed with digital by LED indicator.

1) Indicate of the Speed and Distance

Speed : (-)□□. □kt

Distance : □□□□. □nm

2) Indicate of the trip distance

Trip distance : □□□□. □nm

3) Indication of the longitudinal transverse speed

(for dual-axis)

longitudinal speed : (-)□□. □kt

Transverse speed : S/P□. □kt

4) Indicating of the resultant speed and detection

(for dual-axis)

Resultant speed : (-)□□. □kt

Direction : □□□deg (relative direction)

5) Indication of GPS speed data

It is indicated ship's speed, total distance traveled and trip distance by speed data from GPS.

6) Indication of alarm

The error messages detected by self diagnostic function are indicated.

- In the first stage adjustment, manual key-in and maintenance

Possible to set manual speed, zero adjustment, milepost measurement, and also to confirm of various data.

- Dimmer LED : LED lamps are added and subtracted by   buttons.

- Input signal : Digital signal(NMEA0183)
Input voltage 24V DC

- Wiring position : Coaming of under or back

- Installation : Desk-top, Wall mount or Flash mount

- Construction : Water resist type

- Junction box LN052

The junction box is used for connection between sensor and master unit. And it is connected by maker supply cable and ship-builder supply cable.

- Installation : Wall mount

- Wiring position : Ground with water resist

- Speed indicator LR524(Single-axis) / LR525 (Dual-axis)

This is a large analog indicator with an outside diameter of 180mm.

The indicative variation are speed, longitudinal / transverse speed (for dual-axis) and resultant speed /direction. And the scale boards are prepared 18 kinds include each measurement range.

- Power supply : 24V DC 0.3A (7.5W)

- Capacity : 4 circuits max.

However, the forth is necessary to have the power supply of 24V DC from external.

- Input signal : Digital signal

- Illumination : EL board or LED illumination

- Dimmer : Built-in or external

- Wiring position : Back part

- Installation : Flash mount or Wall mount

- Construction : Type of water resist

- Dimmer box LD001A

For LR524 / LR525

- Power supply : 100V to 115V or 200V to 230V AC

- Wiring position : Corning

- Installation : Flash mount or Wall mount

- Digital display LR221

Selected and displayed the speed and distance by pressing "Select" button.

- Power : 100V to 230V AC

- Input signal : RS422

- Display form

Speed : (-)□□. □kt

Distance : □□□□. □□nm

- Display : Liquid crystal (LCD) 7 segment

- Illumination : Facet illumination LED

- Dimmer : Push button (Not install external)

- Installation : Flash mount or Desk top type

- Wiring position : Grand with water resist (bracket type) or terminal (flush mount type)

Sea-bottom (Sensor)

- HS1 type : Using the Φ35 sensor, and installed at single or double bottom of ship. Standard length of protraction is 50mm.

- Sensor : Outside diameter : Φ35, length : 400mm with cable (7m/15m)

- Seawater valve : 40A JIS5K Gate valve

- HD1 type : Using theΦ35 sensor, and installed with penetration double bottom. Seawater valve is installed on inner sea-bottom. Standard length of protraction is 50mm.

- Sensor : Outside diameter : Φ35 with rodmeter (connected by connector)

- Seawater valve : 40A JIS5K Gate valve

- Protection tube/seawater valve :

Water resist that the sensor and rodmeter go through double bottom.

- FA1/FA2 type : Using theΦ48 sensor, and installed at single bottom of ship. Standard length of protraction is 13mm or 73mm. FA2 is for dual-axis.

- Sensor : Outside diameter : Φ48, length 345mm

- Seawater valve : 50A JIS5K ball valve

- HV1/HV2 type : Using theΦ70 sensor, and installed at single bottom of ship. Standard length of protraction is 7mm or 50mm. HV2 is for dual-axis.

- Sensor : Outside diameter : Φ70, length 510mm

- Seawater valve : 75A JIS5K ball valve

- RD1 type : With air cylinder unit for remote operation protraction length of the sensor. Using theΦ35 sensor, and installed with penetration double bottom. Seawater valve is installed on inner sea-bottom.

- Sensor : Outside diameter : Φ35 with rodmeter (connected by connector)

- Seawater valve : 40A JIS5K Gate valve

- Protection tube/seawater valve :

Water resist that the sensor and rodmeter go through double bottom.

Type No. and Suffix code

Master unit LT501-X1 ... X7/Option

Type No.	Suffix code	Note
LT501	.....	For EML500
Style	-F	Flush mount
	-W	Wall mount
	-Y	Wall mount (with coaming plate)
System	1	Single-axis
	2	Dual-axis (Note 1)
Ship's power	1	100V AC 50/60Hz 1Φ
	2	110V AC 50/60Hz 1Φ
	3	115V AC 50/60Hz 1Φ
	4	200V AC 50/60Hz 1Φ
	5	220V AC 50/60Hz 1Φ
Measurement range	1	- 4kn to 20kn
	2	- 5kn to 25kn
	3	- 7kn to 35kn
	4	- 8kn to 40kn
	5	- 10kn to 50kn (Note 2)
	6	- 13kn to 65kn (Note 2)
Rule / Name plate	1	None / Japanese & English
	2	JG / Japanese & English
	3	JG / Japanese
	4	None / English
	5	MED / Japanese & English (Note 3)
	6	MED / English (Note 3)
Color	1	YDK Standard (CC24 brown)
	2	Munsell 2.5G7/2
	3	Munsell 7.5BG7/2
Name plate	-1	HS1
	-2	HD1
	-3	HV1
	-4	HV2
	-5	FA1
	-6	FA2
	-7	RD1
Option	/AN1	Analog output (Connect LR522)
	/AN5	Analog output
	/ANF1	Analog output
	/ANF5	Analog output (0V to 5V DC output)
	/CHS	Name plate in Chinese
/GPS	External speed signal input (Note 4)	

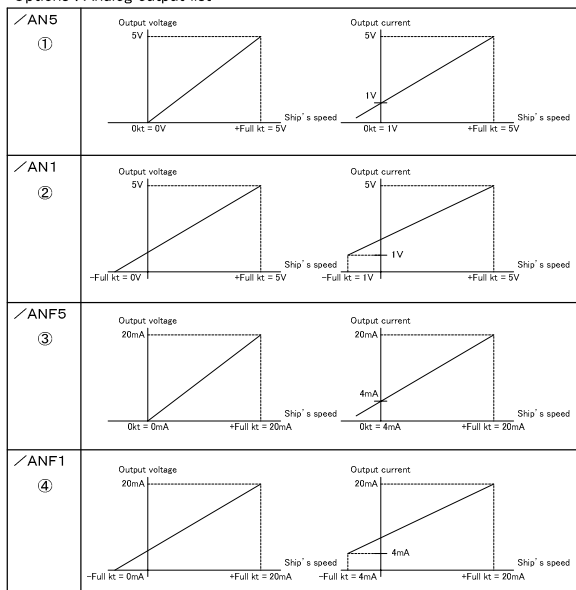
(Note 1) In case of dual-axis, transverse speed may not be able to the mounting position of sensor.

(Note 2) About 50/60kt correspondence, additional engineering is required concerning the installation of the sensor.

(Note 3) MED is attended in case of System X2 = 1 (Single-axis) and X4 = 1 (-4kn to 20kn) or X4 = 2 (-5kn to 25kn)

(Note 4) Please append external speed signal (NMEA0183) format with order sheet.

Options : Analog output list



Master indicator LR523-X1 ... X5/Option

Type No.	Suffix code	Note	
LR523	.....	For EML500
Style	-D	Flush mount	
	-F	Flush mount (with bezel)	
	-W	Desk top type or Wall mount	
System	1	Single-axis	
	2	Dual-axis	
Rule / Name plate	1	None / Japanese & English	
	2	JG / Japanese & English	
	3	JG / Japanese	
	4	None / English	
	5	MED / Japanese & English (Note 1)	
	6	MED / English (Note 1)	
Color	X4	-1	YDK Standard (CC24 brown)
Name plate	-1	HS1	
	-2	HD1	
	-3	HV1	
	-4	HV2	
	-5	FA1	
	-6	FA2	
	-7	RD1	
Option	/CHS	Name plate in Chinese	

(Note 1) MED is attended in case of System X2 = 1 (Single-axis).

Speed indicator (Dual axis) LR525-X1 ... X9/Option

Type No.	Suffix code	Note
LR525	.....	For EML500 (Dual-axis)
Style	-F	Flush mount
	-W	Desk top type or Wall mount
Measurement range	1	- 4kn to 20kn (Note 1)
	2	- 5kn to 25kn
	3	- 7kn to 35kn
	4	- 8kn to 40kn
	5	- 10kn to 50kn
	6	- 13kn to 65kn
Scale plate	1	Longitudinal / Transverse speed
	2	Resultant speed / Direction
Illumination	-A	LED Orange color
	-B	LED Green color
	-G	EL board Green color
	-N	Illumination not use
	-R	EL board Orange color
Dimmer / Power supply	1	External/100V to 115V AC 50/60Hz 1Φ
	2	(Note 2) Built-in /100V to 115V AC 50/60Hz 1Φ
	3	External/200V to 230V AC 50/60Hz 1Φ
	4	(Note 2) Built-in /200V to 230V AC 50/60Hz 1Φ
	5	External/LED illumination
	6	Built-in /LED illumination
N	Illumination not use	
Wiring position	1	Corning φ 25
	2	Grand (Note 3)
Rule / Name plate	1	None / Japanese & English
	2	JG / Japanese & English
	3	JG / Japanese
	4	None / English
Color	1	YDK Standard (CC24 brown)
	2	Munsell 2.5G7/2
	3	Munsell 7.5BG7/2
Name plate	-1	HV2
	-2	FA2
Option	/CHS	Name plate in Chinese

(Note 1) Case of Resultant speed /Direction are not indicate (-) data. Indicate 0 to XX kt.

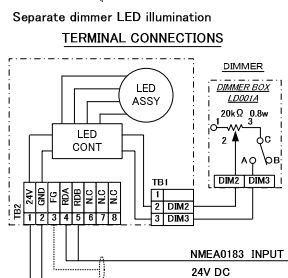
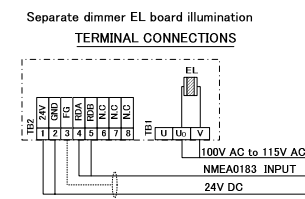
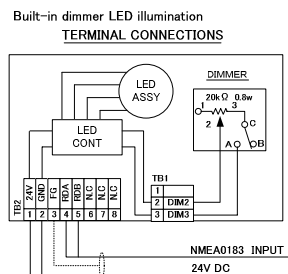
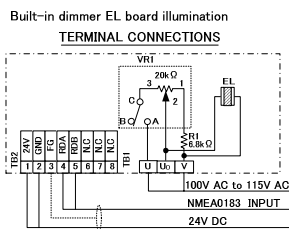
(Note 2) X5 = 2 and X5 = 4 are use for LR525 built-in dimmer unit only.

(Note 3) X6 = 2 Grand is use for Wall mount only. (15b, 20c each 1 use)

Speed indicator (Single-axis) LR524-X1 ... X8/Option

Type No.	Suffix code	Note
LR524	.....	For EML500 (Single axis)
Style	-F	Flush mount
X1	-W	Desk top type or Wall mount
Wiring position	1	Corning ϕ 25
X2	2	Grand (Note 1)
Measurement range	1	- 4kn to 20kn
	2	- 5kn to 25kn
	3	- 7kn to 35kn
	4	- 8kn to 40kn
	5	- 10kn to 50kn
X3	6	- 13kn to 65kn
Illumination	-A	LED Orange color
	-B	LED Green color
	-G	EL board Green color
	-N	Illumination not use
X4	-R	EL board Orange color
Dimmer / Power supply	1	External/100V to 115V AC 50/60Hz 1 Φ
	2 (Note 2)	Built-in /100V to 115V AC 50/60Hz 1 Φ
	3	External/200V to 230V AC 50/60Hz 1 Φ
	4 (Note 2)	Built-in /200V to 230V AC 50/60Hz 1 Φ
	5	External/LED illumination
	6	Built-in /LED illumination
X5	N	Illumination not use
Rule / Name plate	1	None / Japanese & English
	2	JG / Japanese & English
	3	JG / Japanese
	4	None / English
	5	MED / Japanese & English (Note 3)
X6	6	MED / English (Note 3)
Color	1	YDK Standard (CG24 brown)
	2	Munsell 2.5G7/2
X7	3	Munsell 7.5BG7/2
Name plate	-3	HS1
	-4	HD1
	-5	HV1
	-6	HV2
	-7	FA1
	-8	FA2
	-9	RD1
X8		
Option	/CHS	Name plate in Chinese

(Note 1) X2 = 2 Grand is use for Wall mount only. (15b, 20c each 1 use)
 (Note 2) X5 = 2 and X5 = 4 are use for LR524 built-in dimmer unit only.
 (Note 3) MED is attended in case of X3 = 1 (-4kn to 20kn) or X3 = 2 (-5kn to 25kn)



Junction box LN052-X1 ... X5/Option

Type No.	Suffix code	Note
LN052	.....	For EML500/50
Style	X1 -W	Wall mount
Rule / Name plate	1	None / Japanese & English
	2	JG / Japanese & English
	3	JG / Japanese
	4	None / English
	5	MED / Japanese & English (Note 3)
X2	6	MED / English (Note 3)
Color	1	YDK Standard (CG24 brown)
	2	Munsell 2.5G7/2
X3	3	Munsell 7.5BG7/2
Grand size	1	20c
	2	25a
	3	25b
X4	4	25c
Name plate	-3	HS1
	-4	HD1
	-5	HV1
	-6	HV2
	-7	FA1
	-8	FA2
	-9	RD1
X5		
Option	/CHS	Name plate in Chinese

Dimmer box LD001A-X1 ... X5/Option

Type No.	Suffix code	Note
LD001A	.....	For EML500/50
スタイル	X1 -F	Flush mount
	-W	Wall mount
Rule / Name plate	1	None / Japanese & English
	2	JG / Japanese & English
	3	JG / Japanese
	5	None / English
	6	MED / Japanese & English (Note 3)
X2	7	MED / English (Note 3)
Color	1	Munsell 2.5G7/2
X3	2	Munsell 7.5BG7/2
Power supply	1	100V AC to 115V AC
	2	200V AC to 220V AC
X4	3	For LED illumination
Name plate	-1	HS1
	-2	HD1
	-3	HV1
	-4	HV2
	-5	FA1
	-6	FA2
	-7	RD1
X5		
Option	/CHS	Name plate in Chinese

Dimmer switch LD002-X1 ... X4

Type No.	Suffix code	Note
LD001A	.....	For EML500/50
Style	X1 -A	Inner parts only
Power supply	1	200V
	2	100V
X2	3	For LED illumination
Name plate	1	Japanese
X3	2	English
Usable equipment	X4 1	LR524 / LR525

Digital display LR221-X1 ... X5/Option

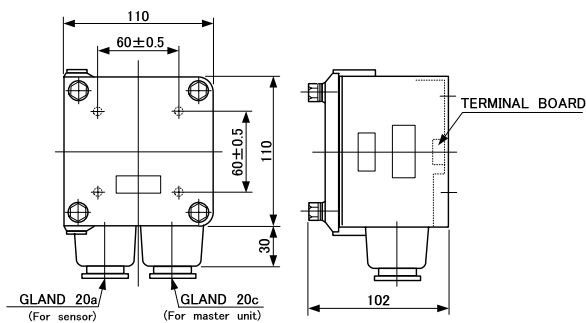
Type No.	Suffix code	Note
LR221	.....	For EML500
Style X1	-D	Desk top type
	-F	Flash mount
Power supply X4	1	100V AC to 115V AC
	2	200V AC to 230V AC
Rule / Name plate	-1	None / Japanese & English
	X2 -2	JG / Japanese & English
System X3	2	For EML500
Name plate	-1	HS1
	-2	HD1
	-3	HV1
	-4	HV2
	-5	FA1
	-6	FA2
	-7	RD1
X5		
Option	/CHS	Name plate in Chinese

- Input signal : RS422
- indicate items : Speed and Distance indicate
- indicate digit : Speed XX.X kn (-X.X kn)
DistanceXXXX.XX nm
- Color : PanelPale green (Mansell 2.8GY6.4/0.9)
BlacketDark green (Mansell 2.0GY3.1/0.5)
- Wiring position: Flash mountTerminal M4
Desk top typeResinous grand

Outline

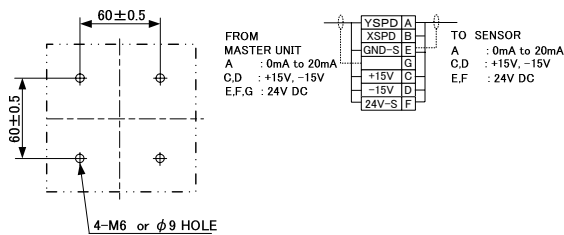
LN052 Junction box

MODEL	LN052
MASS	0.8 kg



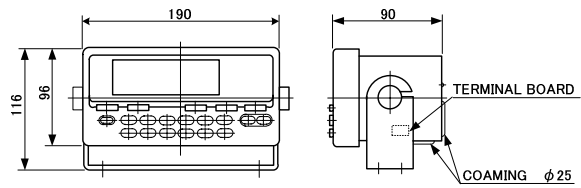
MOUNTING DIMENSION

TERMINAL CONNECTIONS



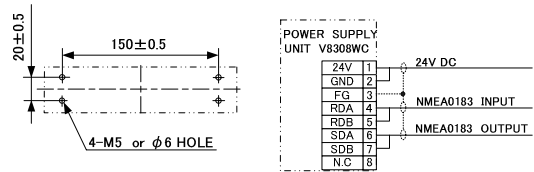
LR523-W Master indicator (Wall mount)

MODEL	LR523-W
MASS	1.2 kg



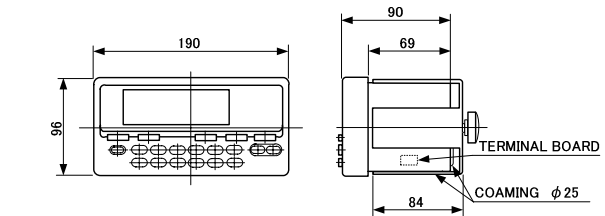
MOUNTING DIMENSION

TERMINAL CONNECTIONS



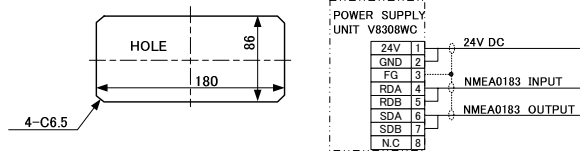
LR523-D Master indicator (Flash mount)

MODEL	LR523-D
MASS	1.3 kg



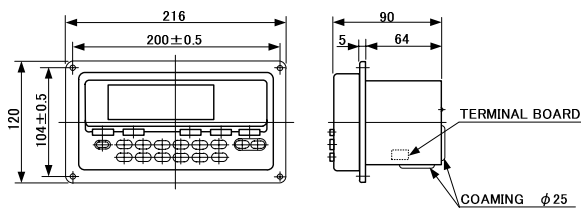
PANEL CUT

TERMINAL CONNECTIONS



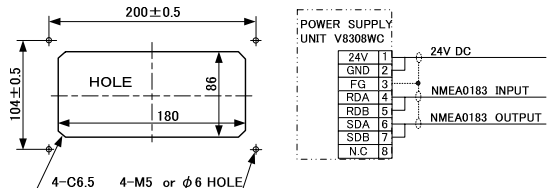
LR523-F Master indicator (Flash mount)

MODEL	LR523-F
MASS	1.1 kg



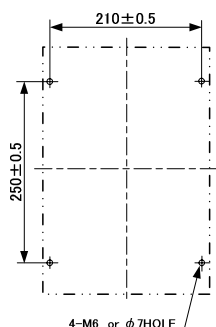
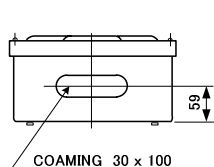
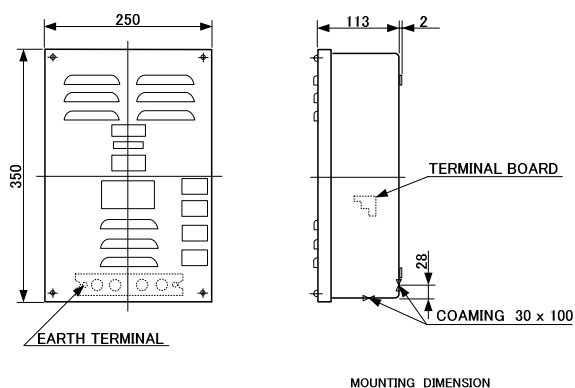
PANEL CUT

TERMINAL CONNECTIONS



LT501-W Master unit (Wall mount)

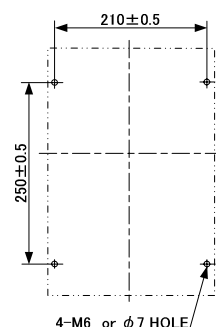
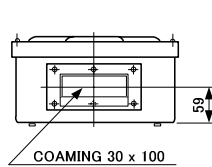
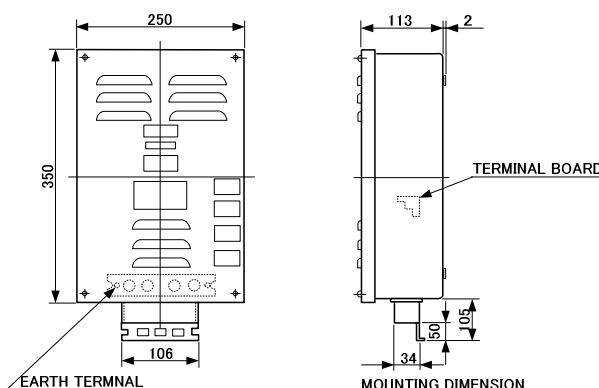
MODEL	LT501-W
MASS	4.9 kg



LT501-Y Master unit

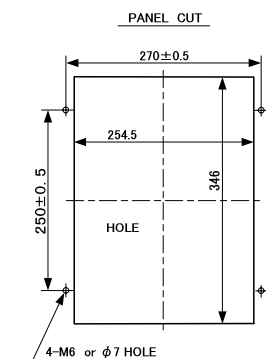
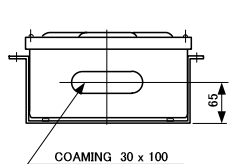
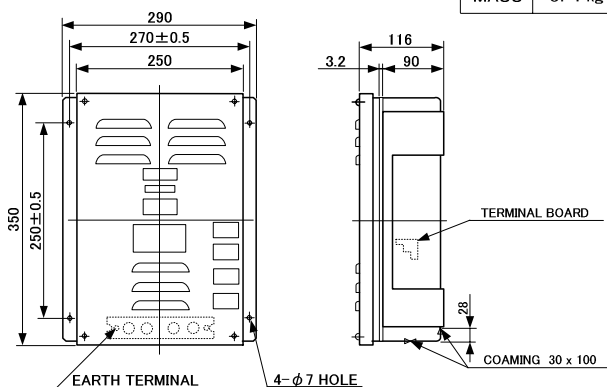
(Wall mount : with coming plate)

MODEL	LT501-Y
MASS	5.1 kg



LT501-F Master unit (Flash mount)

MODEL	LT501-F
MASS	6.4 kg



Terminal drawing

TB1		
1	CL+A	①
2	CL-A	
3	PX1	Ⓞ
4	PX2	Ⓞ
5	PX3	Ⓞ
6	PX4	Ⓞ
7	SD2A1	④
8	SD2B1	
9	SD1A1	Ⓐ
10	SD1B1	
11	CL+B1	
12	CL-B1	⑤
13	PX9	Ⓞ
14	PX6	Ⓞ
15	PX7	Ⓞ
16	PX8	Ⓞ
17	RD2A	⑧
18	RD2B	
19	RD1A	Ⓑ
20	RD1B	
21	UI	Ⓧ
22	V1	
23	200p+1	⑨
24	200p-1	
25	200p+2	⑩
26	200p-2	
27	SD2A2	⑪
28	SD2B2	
29	SD1A2	
30	SD1B2	Ⓛ

TB2		
1	24V-A	Ⓐ
2	GND-A	
3	SHLD3	Ⓞ
4	+15V	Ⓒ
5	-15V	
6	24V-D	Ⓑ
7	GND-D	
8	SHLD4	Ⓞ
9	YSPD	Ⓒ
10	XSPD	
11	AC-100V	Ⓧ
12	AC-100V	Ⓧ
13	24V-S	Ⓒ
14	GND-S	
15	SHLD5	Ⓞ

TB3		
1	CL-B2	Ⓛ
2	CL-B2	
3	PX9	Ⓞ
4	PX10	Ⓞ
5	PX11	Ⓞ
6	PX12	Ⓞ
7	LMT+1	⑬
8	LMT-1	
9	LMT+2	⑭
10	LMT-2	
11	CL-B3	Ⓛ
12	CL-B3	
13	PX13	Ⓞ
14	PX14	Ⓞ
15	PX15	Ⓞ
16	PX16	Ⓞ
17	RUN+	
18	RUN-	
19		
20		
21	VOL+1	⑰
22	VOL-1	
23	SHLD1	Ⓞ
24	VOL+2	⑱
25	VOL-2	
26	SHLD2	Ⓞ
27	ALM+1	⑲
28	ALM-1	
29	ALM+2	⑳
30	ALM-2	

- ①⑤⑬⑱: ANALOG SPEED OUTPUT
0mA to 20mA or 4mA to 20mA
- ②③⑥⑦④⑩⑬⑲⑳: PHOTO COUPLER OUTPUT
200Pulse/n mile
- ④⑪: DIGITAL SPEED OUTPUT
NMEA0183
- ⑧: GPS BACK-UP INPUT
- ⑨⑩: CONTACT OUTPUT
200Pulse/n mile
- ⑫: SHIP'S POWER SUPPLY

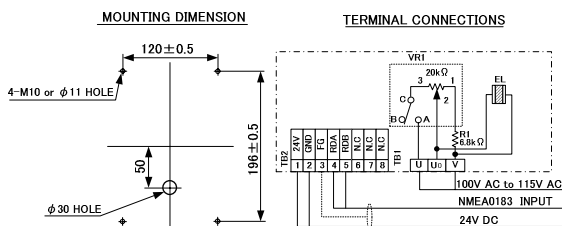
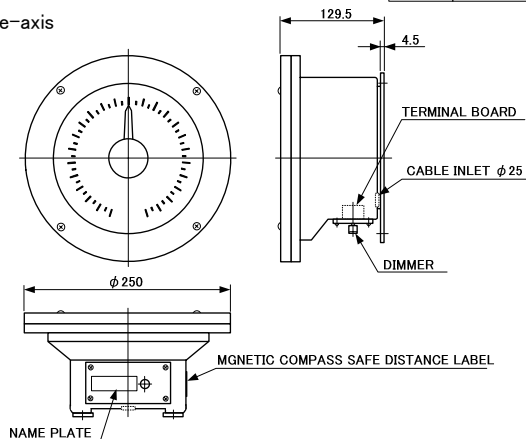
- ⑯⑰: ALARM CONTACT OUTPUT FOR SPEED LIMIT
- ⑳㉑: ANALOG SPEED OUTPUT
0V DC to 5V DC or 1V DC to 5V DC/FULL RANGE
- ㉒㉓: ALARM CONTACT OUTPUT FOR SYSTEM FAIL
- Ⓐ: SPEED INDICATOR OUTPUT
- Ⓑ: MASTER INDICATOR OUTPUT
- Ⓒ: JUNCTION BOX INPUT/OUTPUT
- Ⓧ: AC POWER FOR OUTPUT

LR524-W Analog indicator (Wall mount)

(Power supply 100V to 115VAC)

Single-axis

MODEL	LR524-W
MASS	4.1kg

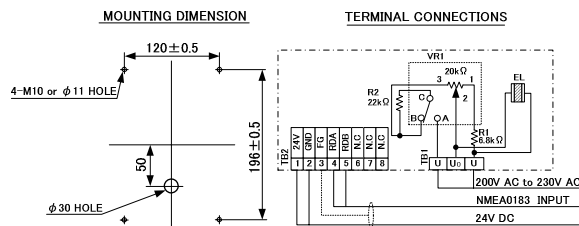
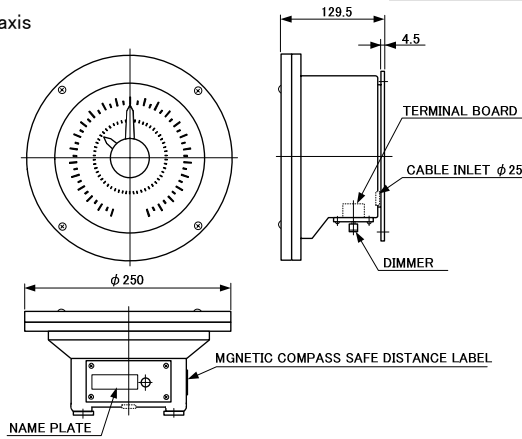


LR525-W Analog indicator (Wall mount)

(Power supply 200V to 230VAC)

Dual-axis

MODEL	LR525-W
MASS	4.1kg

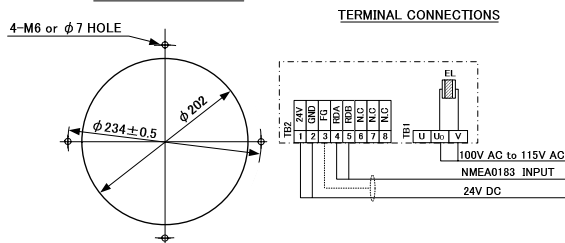
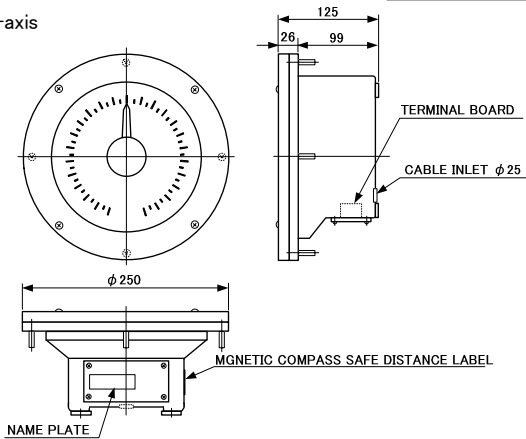


LR524-F Analog indicator (Flash mount)

(Power supply 100V to 115VAC)

Single-axis

MODEL	LR524-F
MASS	3.8kg

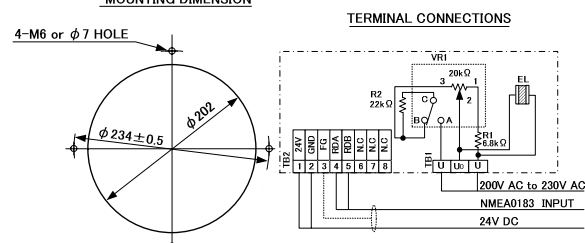
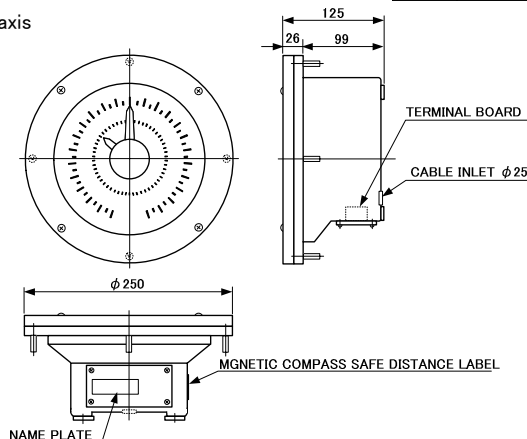


LR525-F Analog indicator (Flash mount)

(Power supply 200V to 230VAC)

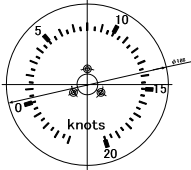
Dual-axis

MODEL	LR525-F
MASS	3.8kg

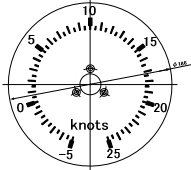


Scale plate list

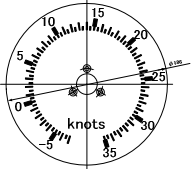
- Single : -4kt to 20kt



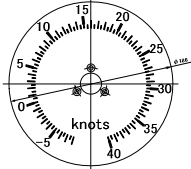
- Single : -5kt to 25kt



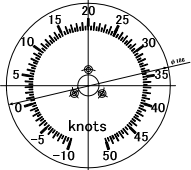
- Single : -7kt to 35kt



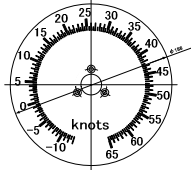
-Single : -8kt to 40kt



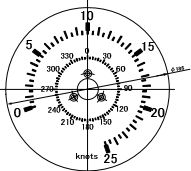
- Single : -10kt to 50kt



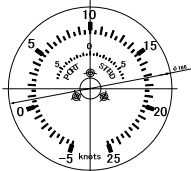
-Single : -13kt to 65kt



- Dual :
resultant speed /direction



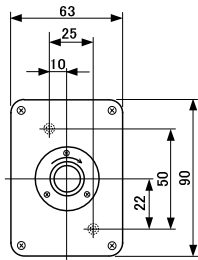
- Dual :
longitudinal / transverse speed



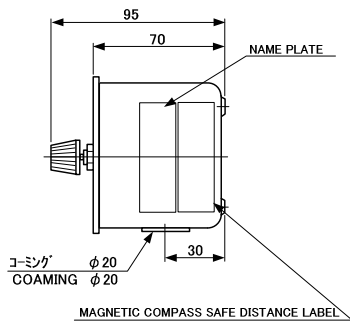
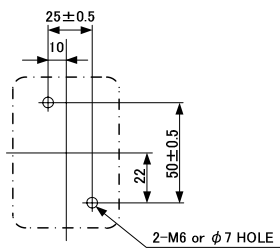
LD001A-W Dimmer box (Wall mount type)

(Connection diagram is for EL board)

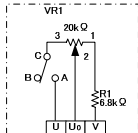
MODEL	LD001A-W
MASS	0.5 kg



MOUNTING DIMENSION



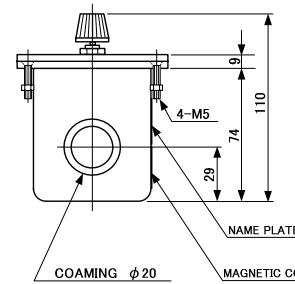
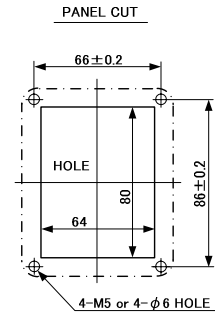
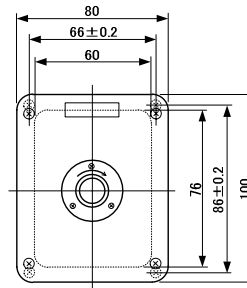
CONNECTION DIAGRAM



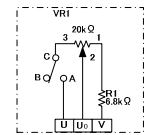
LD001A-F Dimmer box (Flash mount type)

(Connection diagram is for EL board)

MODEL	LD001A-F
MASS	0.5 kg



CONNECTION DIAGRAM

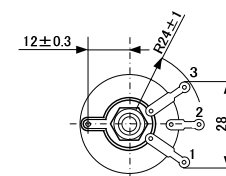


LD002 Dimmer switch

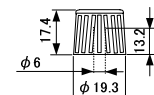
(Connection diagram is for LED illumination)

MODEL	LD002
MASS	0.1 kg

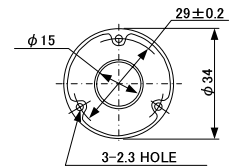
- VARIABLE RESISTOR 20k Ω 0.8w



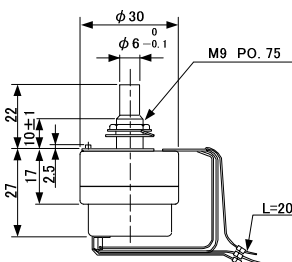
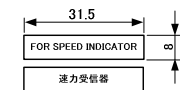
2. KNOB



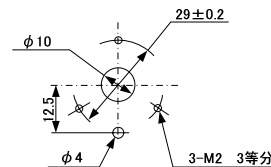
3. NAME PLATE



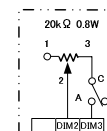
4. NAME PLATE



PANEL CUT

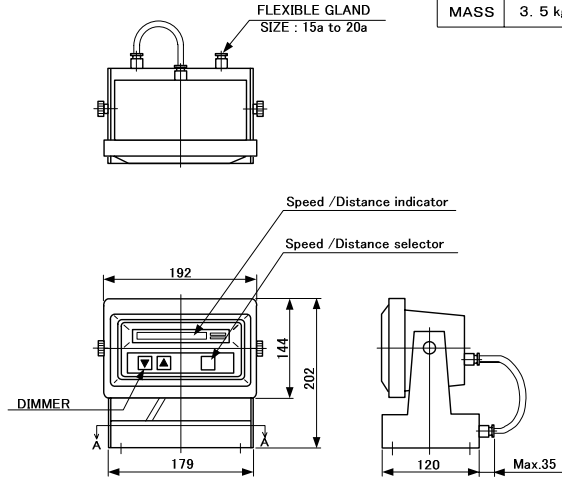


CONNECTION DIAGRAM

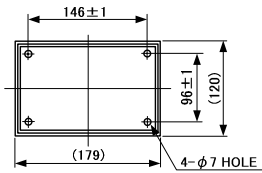


LR221-D Digital display (Desk-top type)

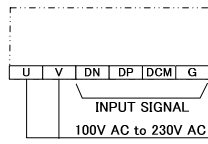
MODEL	LR221-D
MASS	3.5 kg



SECTION A - A

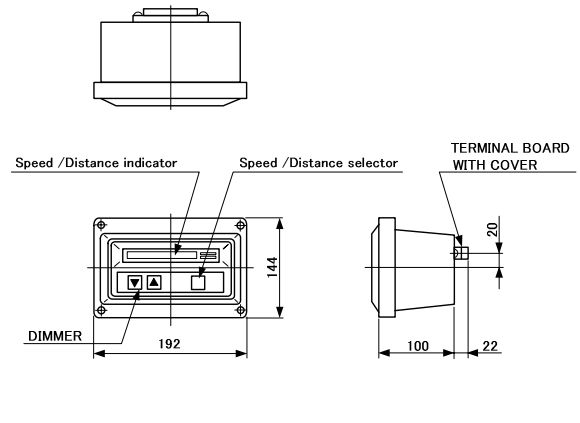


TERMINAL CONNECTIONS

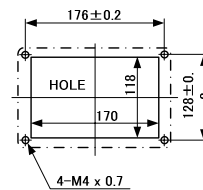


LR221-D Digital display (Flash-mount type)

MODEL	LR221-F
MASS	2.0 kg



PANEL CUT



TERMINAL CONNECTIONS

