Chapter 2 Product Specification

2.1 General Specification

The General Specification of Smart I/O series is as follows.

<table>
<tr><th>No</th><th>Items</th><th colspan="7">Specification</th><th>References</th></tr>
<tr><td>1</td><td>Use temperature</td><td colspan="7">0 ~ 55 °C</td><td></td></tr>
<tr><td>2</td><td>Storage Temp.</td><td colspan="7">–25 ~ +70 °C</td><td></td></tr>
<tr><td>3</td><td>Use humidity</td><td colspan="7">5 ~ 95%RH, no dew</td><td></td></tr>
<tr><td>4</td><td>Storage humidity</td><td colspan="7">5 ~ 95%RH, no dew</td><td></td></tr>
<tr><td rowspan="8">5</td><td rowspan="8">Vibration-resistant</td><td colspan="5">In case of Intermittent vibration</td><td colspan="2">-</td><td></td></tr>
<tr><td colspan="2">Frequency</td><td colspan="2">Acceleration</td><td>Amplitude</td><td colspan="2">Times</td><td rowspan="7">IEC6 1131-2</td></tr>
<tr><td colspan="2">10 ≤ f < 57Hz</td><td colspan="2">–</td><td>0.075mm</td><td colspan="2" rowspan="5">X, Y, Z
10 times
each direction</td></tr>
<tr><td colspan="2">57 ≤ f ≤ 150Hz</td><td colspan="2">9.8m/s^2{1G}</td><td>–</td></tr>
<tr><td colspan="5">In case of Continuous vibration</td></tr>
<tr><td colspan="2">Frequency</td><td colspan="2">Acceleration</td><td>Amplitude</td></tr>
<tr><td colspan="2">10 ≤ f < 57Hz</td><td colspan="2">–</td><td>0.035mm</td></tr>
<tr><td colspan="2">57 ≤ f ≤ 150Hz</td><td colspan="2">4.9m/s^2{0.5G}</td><td>–</td></tr>
<tr><td>6</td><td>Impact-proof</td><td colspan="7">• max. impact acceleration : 147 m/s^2{15G}
• Application time : 11ms
• pulse wave type : semi-sine wave pulse (3 times each direction X, Y, Z)</td><td>IEC 61131-2</td></tr>
<tr><td rowspan="5">7</td><td rowspan="5">Noise-resistant</td><td>Square wave impulse noise</td><td colspan="6">AC : ± 1,500 V, DC : ±900 V</td><td>LG 산전내부 시험규격기준</td></tr>
<tr><td>Electrostatic discharge</td><td colspan="6">Voltage : 4kV (Touch discharge)</td><td>IEC 61131-2, IEC 801-2</td></tr>
<tr><td>Radiant electromagnetic field noise</td><td colspan="6">27 ~ 500 MHz, 10 V/m</td><td>IEC 61131-2, IEC 801-3</td></tr>
<tr><td rowspan="2">Fast Transient / Bust Noise</td><td>Classification</td><td>Power module</td><td colspan="2">Digital I/O (more than 24V)</td><td colspan="2">Digital I/O (below 24V)
Analog I/O
Communication Interface</td><td rowspan="2">IEC 61131-2
IEC 801-4</td></tr>
<tr><td>Voltage</td><td>2kV</td><td colspan="2">1kV</td><td colspan="2">0.25kV</td></tr>
<tr><td>8</td><td>Surrounding environment</td><td colspan="7">No corrosive gas, no dust</td><td></td></tr>
<tr><td>9</td><td>Use altitude</td><td colspan="7">Less than 2,000m</td><td></td></tr>
<tr><td>10</td><td>Pollution</td><td colspan="7">Less than 2</td><td></td></tr>
<tr><td>11</td><td>Cooling method</td><td colspan="7">Natural air-conditioning</td><td></td></tr>
</table>

Remark

1) IEC(International Electrotechnical Commission)
: International civil community that promotes international cooperation for standardization of electric/ electro technology, publishes international standard and operates suitability assessment system related to the abov.

2) Pollution Degree
: An index that indicates the pollution degree of used environment that determines the insulation performance of the device. For example, pollution degree 2 means the state to occur the pollution of non-electric conductivity generally, but the state to occur temporary electric conduction according to the formation of dew.

2.2 Power Specification

Here describes the Power Specification of Smart I/O.

2.2.1 Performance Specification

Here describes Power Performance Specification of Smart I/O Profibus-DP(Pnet) module.

Items	Specification					
	GPL-TR2A	GPL-TR4A	GPL-RY2A	GPL-DT4A	GPL-D22A	GPL-D24A
Input power	DC +24V (Max +28V, Min +19V)					
Input current	0.4A(+24VDC)					
Dash current	Less than 40A : (24VDC input)					
Rated output current (+5V)	0.2~0.6A					
Rated output current (+5V, Aux)	0.02~0.1A					
Efficiency	More than 60% (in case of Full Load)					
Power indication	When power input, LED ON					
Output voltage dwell time	Within 150ms (DC19~24V input, Full Load)					
Suitable wire spec	1.5 ~ 2.5mm^2 (AWG16 ~ 22)					
Suitable tightening torque	12kg · cm					

Here describes Power Performance Specification of Smart I/O DeviceNet, Rnet, Modbus module.

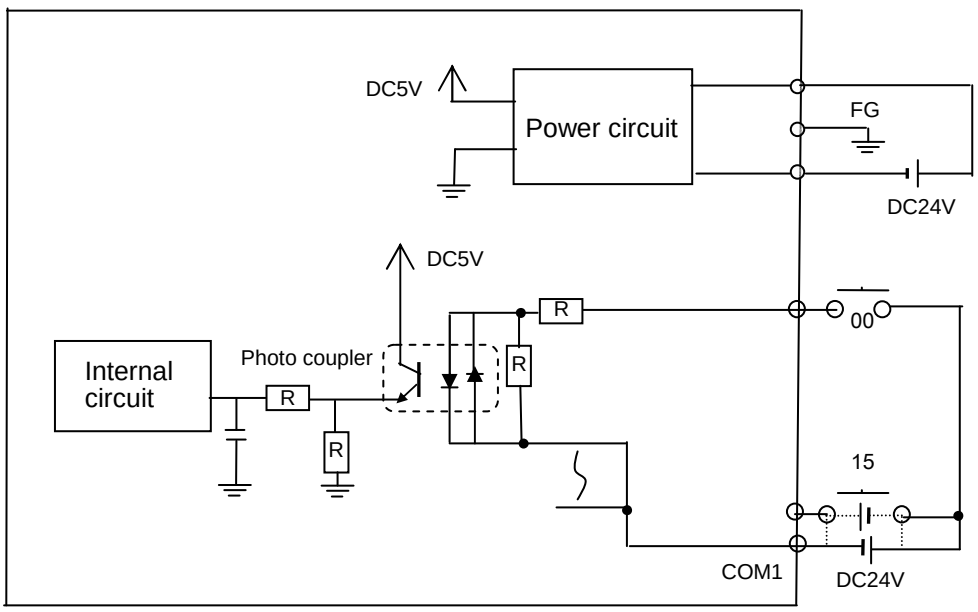
Items	Specification					
	GD/R/SL-TR2A	GD/R/SL-TR4A	GD/R/SL-RY2A	GD/R/SL-DT4A	GD/R/SL-D22A	GD/R/SL-D24A
Input power	DC +24V (Max +28V, Min +19V)					
Input current	0.4A(+24VDC)					
Dash current	Less than 40A : (24VDC input)					
Rated output current (+5V)	0.2~0.6A					
Efficiency	More than 60% (in case of Full Load)					
Power indication	When power input, LED ON					
Output voltage dwell time	Within 150ms (DC19~24V input, Full Load)					
Suitable wire spec	1.5 ~ 2.5mm^2 (AWG16 ~ 22)					
Suitable tightening torque	12kg · cm					

2.3 Digital Input Module Specification

2.3.1 DC16 point Input Module : GPL/GDL/GRL/GSL-D22A

Spec. \ Type name		DC input module
Input point		16 points
Insulation method		Photo coupler insulation
Rated input voltage		DC24V
Rated input current		7 mA
Use voltage range		DC20.4 ~ 28.8V (ripple rate : within 5%)
Max. simultaneous input point		100% (16 points/1COM) simultaneously ON
ON voltage / ON current		More than DC19V / more than 3.5 mA
OFF voltage / OFF current		Less than DC6V / less than 1.5 mA
Input resistance		Approx. 3.3 kΩ
Response time	Off → On	Less than 3 ms
	On → Off	Less than 3 ms
Common method		16 points / COM
Internal consumption current		Less than 200mA
Action indication		LED ON when input ON
External connection method		Terminal unit connector (M3 X 6 screws)
weight		Less than 160g

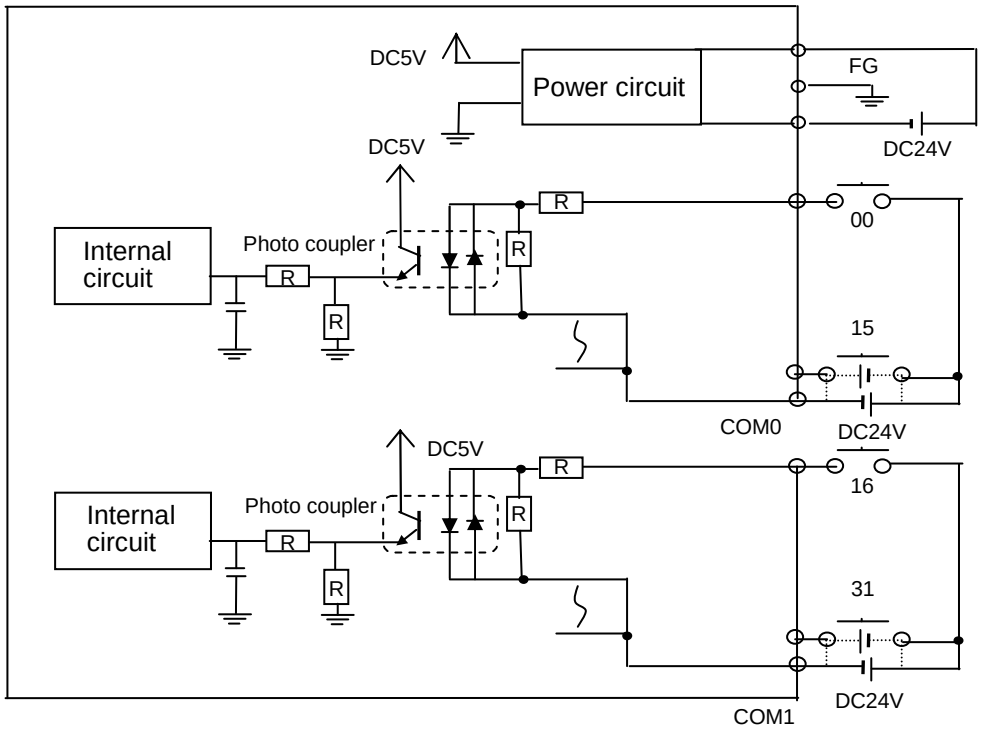
Circuit Configuration



2.3.2 DC32 point Input Module : GPL/GDL/GRL/GSL-D24A

Type name / Spec.		DC Input Module
Input point		32 points
Insulation method		Photo coupler insulation
Rated input voltage		DC24V
Rated input voltage		7 mA
Use voltage range		DC20.4 ~ 28.8V (ripple rate : within 5%)
Max. simultaneous input point		100% (16 points/1COM) simultaneously ON
ON voltage / ON current		More than DC19V / more than 3.5 mA
OFF voltage / OFF current		Less than DC6V / less than 1.5 mA
Input resistance		Approx. 3.3 kΩ
Response time	Off -> On	Less than 3 ms
	On - > Off	Less than 3 ms
Common method		16 points / COM
Internal consumption current		Less than 300 mA
Action indication		LED ON when input ON
External connection method		Terminal unit connector (M3 X 6 screws)
Weight		Less than 240g

Circuit Configuration

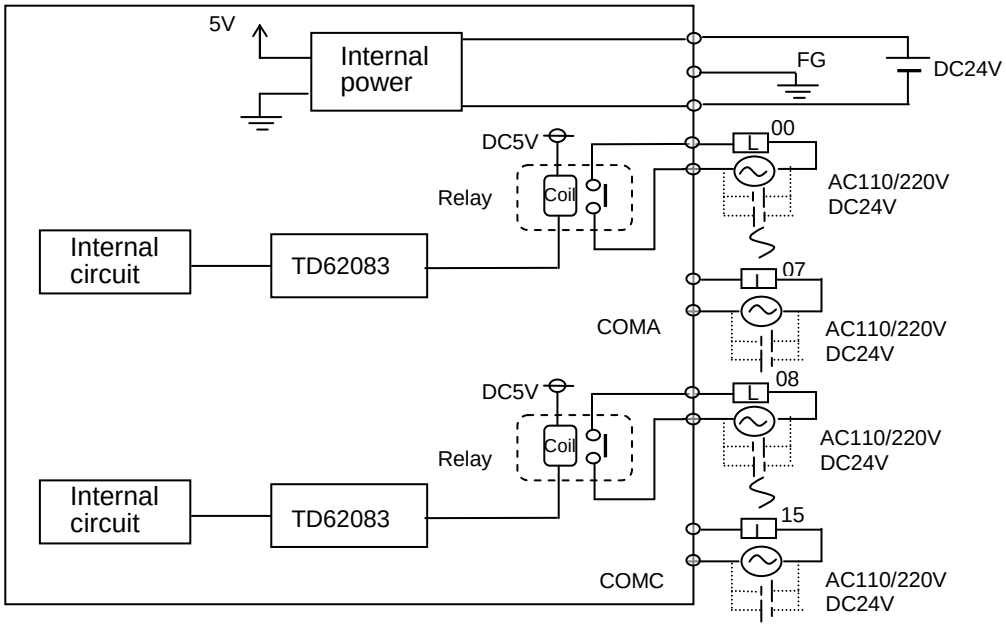


2.4 Digital Output Module Specification

2.4.1 16 point Relay Output Module : GPL/GDL/GRL/GSL-RY2A

Spec. \ Type name		Relay Output Module
Output point		16 points
Insulation method		Relay insulation
Rated load voltage/current		DC24V 2A(resistance load) / 1point, AC220V 2A(COSΨ = 1)
Min.(max.) load voltage/current		DC5V / 1mA, AC250V, DC110V
Max. open/close frequency		1,200 times / hr
Surge killer		None
Life	Mechanical	More than 20,000,000 times
	Electrical	Rated load voltage/current more than 100,000 times
		AC200V / 1.5A, AC240V / 1A (COSΨ = 0.7) more than 100,000
		AC200V / 1A, AC240V / 0.5A (COSΨ = 0.35) more than 100,000
		DC24V / 1A, DC100V / 0.1A (L / R = 7ms) more than 100,000
Response time	Off → On	Less than 10 ms
	On → Off	Less than 12 ms
Common method		8 points / COM
Internal consumption current		Less than 550 mA (when all points ON)
Action indication		LED ON when output ON
External connection method		Terminal unit connector (M3 X 6 screws)
Weight		Less than 300g

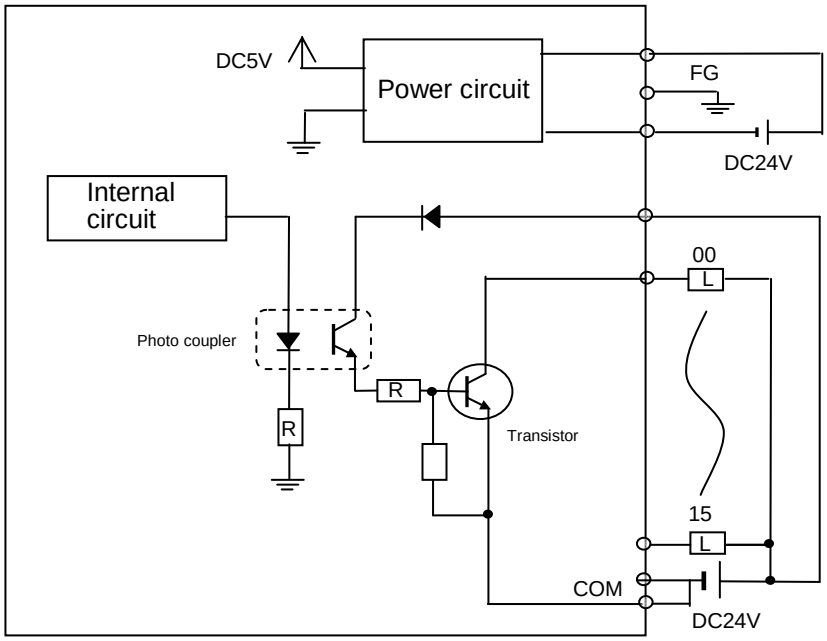
Circuit Configuration



2.4.2 16 point Transistor Output Module : GPL/GDL/GRL/GSL-TR2A

Spec. \ Type name		Transistor Output Module
Output point		16 points
Insulation method		Photo coupler insulation
Rated load voltage		DC 24V
Use load voltage range		DC 20.4 ~ 26.4V
Max. load current		0.1A / 1point, 2A / 1COM
Leakage current when OFF		Less than 0.1mA
Max. inrush current		Less than 4A / 10 ms
Max. voltage falling when ON		DC 1.5V
Surge killer		Clamp diode
Response time	Off → On	Less than 2 ms
	On → Off	Less than 2 ms
Common method		16 points / 1COM
Internal consumption current		Less than 280 mA (when all points ON)
External power Supply	Voltage	DC24V ± 10% (ripple voltage : less than 4 Vp-p)
	current	Less than 50 mA (DC24V per 1COM)
Action indication		LED ON when output ON
External connection method		Terminal unit connector (M3 X 6 screws)
Weight		Less than 160g

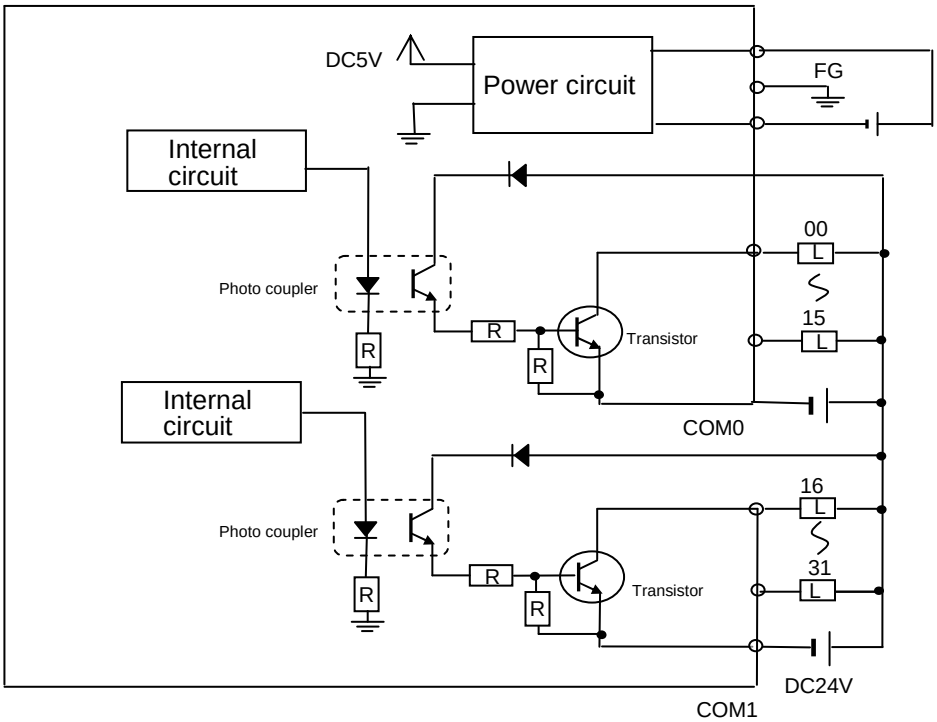
Circuit Configuration



2.4.3 32 point Transistor Output Module : GPL/GDL/GRL/GSL-TR4A

Spec. \ Type name		Transistor Output Module
Output point		32 points
Insulation method		Photo coupler insulation
Rated load voltage		DC 24V
Use load voltage range		DC 20.4 ~ 26.4V
Max. load current		0.1A / 1point, 2A / 1COM
Leakage current when OFF		Less than 0.1 mA
Max. inrush current		Less than 0.4 A / 10 ms
Max. voltage falling when ON		DC 1.0 V
Response time	Off → On	Less than 2 ms
	On → Off	Less than 2 ms
Common method		16 points / 1 COM
Internal consumption current		Less than 380 mA (when all points ON)
External power supply	Voltage	DC 24V ± 10 % (ripple voltage : less than 4Vp-p)
	current	40 mA (DC 24V per 1 COM)
Action indication		LED ON when output ON (16 points indication conversion by selection switch)
External connection method		Terminal unit connector (M3 X 6 screws)
Weight		Less than 240g

Circuit Configuration

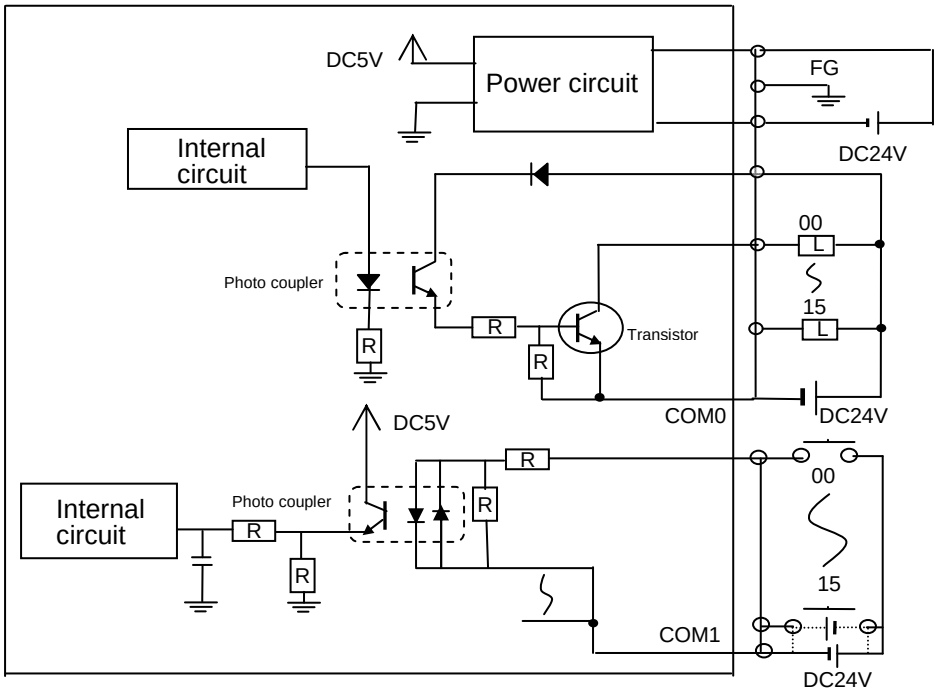


2.5 Digital I/O Combined Module Specification

2.5.1 32 point I/O Combined Module(DC16/TR16 point): GPL/GDL/GRL/GSL-DT4A

I/O Combined Module					
Input			Output		
Input point		16 point	Output point		16 point
Insulation method		Photo coupler insulation	Insulation method		Photo coupler insulation
Rated input voltage		DC 24V	Rated load voltage		DC24V
Rated input current		7 mA	Max. load current		0.1A/1point, 2A/1COM
Use voltage range		DC20.4~26.4V (ripple rate : within 5%)	Max. load voltage/current		AC250V, DC125V
Max. simultaneous input point		100% simultaneously ON	Leakage current when OFF		Less than 0.1 mA
ON voltage/ON current		DC19V/3.0 mA or more	Max. inrush current		Less than 4A/10ms
OFF voltage/OFF current		DC6V/1.5 mA or less	Surge killer		none
Input resistance		Approx. 3.3 kΩ	Response time	Off → On	Less than 2 ms
Response time	Off→ On	Less than 3 ms		On → Off	Less than 2 ms
	On → Off	Less than 3 ms			
Common method		16 points / COM	Common method		16 points / 1COM
Action indication		LED ON when input ON	Action indication		LED ON when output ON
External connection method		Terminal unit connector (M3×6 screws)			
Internal consumption current		Less than 350 mA			
Weight		Less than 240g			

Circuit Configuration



2.6 Communication Module Specification

2.6.1 Profibus-DP Module Specification

Classification	Profibus-DP
Module Type	Remote slave
Standard	EN 50170 / DIN 19245
Interface	RS-485(Electric)
Medium Access	POLL
Topology	BUS
Encoding method	NRZ
Cable	Shielded Twisted Pair
Communication distance	1200m (9.6K ~187Kbps)
	400m (500 Kbps)
	200m (1.5 Mbps)
	100m (3M ~ 12Mbps)
Max. node	126 stations
Max. node (per segment)	32 stations
Max. I/O data	64Byte

2.6.2 DeviceNet Module Specification

Classification		DeviceNet
Module type		Remote slave
Protocol		CAN Protocol
Medium Access		POLL
Topology		BUS
Cable		Class 2 Thick/Thin Cable(Allen-Bradley standard)
Communication speed		125/250/500 kbps
Communication distance(Thick)		500/250/100 m
Max. drop length	125 kbps	6m(max. extension 156m)
	250 kbps	6m(max. extension 78m)
	500 kbps	6m(max. extension 39m)
Data packet		0 ~ 8 Byte(64 Bits)
Network structure		• Trunk/drop line • Power within same network/ signal cable
Bus method		• Multi slave/ multi casting • Peer-to-Peer method • Strobe,Poll,COS/Cyclic method
Max. node		Max. 64 MAC ID 32 I/O per node (max. 2,048 I/O)
System type		Node insertion/removal in voltage ON
Action voltage		DC 24V

2.6.3 Rnet Module Specification

Classification	Rnet
Allowable inspection power cut time	20ms
Communication speed	1Mbps
Communication method	Semi dual bit serial method
Synchronous method	Frame synchronous method
Transmission path method	BUS
Total extension distance	750m
No. of connecting station	64 stations (including master stations)
Modulation method	Manchester Biphase-L
Error control method	Retry by CRC-CCITT and Time Over
Connector connection	9-PIN plug type
Using cable	TWISTED PAIR SHIELDED CABLE
Max. communication point	3,840 Word (master base)
Max. sending point	1,920 Word(master base)
Max. block no. assignment	63
Max. point of Block unit	60 Word

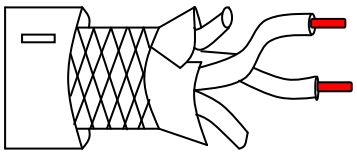
2.6.4 Modbus Module Specification

Classification	Snet
Module type	Remote slave
Protocol	Modbus-RTU
Max. protocol size	8 Byte
Topology	BUS
Cable	TWISTED PAIR SHIELDED CABLE
Communication speed	2400 ~ 38,400 BPS
Communication distance	1 Km
Medium Access	POLL
Max. node	32 stations
Communication point	32 points

2.7 Communication Cable Specification

2.7.1 Profibus-DP Cable Specification

- Belden Network Cable
  Type : Network Components
  Protocol : FMS-DP-PA
  Certification : No
  Order No. : 3076F, 3077F, 3079A

Classification	Twinax	
AWG	22	
Type	BC-Bare Copper	
Insulation	PE-Polyethylen	
Insulation strength	0.035 (Inch)	
Shield	Aluminum Foil- Polyester Tape/Braid Shield	
Capacitance	8500 pF/ft	
Characteristic impedance	150Ω	
Number of core wire	2 Core	

2.7.2 DeviceNet Cable Specification

- **Cable Specification**

Type name	Class 2 Thick/Thin Cable	
Maker	Allen-Bradley	Trunk/ drop Simultaneous use
Cable type	Round	
Rated output voltage	30V/100VA	
Max. allowable current	100VA/24V or 4A	
External diameter	12.2mm/6.9mm	
Number of core wire	5 cores	

Class 2 Thick Cable
Spool Size
50m
150m
300m
500m

Class 2 Thin Cable
Spool Size
50m
150m
300m
600m

- **Cable Signal Name**

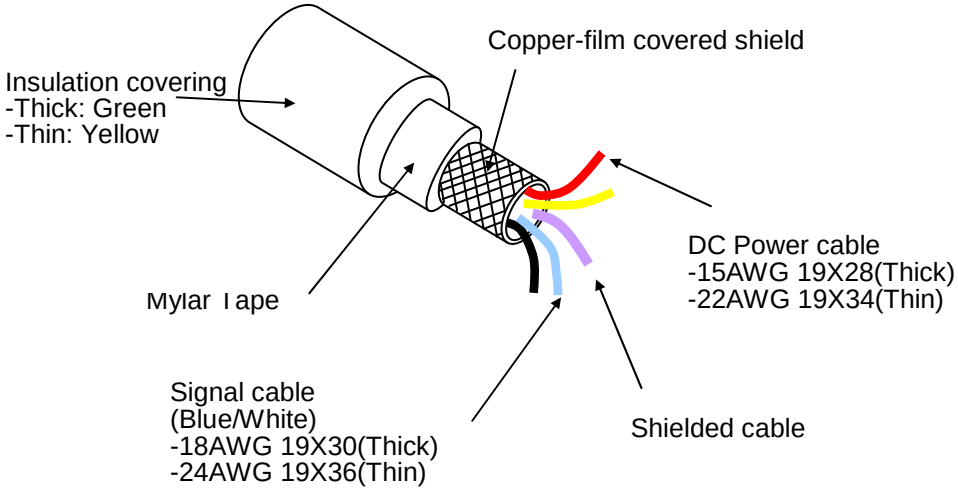
Smart I/O Dnet I/F module cable have 5 cores as follows. It is composed of Twist pair cable for DC 24V power supply, twist pair cable for signal cable, shield cable etc. and both Thick and Thin cable are available for trunk/drop line.

Cble color	Signal name	Description
While	CAN_H	Signal cable
Blue	CAN_L	Signal cable
Bare	Drain	Shield cable
Black	V-	Power cable
Red	V+	Power cable

- **Max. transmission distance by Cable types**

Transmission speed	Max. distance	
	Thick cable	Thin cable
125kbps	500m	100m
250kbps	250m	100m
500kbps	100m	100m

<STRUCTURE>

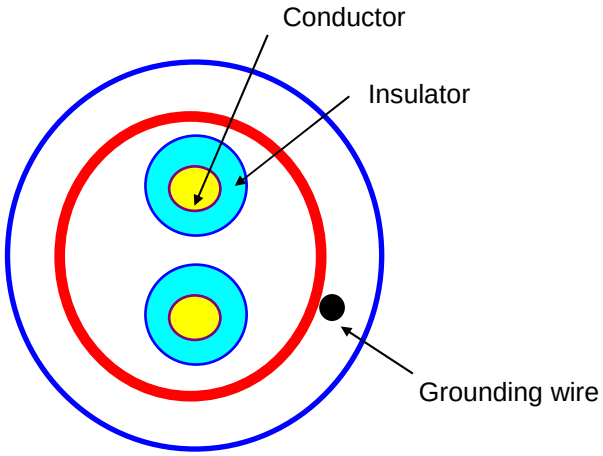

Insulation covering
-Thick: Green
-Thin: Yellow
Copper-film covered shield
DC Power cable
-15AWG 19X28(Thick)
-22AWG 19X34(Thin)
Mylar Tape
Signal cable
(Blue/White)
-18AWG 19X30(Thick)
-24AWG 19X36(Thin)
Shielded cable

2.7.3 Rnet Cable Specification

- **Twist Pair Cable**

Cable Description			
Product name	Low Capacitance Lan Interface Cable		
Type name	LIREV-AMESB		
Specification	2*0.64 mm (GS 92-3032,22 AWG)		
Maker	LG Cable		
Electric characteristics			
Items	Unit	Characteristics	Test condition
Conductor resistance	Ω/km	Less than 59	Normal temp.
Voltage-resistance(DC)	V/min	500V 1 min resist	In air
Insulation resistance	MEGA Ω-km	More than 1,000	Normal temp.
Capacitance	pF/m	Less than 45	1 kHz
Characteristic impedance	Ω	120 ± 12	10MHz
Appearance characteristics			
Conductor	No. of core wire	CORE	2
	Spec.	AWG	18
	Composition	NO./mm	1/1.0
	Outside diameter	mm	1.0
Insulator	Thickness	mm	0.9
	Outside diameter	mm	2.8

- Structure Diagram



2.7.4 Modbus Cable Specification

In case of Modbus communication using RS-422 channel, it is required to use Twist Pair Cable for RS-422 considering communication distance and communication speed. The table below shows the specification of recommended cable. In case of using other cables, it is required to use the cable suitable for the following characteristics.

- ❑ Product name : Low Capacitance Lan Interface Cable
- ❑ Type name : LIREV-AMESB
- ❑ Spec. : 2P X 22AWG(D/0.254 TA)
- ❑ Maker : LG Cable

Twist Pair Cable Specification

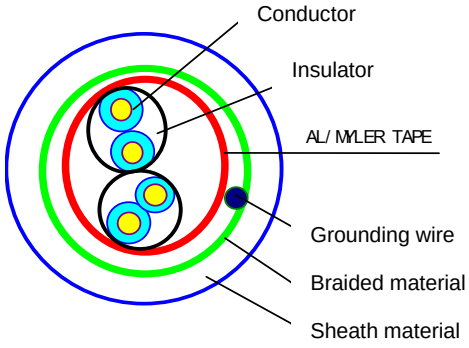
1) Electric Characteristic

Test Items	Unit	Characteristics	Test condition
Conductor resistance	Ω/km	Less than 59	Normal temp.
Voltage-resistance(DC)	V/1min	500V 1 min resist	In air
Insulation resistance	MΩ-km	More than 1,000	Normal temp.
Capacitance	Pf/M	Less than 45	1kHz
Characteristics impedance	Ω	120 ± 12	10MHz

2) Appearance Characteristic

Items			Single Wire
Conductor	No. of core wire	Pair	2
	Spec.	AWG	22
	Composition	NO./mm	1/0.643
	Outside diameter	Mm	0.643
Insulator	Thickness	Mm	0.59
	Outside diameter	Mm	1.94

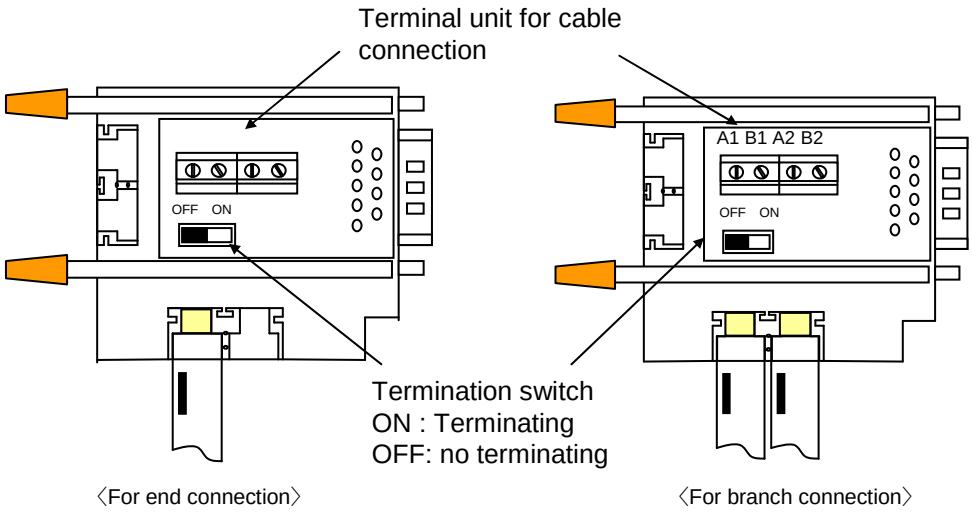
* Structure Diagram



2.8 Terminating

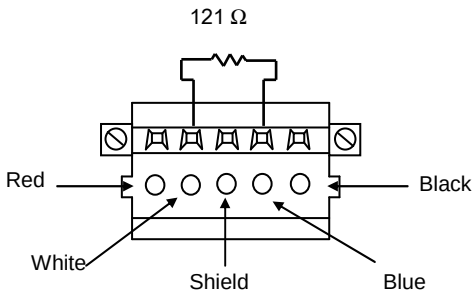
2.8.1 Profibus-DP Terminating

- Connection Connector



2.8.2 DeviceNet Terminating

- **Terminal resistance**
  - 121Ω, 1%, 1/4W resistance should be added.
  - Connected to CAN_H of connector and CAN_L signal cable



Remark

1) Terminal resistance should be added to both end of trunk line of network and in case of composing by device port tab, it is required to install terminal resistance on both ends of tab. In case that terminal resistance is omitted, the normal communication is not available.

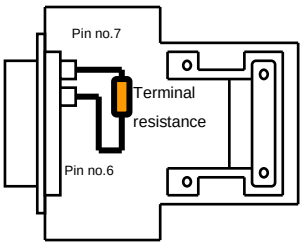
2.8.3 Rnet Terminating

Signal cable for electric network connection for Smart I/O Rnet uses no.6 and 7 from connector pin of Rnet master module and no.8 and 9 of Smart I/O module.
No.6 signal of master module Is connected to no.8 signal cable of Smart I/O module and no.7 signal is connected to no.9 signal cable respectively.
As each connector body is connected to other module by shield cable which plays the role to bypass the external noise, the connector bodies of both side should be connected by shield cable and the body of cable connector is not allowed to contact to high voltage and high current cables.

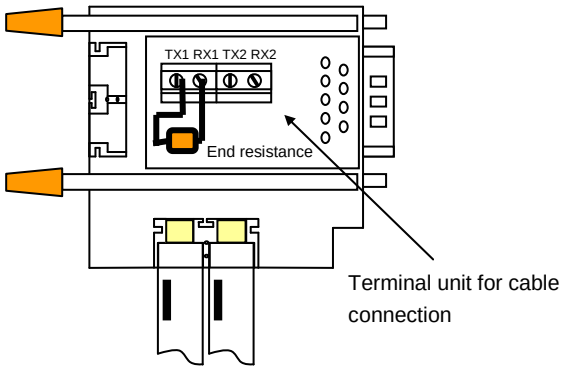
When soldering the shield cable to 9 pin connector body, it is required to heat the connector body with soldering iron sufficiently for strict and non removable soldering. In case of soldering, use the suitable amount of solder as too much solder adding makes the assembly of connector case difficult.

- Resistance value : 110Ω, 1/2W
- Connection pin no.
  - Master connection section : Pin no.6, 7
  - Smart I/O connection section : Pin no.8, 9

- Terminal resistance as fittings(110Ω, 1/2W) should be added on both ends of network.
- Connector case and end resistance are not allowed to contact each other.



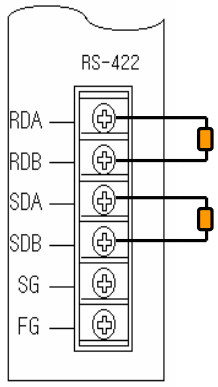
Master connection



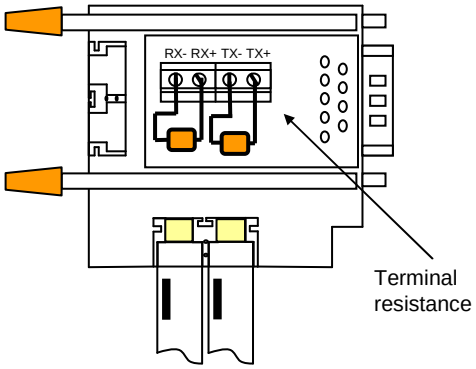
Smart I/O connection

2.8.4 Modbus Terminating

In case of communicating through RS-422 channel, it should be required to connect the terminal resistance from outside. In case of long distance communication, terminal resistance plays the role to prevent the signal distortion caused by reflection wave of cable and is required to connect the resistance (1/2W) same as characteristic impedance value to the end of network. In case of using the recommended cable, please connect 120Ω terminal resistance to both end of cable. In case of using other cables except the recommended cable, it is required to connect the 1/2W resistance same as the characteristic impedance value of using cable to both sides of cable.



Master connection



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