0.3M / 1.2M Monochrome / Color Vision Sensor (Internal illumination)

VG2 Series

PRODUCT MANUAL

For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.
The specifications, dimensions, etc. are subject to change without notice for product improvement. Some models may be discontinued without notice.

Safety Considerations

- Observe all 'Safety Considerations' for safe and proper operation to avoid hazards.
- ⚠ symbol indicates caution due to special circumstances in which hazards may occur.

⚠ Warning Failure to follow instructions may result in serious injury or death.

01. **Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss. (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)**
    Failure to follow this instruction may result in economic loss, personal injury or fire.
02. **Do not use or store the unit in the place where flammable/explosive/ corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.**
    Failure to follow this instruction may result in fire or explosion.
03. **Do not use this product for protecting human body or part of body.**
04. **Do not see light LED directly or direct beam at person.**
    Failure to follow this instruction may result in damage on eyes.
05. **Do not connect, repair, or inspect the unit while connected to a power source.**
    Failure to follow this instruction may result in fire.
06. **Check connections and connect cables.**
    Failure to follow this instruction may result in fire.
07. **Do not disassemble or modify the unit.**
    Failure to follow this instruction may result in fire.

⚠ Caution Failure to follow instructions may result in injury or product damage.

01. **Use the unit within the rated specifications.**
    Failure to follow this instruction may result in fire or product damage.
02. **Use dry cloth to clean the unit. Do not use water or organic solvent when cleaning the unit.**
    Failure to follow this instruction may result in fire.
03. **Keep the product away from metal chip, dust, and wire residue which flow into the unit.**
    Failure to follow this instruction may result in fire or product damage.
04. **When replacing filters, lights, or polarizing covers, avoid applying static electricity to the inside of the product. Reassemble it correctly.**
    Failure to follow this instruction may result in product damage or protection structure may be damaged.
05. **Do not touch the case while the product is in operation or immediately after the power is turned off.**
    There is a risk of burns when touching the case (excluding buttons).
06. **Do not expose the lens part of the product to excessive light for a long period of time.**
    Failure to follow this instruction may result in lens to burn or product malfunction.

Cautions during Use

- Follow instructions in Cautions during Use.
  Otherwise, it may cause unexpected accidents.
- This product is intended to be supplied by a UL Listed Power Supply Unit marked Class 2 or LPS or PS2.
- Prevent power wire from short to other wires in power I/O cable.
- In order to avoid malfunction from static electricity or noise, ground shield wire of the power I/O cable.
- Do not disconnect the power supply while setting operation or saving set information. It may cause data loss.
- Do not disconnect the power supply while updating firmware. It may cause product damage.

- Keep optical section of the product away from the contact with water, dust and oil. It may cause malfunction.
- When changing the light or filter, use the assembly tool and observe installation instruction.
- When the product is not used for a long time, separate the power cable to store.
- When connecting network, connection must be operated by technical expert.
- In the following case, disconnect the power supply immediately. It may cause fire or product damage.
  - When water or foreign substance is detected in the product
  - When the product is dropped or case is damaged
  - When smoke or smell is detected from the product
- Do not use the product in the place where strong magnetic field or electric noise is generated.
- Avoid sudden temperature changes in the product and peripheral devices. It may cause condensation.
- This unit may be used in the following environments.
  - Indoor (in the environment conditions in specifications)
  - Altitude max. 2,000m
  - Pollution degree 2
  - Installation category II

Ordering Information

This is only for reference, the actual product does not support all combinations.
For selecting the specified model, follow the Autonics website.

VG2	-	❶	❷	❸	-	❹	❺

❶ Image element
M: Mono CMOS
C: Color CMOS

❷ Resolution
03: 0.3 MP (640 × 480 pixel)
12: 1.2 MP (1,280 × 960 pixel)

❸ Color of light
W: White
R: Red
B: Blue

❹ Effective focal length
Number: Effective focal length (unit: mm)

❺ Communication
E: Ethernet (TCP/IP)

Product Components

- Product
- Instruction manual

Sold Separately

- Bracket A (BK-VG2-A)
- Bracket B (BK-VG2-B)
- Ethernet connector protection cover (P96-M12-1)
- Polarizing cover (CVR-□-VG2)
- Light (LM-□-8-VG2), Filter (FL-□-VG2)
- M12 connector cable (C□D12-□, C□DM12-□-A)
- M12 connector communication cable (C□M8-□PR(-A), C□8-□PR(-A))

Software

Download the installation file and the manuals from the Autonics website.

■ atVision

The program allows setting of vision sensor parameters and management of monitoring data such as inspection status and status information.

Network Setting

IP address	192.168.0.2
Subnet mask	255.255.255.0
Gateway	192.168.0.1

- Configure the network settings of vision sensor via atVision.
- For initial IP address, refer to the table.

Installation Order

For more information, refer to the atVision software manual.

01. Install the vision sensor.
Secure the vision sensor to the installation location.
⚠ The product may become hot during operation. Heat dissipation measures are required during installation.
It is recommended to use the dedicated bracket (BK-VG2-□, sold separately).
Do not use insulators on the bracket or surface during installation. This will reduce the heat dissipation effect. Use a metal bracket and fix it to a metal surface. Metal has high thermal conductivity and can effectively dissipate heat.

02. Install the vision sensor program, atVision, to PC.
Download the software provided by Autonics website.

03. Connect the vision sensor and the PC, and set the network.
Refer to the Network Setting.
Use GigE communication for stable operation.

Connections

■ Power I/O connector cable (M12 12-pin connector, Plug - Male)

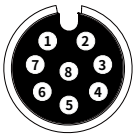
- When the power is unstable, ground the shield of the provided cable.

Pin	Cable color		Signal	Function
	C□DM12-□-A	C□D12-□		
1	Brown	Brown	VCC	Power input 24 VDC⎓
2 01)	Blue	Blue	GND	Ground
3	White	White	NC	Not connected
11	Gray / Pink	Sky	Input COMMON	
4	Green	Green	IN0	Trigger input, Work group change Bit 0,1
5	Pink	Orange	IN1	
6 01)	Yellow	Yellow	RS232 TX	RS232 transmit
8 01)	Gray	Gray	RS232 RX	RS232 receive
7	Black	Black	OUT0	Inspection complete, inspection result output (PASS / FAIL), external trigger, alarm, product work
9	Red	Red	OUT1	
10	Purple	Purple	OUT2	
12	Red / Blue	Bright green	OUT3	

01) Connect RS232C as follows.

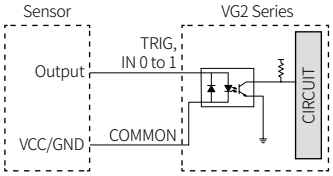
■ Ethernet connector cable (M12 8-pin-RJ45 connector, Socket - Female)

M12 8-pin	RJ45	Signal
1	5	MX2-
2	7	MX3+
3	8	MX3-
4	2	MX0-
5	3	MX1+
6	1	MX0+
7	4	MX2+
8	6	MX1-

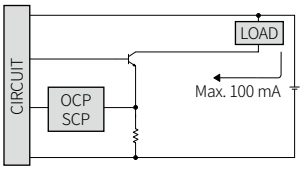


Inner Circuit

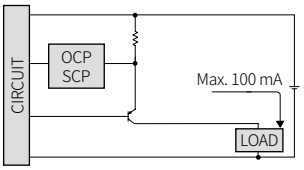
■ External trigger (TRIG), Work group change input



■ NPN open collector output



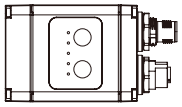
■ PNP open collector output

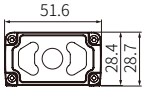


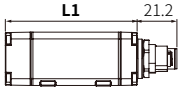
- OCP (over current protection), SCP (short circuit protection)
- If short-circuit the control output terminal or supply current over the rated specification, normal control signal is not output due to the output short over current protection circuit.

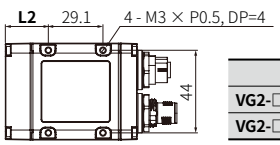
Dimensions

- Unit: mm, For the detailed drawings, follow the Autonics website.



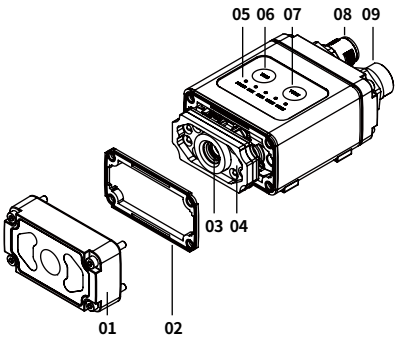






	L1	L2
VG2-□□□-8E	70.2	22.9
VG2-□□□-16E	81.9	34.6

Unit Descriptions



01. Front cover:
Do not touch the lens with your hands. Be careful not to scratch it.
02. Gasket
03. Lens
04. Light LED module
05. Indicator
06. Trigger button
07. TUNE button
08. Power I/O connector
09. Ethernet connector

■ Indicator

Indicator	Color	Name	Function
POWER	Green	Power indicator	Turns ON when power is supplied.
LINK	Green	Ethernet connection indicator	Turns ON in Ethernet communication status.
DATA	Green	Data transmit indicator	Flashes when data is transmitted between product and PC.
USER 1	Green / Red	User setting indicator	Turns ON or flashes in operation of inspection complete, inspection result (PASS, FAIL), external trigger, alarm, and product work.
USER 2			

Specifications

Model	VG2-□□□-8E	VG2-□□□-16E
Effective focal length	8 mm	16 mm
Min. working distance	40 mm	
Image filter	Preprocessing, external filter (filter, polarizing cover)	
Image element	1/2.9 inch mono CMOS / color CMOS model, 3.45 × 3.45 µm pixel	
Shutter	Global shutter	
Exposure time	30 to 1,400,000 µs	
Lens type	f8 mm Board Lens	f16 mm Board Lens
	Liquid Lens (auto focus function)	
eMMC	8 GB	
DDR4	4 GB	
Inspection work group 01)	64 (simultaneous inspection: 32)	
Light ON / OFF method	Pulse	
Trigger mode	Continuous, External Trigger, Manual, Ethernet, RS232	
Communication	Ethernet (TCP/IP, 10 / 100 / 1000 Base-T), Modbus (TCP, RTU)	
FTP trans. output	YES	
Certification	CE UKCA cULus KC	
Unit weight (package)	≈ 182 g (≈ 242 g)	≈ 202 g (≈ 262 g)

01) Up to 4 can be used when changing work groups through external input.

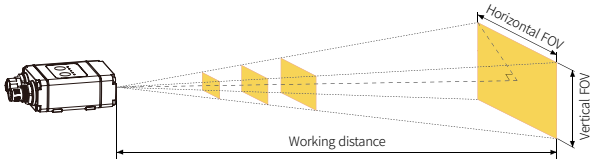
Model	VG2-□03□-□E	VG2-□12□-□E
Resolution	0.3 MP (640 × 480 pixel)	1.2 MP (1,280 × 960 pixel)
Max. No. of images collected per second 01)	≤ 60 fps	≤ 45 fps

01) Based on the min. exposure, no trigger delay, inspection function / pre-processing not being configured and no Ethernet connection.

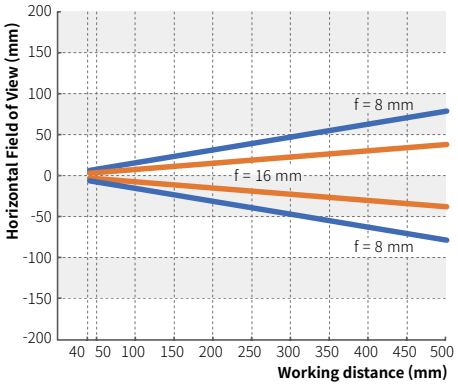
Power supply	24 VDC⎓ ± 10 %
Current consumption	600 mA
Rated input signal	24 VDC⎓ ± 10 %
Output signal	NPN-PNP open collector output setting (software)
Load voltage	24 VDC⎓
Load current	≤ 100 mA
Residual voltage	≤ 2 VDC⎓
Protection circuit	Output short overcurrent protection circuit, reverse voltage polarity protection circuit
Insulation resistance	≥ 100MΩ (500 VDC⎓ megger)
Dielectric strength	500 VAC~ 50/60 Hz for 1 min.
Vibration	1.5 mm amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 2 hours
Shock	300 m/s^2 (≈ 30 G), 11 ms in each X, Y, Z direction for 3 times
Ambient temperature	0 to 45 °C, storage: -20 to 70 °C (non-freezing or non-condensation)
Ambient humidity	35 to 85%RH, storage: 35 to 85%RH (non-freezing or non-condensation)
Protection structure	IP66, IP67 (IEC standard) , IP69K (DIN standard)
Connection	Connector type
Connector spec.	Power I/O: M12 12-pin, Ethernet: M12 8-pin (cable tightening torque: 0.4 N m)
Material	Case: Die-cast Aluminum Housing, Window: Glass, Gasket: Silicon

Working Distance and Field of View (FOV)

• Aperture Ratio: F/7.0

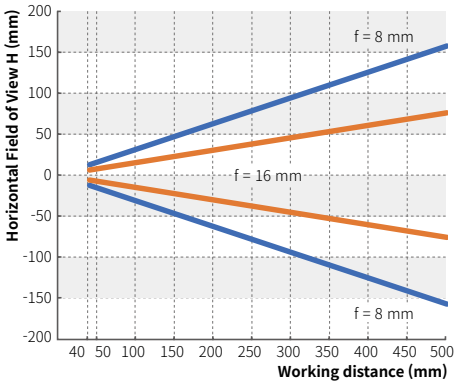


■ Resolution 0.3 MP



Working distance	Effective focal length (f) = 8 mm		Effective focal length (f) = 16 mm	
	Horizontal FOV	Vertical FOV	Horizontal FOV	Vertical FOV
40	12	9	6	5
100	31	23	15	11
200	62	46	30	23
300	93	70	45	34
400	125	93	60	45
500	156	116	75	57

■ Resolution 1.2 MP



Working distance	Effective focal length (f) = 8 mm		Effective focal length (f) = 16 mm	
	Horizontal FOV	Vertical FOV	Horizontal FOV	Vertical FOV
40	25	19	12	9
100	62	46	30	23
200	125	93	60	45
300	187	139	90	68
400	249	185	120	90
500	311	232	150	113

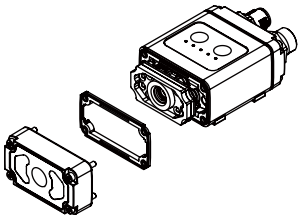
Replacement of Polarizing cover / Light / Filter

⚠ Ensure that the power is turned off before replacing.

■ Cover removal / assembly

When replacing the polarizing cover, light, or filter, follow the below to remove and assemble the cover.

[Cover removal]
Remove the four screws on the front cover or polarizing cover by turning them counterclockwise.

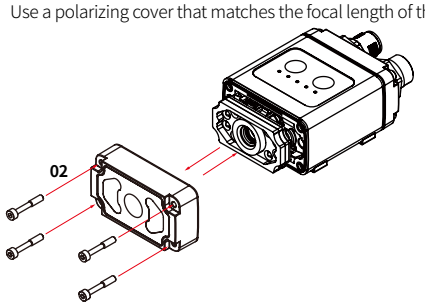


[Cover assembly]
Install the vision sensor by turning the four screws on the cover clockwise in the order 1 - 2 - 3 - 4 - 1 - 2 - 3 - 4.

- Do not miss any internal components when installing.
- Tighten the screws with a torque of 0.6 N m.

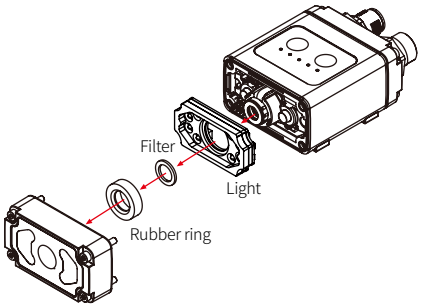
■ Polarizing cover replacement

01. Cover removal: Detach the cover from the vision sensor.
02. Install the polarizing cover by turning the screw clockwise.
03. Cover assembly: Install the polarizing cover to the vision sensor.
Use a polarizing cover that matches the focal length of the vision sensor.



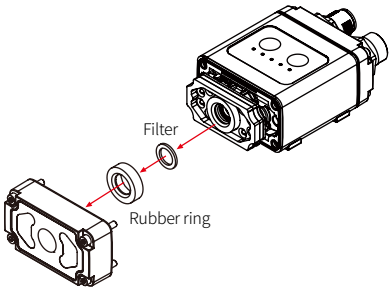
■ Light replacement

01. Cover removal: Detach the cover from the vision sensor.
02. Separate the rubber ring, filter, and light in order.
03. Fit the light to be replaced into the body by aligning it with the groove.
04. Fix the light, filter, and rubber ring to the main body in order.
05. Cover assembly: Install the cover to the vision sensor.



■ Filter replacement

01. Cover removal: Detach the cover from the vision sensor.
02. Separate the rubber ring, filter in order.
03. Install the filter to be replaced.
04. Fix the filter and rubber ring to the main body in order.
05. Cover assembly: Install the cover to the vision sensor.



Sold Separately: Ethernet connector protection cover (P96-M12-1)

- Connector protection cover protects unused connectors from foreign substances.
- When installing the connector protection cover, tighten the cover with hand.

Sold Separately: Polarizing cover (CVR-□-VG2)

Model	Appearance	Application Model
CVR-8P-VG2		VG2-□□□-8E
CVR-16P-VG2		VG2-□□□-16E

Sold Separately: Light (LM-□-8-VG2)

Model	Appearance	Color
LM-W-8-VG2		White
LM-R-8-VG2		Red
LM-B-8-VG2		Blue

Sold Separately: Filter (FL-□-VG2)

Model	Appearance	Color
FL-B-VG2		Blue
FL-R-VG2		Red
FL-W-VG2 [01]		Clear

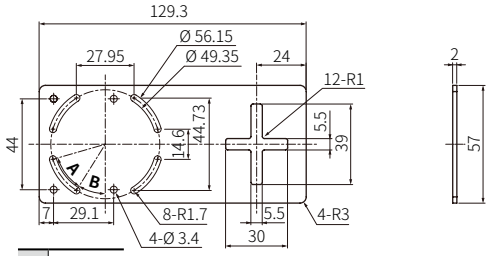
01) When not using a color filter, use it to maintain the height of the entire fixture.

Sold Separately: Bracket

- Unit: mm, For the detailed drawings, follow the Autonics website.

■ Bracket A: BK-VG2-A

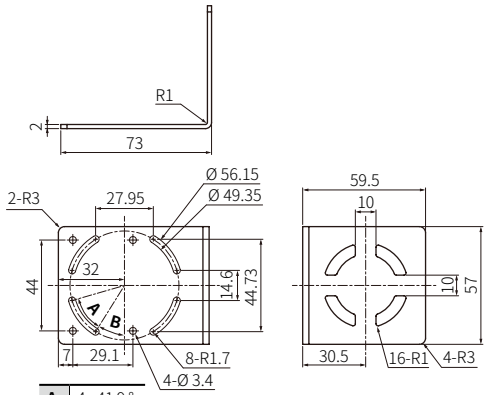
- Components: M3 × L6 bolt: 4



A	4 - 41.9 °
B	4 - 32 °

■ Bracket B: BK-VG2-B

- Components: M3 × L6 bolt: 4

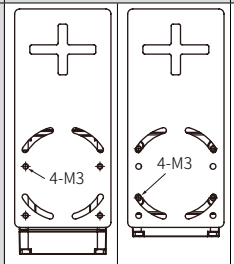
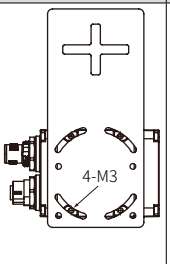
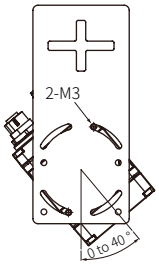
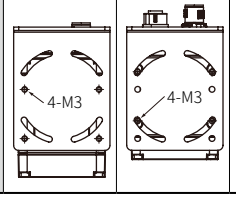
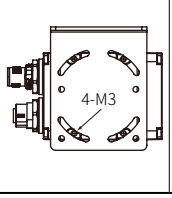
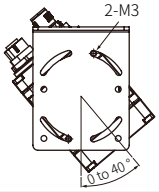


A	4 - 41.9 °
B	4 - 32 °

■ Mounting of device and bracket by angle

The device can be installed according to the desired installation angle by connecting 4 - Ø 3.4 holes or 8 - R1.7 through holes of the bracket and 4 - M3 Taps of the device.

- Tightening torque: 1 N m

Bracket	Installation angle			
	0°		90°	0 to 40°
A				
B				

Sold Separately: M12 Connector Cable

- For more information, refer to the M8/12 Connector Cable Product Manual.
- Tightening torque: 0.4 N m

Appearance	Power supply	Connector 1	Connector 2	Length	Feature	Model
	DC	M12 (Socket-Female) 12-pin	12-wire	2 m	• Drag chain type (2 million) • IP65 / IP67 • PUR • cULus EAC	CIDM12-2-A
				5 m		CIDM12-5-A
				10 m		CIDM12-10-A
		M12 (Socket-Female) 12-pin, L type	12-wire	2 m		CLDM12-2-A
				5 m		CLDM12-5-A
				10 m		CLDM12-10-A
		M12 (Socket-Female) 12-pin	12-wire	2 m	PVC	CID12-2
				5 m		CID12-5
				10 m		CID12-10
		M12 (Socket-Female) 12-pin, L type	12-wire	2 m		CLD12-2
				5 m		CLD12-5
				10 m		CLD12-10

Sold Separately: M12 Connector Communication Cable

- For more information, refer to the M12 Connector Communication Cable Product Manual.
- Tightening torque: 0.4 N m

Appearance	Power supply	Connector 1	Connector 2	Length	Feature	Model
	DC	M12 (Plug-Male) 8-pin	RJ45	2 m	• Drag chain type (16 million) • TPE	C1M8-2PR
				5 m		C1M8-5PR
				10 m		C1M8-10PR
		M12 (Plug-Male) 8-pin, L type	RJ45	2 m		C4M8-2PR
				5 m		C4M8-5PR
				10 m		C4M8-10PR
		M12 (Plug-Male) 8-pin	RJ45	2 m	PVC	C18-2PR
				5 m		C18-5PR
				10 m		C18-10PR
		M12 (Plug-Male) 8-pin, L type	RJ45	2 m		C48-2PR
				5 m		C48-5PR
				10 m		C48-10PR
		M12 (Plug-Male) 8-pin	RJ45	2 m	• Drag chain type (5 million) • IP65 / IP67 • PUR • cULus EAC	C1M8-2PR-A
				5 m		C1M8-5PR-A
				10 m		C1M8-10PR-A
		M12 (Plug-Male) 8-pin, L type	RJ45	2 m		C4M8-2PR-A
				5 m		C4M8-5PR-A
				10 m		C4M8-10PR-A
		M12 (Plug-Male) 8-pin	RJ45	2 m	• IP65 / IP67 • PUR • cULus EAC	C18-2PR-A
				5 m		C18-5PR-A
				10 m		C18-10PR-A
		M12 (Plug-Male) 8-pin, L type	RJ45	2 m		C48-2PR-A
				5 m		C48-5PR-A
				10 m		C48-10PR-A

atVision

For more detail, refer to atVision software manual.

■ Basic setting

- Camera setting
- Network setting
- I/O setting
- Advanced setting

■ Inspection function

Function	Descriptions
Alignment Shape	Compares the registered shape with the input image to detect the presence and position of the shape.
Alignment Corner	Compares the intersection of two registered edge lines with the input image to detect the presence of edges and the position of the intersection.
Brightness	Inspects the average brightness of the region.
Contrast	Inspects the contrast of the object.
Shape Comparison	Compares the registered shape with the input image to evaluate similarity.
Color Identification	Inspects the average color of the object.
OCR	Detects and recognizes characters.
OCV	Inspects the legibility and quality of characters.
Multi-position Inspection	Compares the registered shapes with the input image to detect the presence and positions of multiple shapes.
Area	Inspects the size of the region.
Edge	Measures the angle and position of edges.
Diameter	Measures the diameter and circularity of the object.
Object Counting	Counts the number of objects.
Angle	Measures the angle between two edge lines.
Length	Measures the distance between two edges.
Color Area	Inspects the area size of colored objects.
Count of Colored Objects	Counts the number of colored objects.

Troubleshooting

Please check routinely whether product is operating in normal status or not.
For more information, refer to the atVision software manual.

Symptom	Solution
When supplying power, POWER indicator is not turned on.	Check that status of power supplying and power cable connections is in normal.
	Check that power is being supplied within the rated range.
	Check that polarity of power is connected correctly.
	Check that power terminal is tightened thoroughly.
The Product does not work.	Check that the ambient temperature is within the rated range.
Product does not work due to the external input error.	Check that whether status of input COMMON or each of input wire connection is in normal.
	Check that the device connected to input has a problem.
Product does not work due to the external output error.	Check that output wire is connected correctly.
	Check that power to output is being supplied within the rated range.
	Check that the device connected to output has a problem.
	Check that specifications of load connected to output is within the rated range.
Error occurs in Ethernet communication.	Check that LINK indicator is turned on. If not, check wiring.
	Check that communication (IP address, subnet mask, and gateway) is set correctly.
	Check that connection or specification of the communication cable is corresponding to that of Autonics guide. Use the Autonics cable (sold separately).