

AnyWireASLINK System
DeviceNet Gateway
B2G78-D1

User's Manual

Version 1.3 August 6, 2019

Precautions

● Precautions related to this user's manual

1. The customer is kindly requested to see to it that this user's manual reaches the end user.
2. Read this user's manual thoroughly and understand the descriptions, and then operate this product.
3. This user's manual is intended to describe the details of the functions provided in this product and not to guarantee that this product serves the specific purposes the customer aims at.
4. Reproduction or duplication of part or all of this user's manual without permission is prohibited.
5. Contents of this user's manual may be subject to future changes without prior notice.

● Safety precautions (Make sure to read before use)

When using this product, please carefully read this Manual and the related Manuals introduced in this Manual and pay sufficient attention to safety in order to handle this product properly.

The precautions in this Manual describe only matters related to this product.

For safety precautions as a system, refer to User's Manuals for controllers, such as the CPU unit.

"Safety precautions" ranks the safety precaution items into "⚠ WARNING" and "⚠ CAUTION."



WARNING

Improper handling may cause a dangerous situation and can result in death or serious injury.



CAUTION

Improper handling may cause a dangerous situation and can result in moderate injury or minor injury or is assumed to result in property damage only.

In addition,

Matters described in ⚠ CAUTION may lead to serious consequences depending on the situation.

All describe important contents, therefore, make sure to observe the cautions and warnings.

Carefully store this Manual so as to access it whenever necessary, and deliver this Manual to the end user.

[Application of the product]



WARNING

- Application of the AnyWire system is limited to areas in which any failure and/or problem of the product shall not result in serious consequences and in systems with fail-safe and backup functions are provided externally.
- The AnyWire system is designed for applications in general industrial purposes and does not come with control features designed for mission critical purposes.
Therefore, the product is not applicable in areas like medical equipment, nuclear power plants, railroad, aviation, safety devices, in which extreme safety is the priority.

[Precautions for design]



- The AnyWire system has high noise resistance, however, keep transmission lines and input/output cables 100 mm or more (as a guide) away from high-voltage cables or power lines. A malfunction may result.
- Incorporate an emergency stop circuit and an interlock circuit for safety into an external circuit other than the AnyWire system.

[Precautions for installation]



- AnyWire products should be used in environments that meet the general specifications presented in the User's Manual.
Using them in environments outside the general specifications may result in injuries due to electric shock, fire, malfunctions and/or damage to or degradation of the products.
- Install respective products properly. Improper installations may cause malfunctions, failures and/or falls.
If they are to be installed on a DIN rail, ensure to orient the products so that the fixed hooks would be on top.
Holding them with the movable hooks on top may cause devices to fall due to vibrations or the weight of cables.
It is strongly recommended to use DIN rail stoppers for secure installation.
If screws were used to install them, fasten screws within the torque specified for respective screws.
Loose screws or screws fastened too tight may cause damage, dropout and/or malfunction of the devices.
- To install and remove the devices, always ensure that all phases of external power supplies used in the system are shut down.
Failing to do so may result in damages and/or malfunctions due to sneak current.
- Do not touch energized parts and electronic components with a bare hand. Doing so may cause malfunctions and/or failures.

[Precautions for wiring]



- Tighten the terminal screws within the specified torque range. Loose tightening of the terminal screws may result in short-circuit, fire or malfunction. Excessive tightening of the terminal screws may cause damage to the screws or unit, resulting in dropping, short-circuit or malfunction.
- Be careful to prevent foreign matter such as cutting chips and wiring offcuts from entering into the unit. Fire, failure or malfunction may result.
- On the upper part of the units, protective labels are provided to prevent foreign matter, such as chips of wires and shields, entering inside the units during the wiring operation. Do not remove those labels until the wiring is complete.
To ensure proper heat radiation, confirm that those labels are removed prior to operating the system.
- Incorrect wiring may damage the equipment. Be careful with regard to the label length and layout so that connectors and electric wires are not disconnected.
- When connecting wires with terminal blocks, do not solder. A contact failure may result.
- If wiring for the power line is long, power voltage for the remote slave unit may become insufficient due to voltage drop. Therefore, connect an external power source to ensure the specified voltage.
- Do not turn on the 24 V DC power source before completing wiring and connections of the whole Anywire system.
- Use a 24 V DC direct current stabilized power supply for Anywire system devices.
- Do not bind the control wire and communication cable with the main circuit or power line, or do not bring them close to each other. Noise may result in malfunction.
- Make sure to put electric wires and cables to be connected to the unit into ducts or fix them with clamps. Unless cables are put into ducts or fixed with clamps, drift, movement or careless tensioning of a cable may result in damage to the unit or cable, and a connection failure of a cable may result in malfunction.
- When removing cables connected to the unit, do not hold the cable section by hand when pulling. Remove the cable equipped with a connector by holding the connector on the connection part of the unit.
To remove cables connected to the terminal blocks, loosen the terminal screws on the terminal block. When cables are pulled while they are connected to the unit, malfunction or damage of the unit or cable may result.

[Precautions for startup and maintenance]

WARNING

- Do not touch the terminals while the power is on. Electric shock or malfunction may result.
- To clean or to re-tighten the screws on the terminal block and the unit mounting screws, make sure to shut off all phases of the external supply power used in the system. Unless all phases are shut off, electric shock may result. Loose tightening of the screws may result in short-circuit or malfunction. Excessive tightening of the screws may cause damage to the screws or unit, resulting in dropping, short-circuit or malfunction.

CAUTION

- Do not disassemble or remodel each unit. Failure, malfunction, injury or fire may result.
- Make sure to shut off all phases of the external supply power source used in the system for installation and removal of the unit.
Unless all phases are shut off, failure or malfunction of the unit may result.
- Before touching the unit, make sure to touch grounded metal to discharge static electricity charged to the human body. Unless static electricity is discharged, failure or malfunction of the unit may result.

[Precautions for disposal]

CAUTION

- Dispose of this product as industrial waste.

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1. Overview

The B2G78-D1 operates as a gateway unit for the DeviceNet and AnyWireASLINK. The AnyWireASLINK system can be connected to the DeviceNet by using this gateway.

The AnyWireASLINK system is a “Sho-Haisen” (wiring saving) system consisting of compact and fewer-point/multiple-distribution units suitable for wire saving on the sensor level.

This system covers bundling of a minimum 1 point to 8 points in a compact unit, therefore, it can bundle even in a narrow device in which a BOX is not placed.

In addition, this system also proposes “Digital Link Sensors” that incorporate the AnyWireASLINK sensing function and wiring saving function.

This is a sensor able to be directly connected to the transmission line, and offers excellent wiring saving without using a remote terminal.

In addition to ON/OFF information, information such as sensing level and disconnections are also transmitted to the controller side.

It is possible to monitor the operating state, prevent momentary stoppages, and significantly reduce cause investigation time during a failure.

2. Specifications

2.1 General specifications

Items	Specifications
Operating ambient temperature/humidity	0–+55°C, 10%–90% RH, without condensation
Storage ambient temperature/humidity	-20–+75°C, 10%–90% RH, without condensation
Resistance to vibration	Based on JIS B 3502 and IEC 61131-2
Resistance to shock	Based on JIS B 3502 and IEC 61131-2
Atmosphere	No corrosive gas
Rated altitude ^{*1}	0–2000 m
Pollution degree ^{*2}	2 or less

^{*1} Do not use or store the AnyWire ASLINK equipment in an environment pressurized more than the atmospheric pressure at 0 m altitude. Failure to observe this instruction causes malfunction of the equipment.

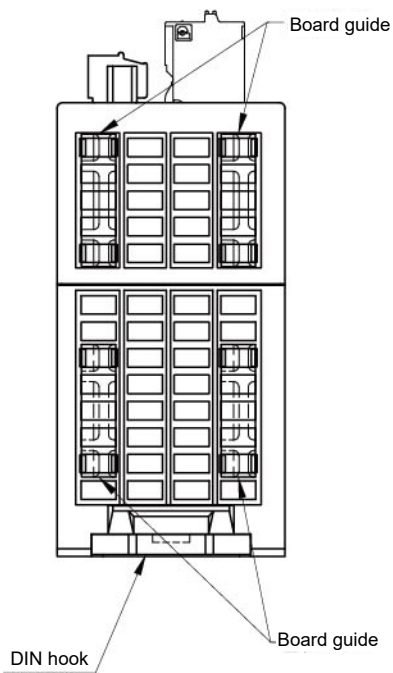
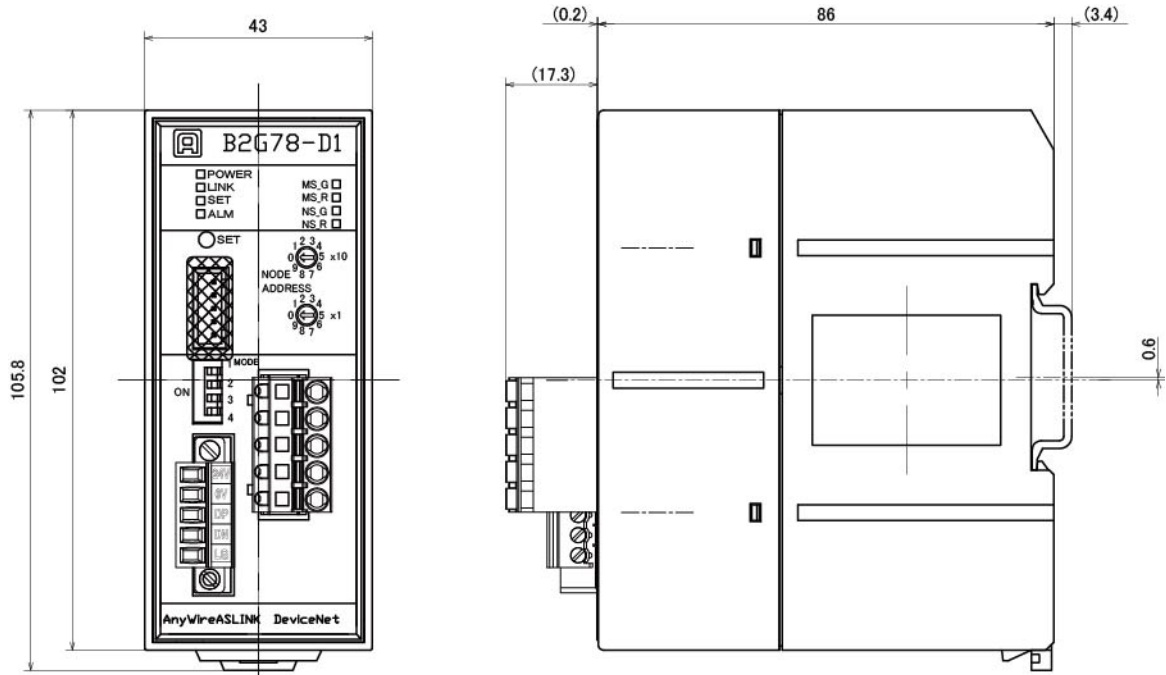
^{*2} Index indicating a degree of conductive substance generation under the equipment operating environment. "Pollution degree 2" indicates generation of nonconductive substance only. However, temporary conduction may occur in the environment due to accidental coagulation.

2.2 Performance specifications

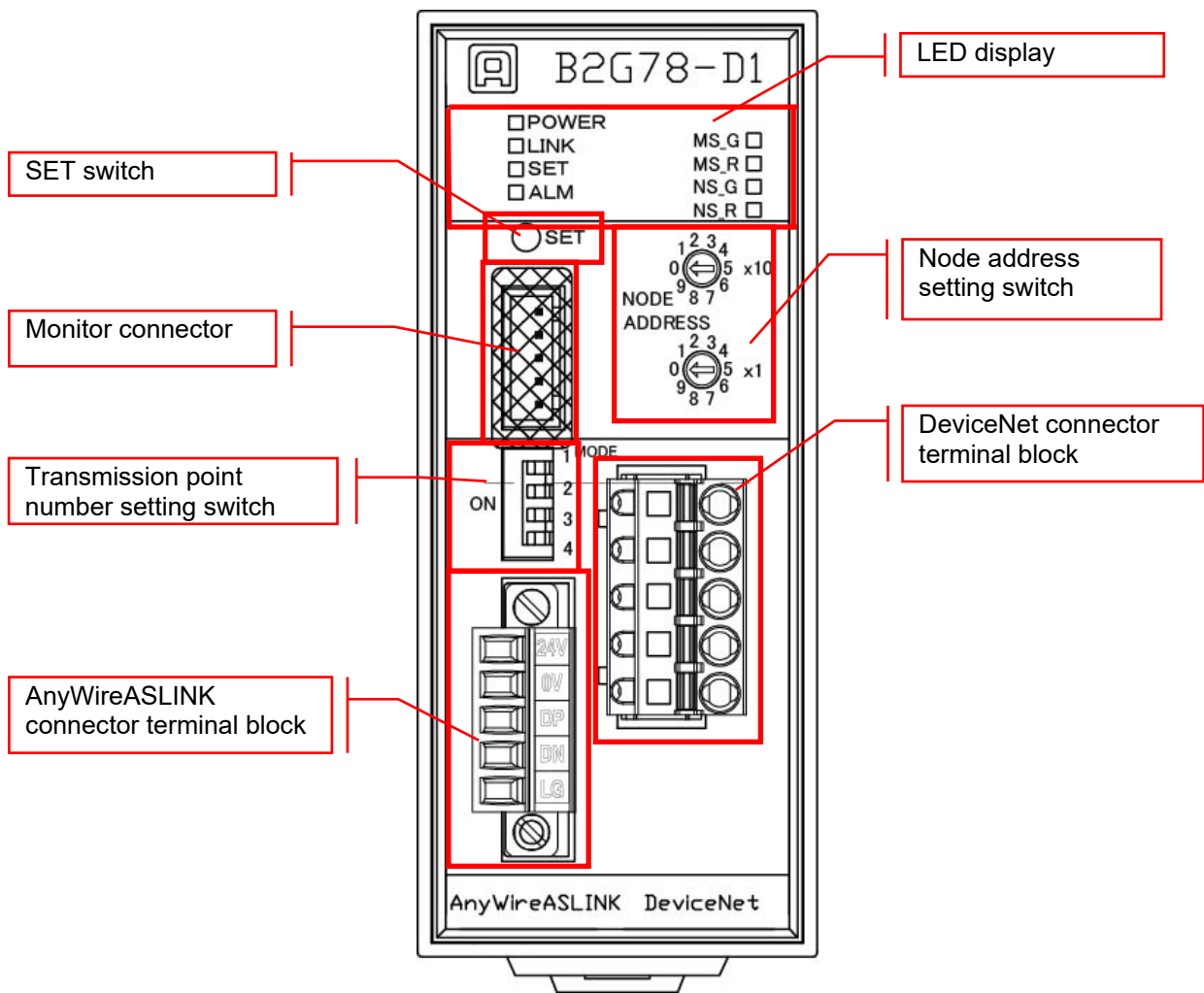
Items	Specifications			
Transmission clock	27 kHz (37 μs)			
Transmission method	DC power supply superimposed total frame, cyclic method			
Synchronization	Frame/bit synchronization			
Transmission protocol	AnyWire ASLINK protocol			
Maximum number of bits	512 points (256 inputs, 256 outputs)			
Number of connectable units	128 units max.			
Transmission distance / Supply current	Cable diameter	Transmission distance		DP-DN allowable supply current
	1.25 mm ²	50 m or less		MAX 2A
		Over 50 m, 100 m or less		MAX 1A
		Over 100 m, 200 m or less		MAX 0.5A
	0.75 mm ²	50 m or less		MAX 1.2A
		Over 50 m, 100 m or less		MAX 0.6A
		Over 100 m, 200 m or less		MAX 0.3A
	0.5 mm ²	50 m or less		MAX 0.8A
		Over 50 m, 100 m or less		MAX 0.4A
		Over 100 m, 200 m or less		MAX 0.2A
Error correction	Double check, chuck sum			
RAS functions	Transmission cable disconnection detecting function, Transmission cable short-circuit detecting function, Transmission circuit drive power supply voltage drop detecting function, ID (address) duplication/no setting detecting function			
Applicable cable	<ul style="list-style-type: none">General-purpose, 2-core/4-core cable (VCTF, VCT 0.75 to 1.25 mm2, Rated temperature: 70°C)General-purpose cable (0.75 to 1.25 mm2, Rated temperature: 70°C)Dedicated flat cable (0.75 mm2 / 1.25 mm2, Rated temperature: 90°C)			
Connection method	T-branching, multi-drop, star-branching, Tree-branching			
Power supply	Voltage: 21.6 to 27.6 V DC (24 V DC -10 to +15%) Ripple: 0.5 V p-p or less Recommended voltage: 26.4 V DC (24 V DC +10%) To comply with the UL standard, be sure to use a 24 V DC stabilized power supply for NEC Class 2 output.			
Bit transmission cycle time	32 inputs	64 inputs	128 inputs	256 inputs
	32 outputs	64 outputs	128 outputs	256 outputs
	2.4 ms	3.6 ms	6.0 ms	10.7 ms
Power consumption	150 mA (not including the load)			
Weight	200 g			

2.3 Outside dimensions

Unit: mm



2.4 Name of each part



2.5 Attaching to/detaching from DIN rail

Please install this device to the DIN rail before use.

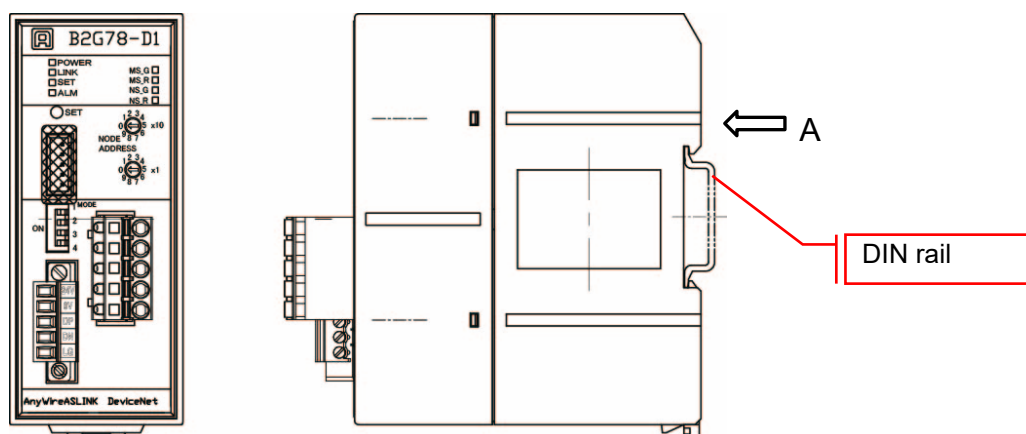
Vertical installation

1. DIN rail attachment procedure

- ① Hook spring pin A on the lower part of the bottom face to a DIN rail.
- ② Fit the device into the DIN rail while pressing this device upward from underneath.

2. DIN rail detachment procedure

Pull the upper side of this device toward you while pressing upward from below, and remove from the DIN rail.



CAUTION

Do not install in the reverse direction (with A on the bottom side).

This device may become detached from the DIN rail due to vibration and similar causes.

3. Switch settings

3.1 Node address setting switch

Set the node address on the DeviceNet side by using the node address setting switch.

Do not change the node address while the unit is in operation.

The range in which the node address can be set varies depending on the master to be used.

If another node is already using the selected address, a node address redundancy will occur and the address cannot start communication.

Node address	Node address setting switch	
	x10	x1
0	0	0
1	0	1
2	0	2
.		
62	6	2
63	6	3

3.2 Transmission point number setting switch

Set the number of transmission points for the AnyWireASLINK.

This setting also changes the number of bytes occupied by the DeviceNet.

SW		Number of transmission points			DeviceNet occupied byte number	
1	2	Input	Output	Total	Input	Output
ON	ON	32 points	32 points	64 points	16	16
OFF	ON	64 points	64 points	128 points	20	20
ON	OFF	128 points	128 points	256 points	28	28
OFF	OFF	256 points	256 points	512 points	44	44

* Always turn off the power before changing the DIP switch settings.

3.3 SET switch

This is a switch for performing error flag clear, and slave automatic address recognition.

(1) Error flag clear

Pressing the SET switch clears the error flag.

This is the same operation as clearing the error flag of the output memory.

→ P5-7

(2) Automatic address recognition

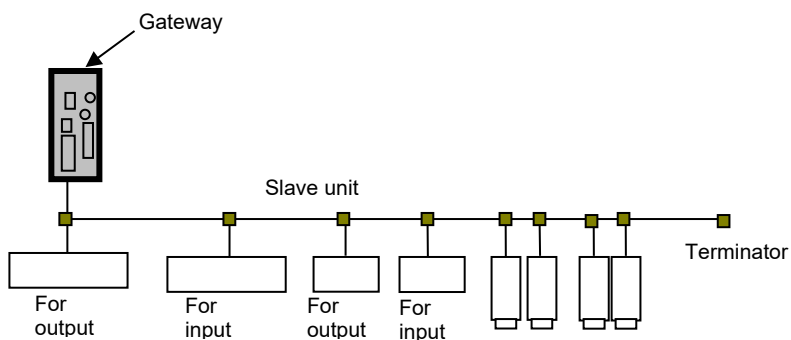
Pressing the SET switch for approximately two seconds or more lights up the "SET" LED to start automatic address recognition.

→ P6-1

4. AnyWireASLINK

4.1 System configuration

The AnyWireASLINK system consists of a master unit, slave units and their peripheral devices.



4.2 Slave units

■ Types of slave units

This product uses slave units for the AnyWireASLINK system.

The following types of slave units can be used.

Unit type	Slave
I/O terminal	ASLINK terminals and the like
Analog terminal	Analog input unit and the like
Sensor/amplifier	ASLINK sensor and the like
Other hardware	Small display unit and the like

- ◆ Confirm the model name and type of the slave unit by using the separate AnyWireASLINK system catalog.

■ Number of slave units connected

The maximum number of slave units that can be connected to one line of the AnyWireASLINK system is 128 units.

(It is necessary that both the total number of points occupied by slave units and the total consumption current of the transmission line do not exceed the maximum number of transmission points and the allowable supply current.)

■ Connection of slave units

There are roughly two types of methods for the connection of AnyWireASLINK slave units.

One is the “two-wire (non-isolated) type” method and the other is the “four-wire (isolated) type” method.

Classification	Operation
Two-wire (non-isolated) type	Slave units and connection loads are driven with just two transmission lines.
Four-wire (isolated) type	Two transmission lines are used to drive the transceivers. Slave units and connection loads are driven by two external power supply lines. This is selected when the allowable supply current via two transmission lines is insufficient, or when you wish to separate the power supply to the load.

Any configuration consisting of the two-wire type only, the four-wire type only, or a mixture of two-wire and four-wire types can be used.

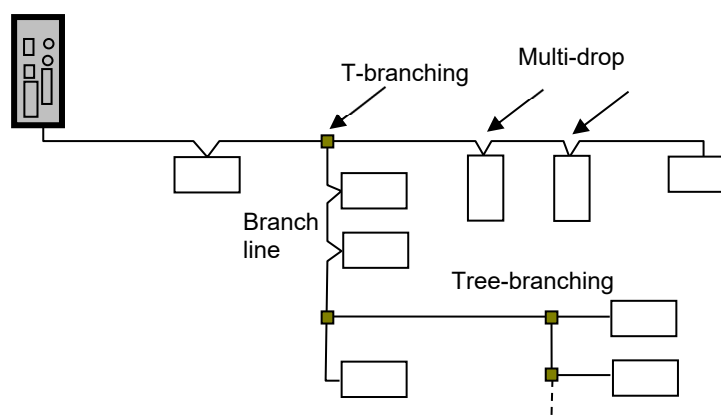
The choice whether to use a two-wire type or a four-wire type depends on the slave unit.

4.3 Transmission line (DP-DN)

The “AnyWireASLINK Protocol” is a low speed transmission clock that can also achieve effective high-speed transmission making it compatible with a wide range of cable characteristics, and therefore allows for various transmission cables and general-purpose electric wires to be used as transmission channels.

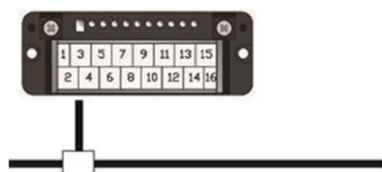
4.4 Connection mode

The AnyWireASLINK system allows for various connections such as T-branching, multi-drop, tree-branching, and star-branching.



■ T-branching method

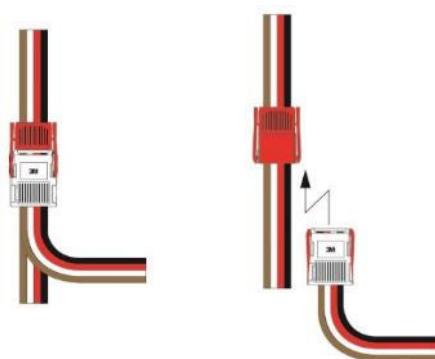
The T-branching method is a connection method to branch off a cable from an insulation displacement connector or terminal block and connect to the slave unit.



The actual wiring is shown below.

● When an insulation displacement connector is used

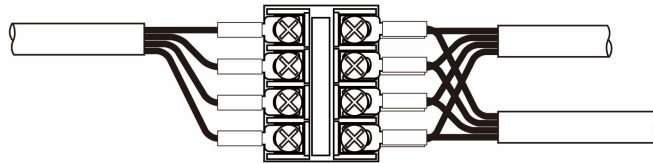
A flat cable is branched using an insulation displacement connector as described below.



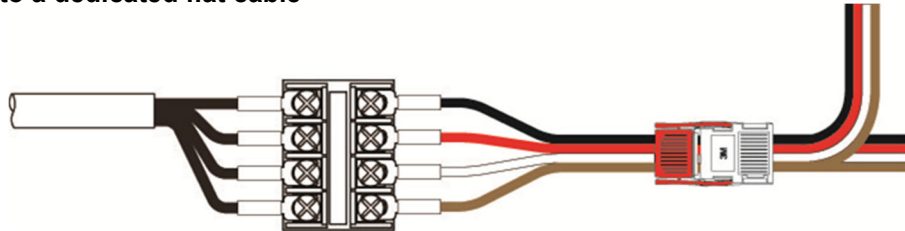
- **When a terminal block is used**

A cable can be branched as follows using a commercially available terminal block (a terminal block in which terminals that face each other are internally connected).

- **Branching between cabtyre cables**



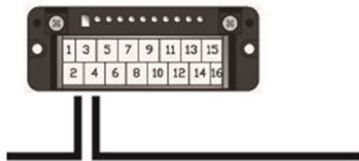
- **Conversion to a dedicated flat cable**



- **Multi-drop method**

The multi-drop method is a way to connect slave units directly to cables.

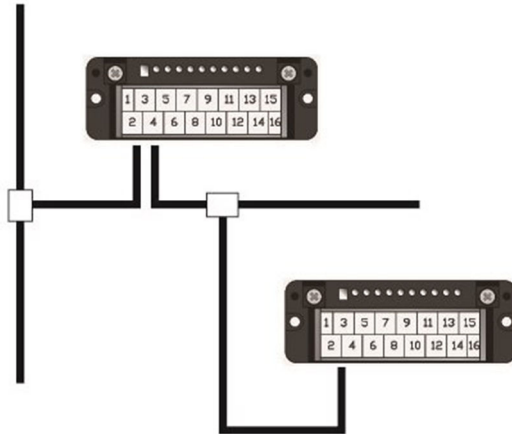
Use of this method eliminates the need for new cables or other connecting devices other than cables.



In the actual wiring, as shown in the image above, the signal lines of transmission cables from one side and those of transmission cables from the other side are integrated and connected to the slave unit.

■ Tree-branching method

The tree-branching method is a way to re-connect a T-branched branch line using the T-branching method or multi-drop method.



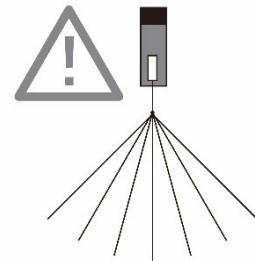
Actual wiring is the same as the T-branching method and the multi-drop method.

■ Star-branching method

The star-branching method is a way to connect the master unit and lay cable radially from a certain branching point to connect the slave unit. This method makes it easy to bundle transmission channels.

However, it also tends to easily cause reflection.

Although the AnyWireASLINK is not susceptible to reflection by a transmission method with a low-speed transmission clock, lay cables at the shortest distance with the minimum number of branches possible.

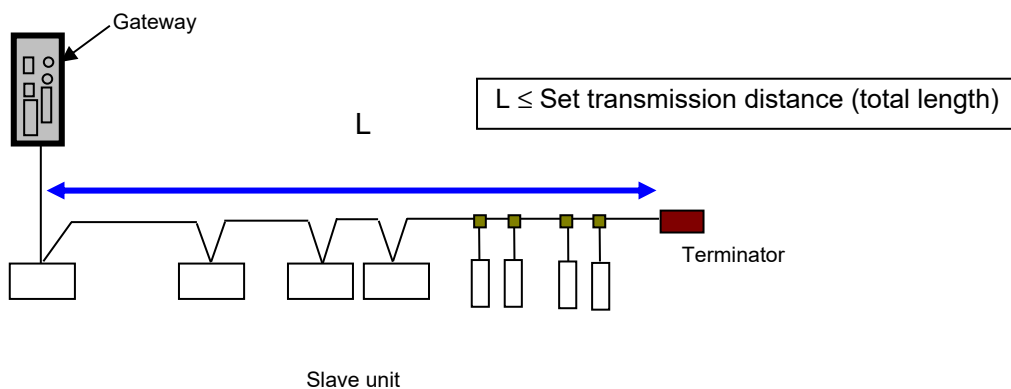


4.5 Transmission distance

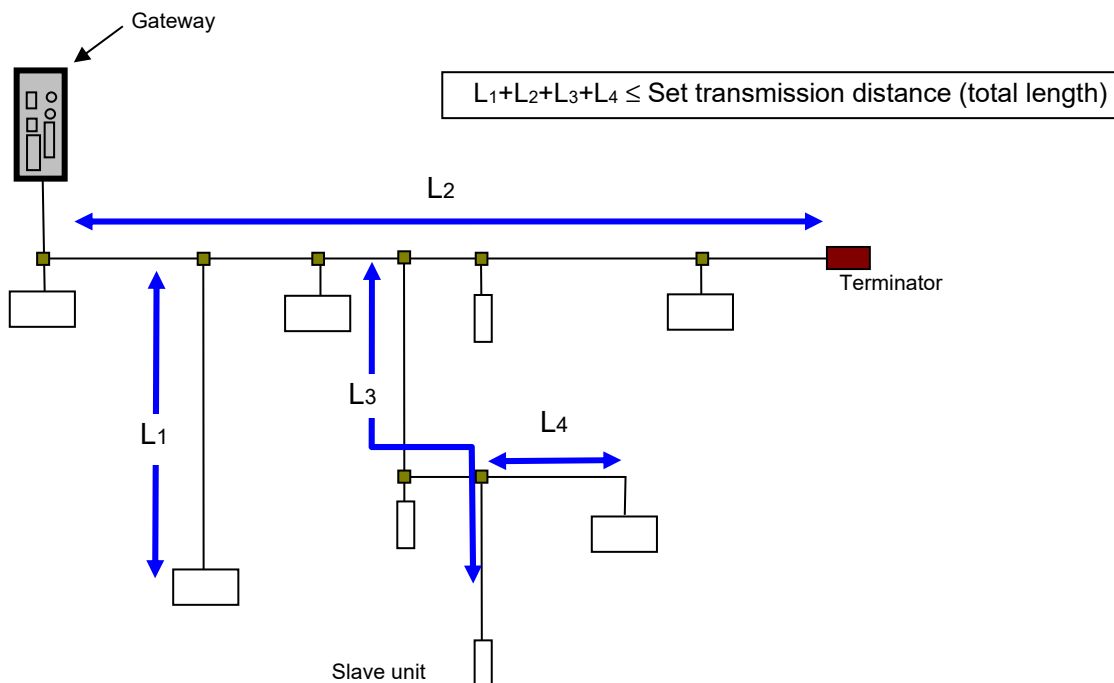
All transmission distances described for the AnyWireASLINK refer to the “total length” of a cable. Total length is the total cable length to be used including branches.

Wiring of the AnyWireASLINK system can be established with only two transmission lines (DP, DN). The two transmission lines (DP, DN) support a maximum total length of 200m. (See P2-1)
This total length also includes the length of the cable coming out of the slave unit.

● In the case of the basic type



● In the case of a branch



4.6 Transmission cable type and precautions

General-purpose cable type cables, twisted pair cables and dedicated flat cables, and similar cables can be used for the transmission cable.

Use the following for electric wires.

- General-purpose two-wire/four-wire cable (VCTF, VCT 0.75 to 1.25mm², rated temperature 60°C)
- General-purpose electric wire (0.75 to 1.25mm², rated temperature 60°C)
- Dedicated flat cable (0.75mm², 1.25mm², rated temperature 70°C)



CAUTION

Shielded cable

- Since AnyWire has high noise resistance, it is unnecessary to use shielded cable. Please note that if the shielded cable shielding is not properly grounded, it may result in problems during use.

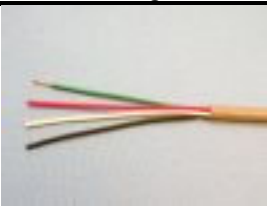




CAUTION

Transmission cable

- Be careful to prevent the voltage from dropping below the lower limit of the allowable voltage range due to voltage drop caused by the cable. Dropping below the lower limit may result in malfunction. Install a local power supply if the voltage drops significantly.
- Do not connect soldered wire directly to a terminal. Looseness may result in contact failure.

■ Electric wiring example

Type	Image	Specifications
300V vinyl cabtyre cable (VCTF)		JIS C3306 Cross-section area: 0.75mm ² Allowable current: 7A (30°C) Conductor resistance: 25.1Ω/km (20°C) or less Insulation resistance: 5MΩ/km (20°C) or more
Dedicated flat cable (HKV) Model: FK4-075-100 (100m winding)		Cross-section area: 0.75mm ² Allowable current: 7A Maximum conductor resistance: 25Ω/km
Dedicated flat cable (HKV) Model: FK4-125-100 (100m winding)		Cross-section area: 1.25mm ² Allowable current: 12.7A Maximum conductor resistance: 15Ω/km

4.7 Transmission line supply current value

The AnyWireASLINK system can be constructed with two wires.

Transmission signals as well as power for the slave unit and whatever is connected to the load side of the slave unit are superimposed on these two wires.

The allowable supply current (transmission line supply current value) from the transmission line varies depending on wire diameter and total wiring distance. It is therefore necessary that the total consumption current of the connected DP-DN (consumption current of the slave unit itself + consumption current on the load side connected to the two-wire type slave) does not exceed this allowable current value.

■ Transmission line supply current value

Length of transmission line	Wire diameter of transmission line (DP-DN)		
	1.25mm ²	0.75mm ²	0.5mm ²
Total length: 50m or less	MAX 2.0A	MAX 1.2A	MAX 0.8A
Total length: Over 50m, no longer than 100m	MAX 1.0A	MAX 0.6A	MAX 0.4A
Total length: Over 100m, no longer than 200m	MAX 0.5A	MAX 0.3A	MAX 0.2A

4.8 Terminator

This unit incorporates a circuit which shapes the transmission waveform, and functions to avoid situations where the transmission waveform is disturbed by the external environment.

Make sure to properly connect it to the transmission line as it has a polarity. (DP: Red, DN: Black)

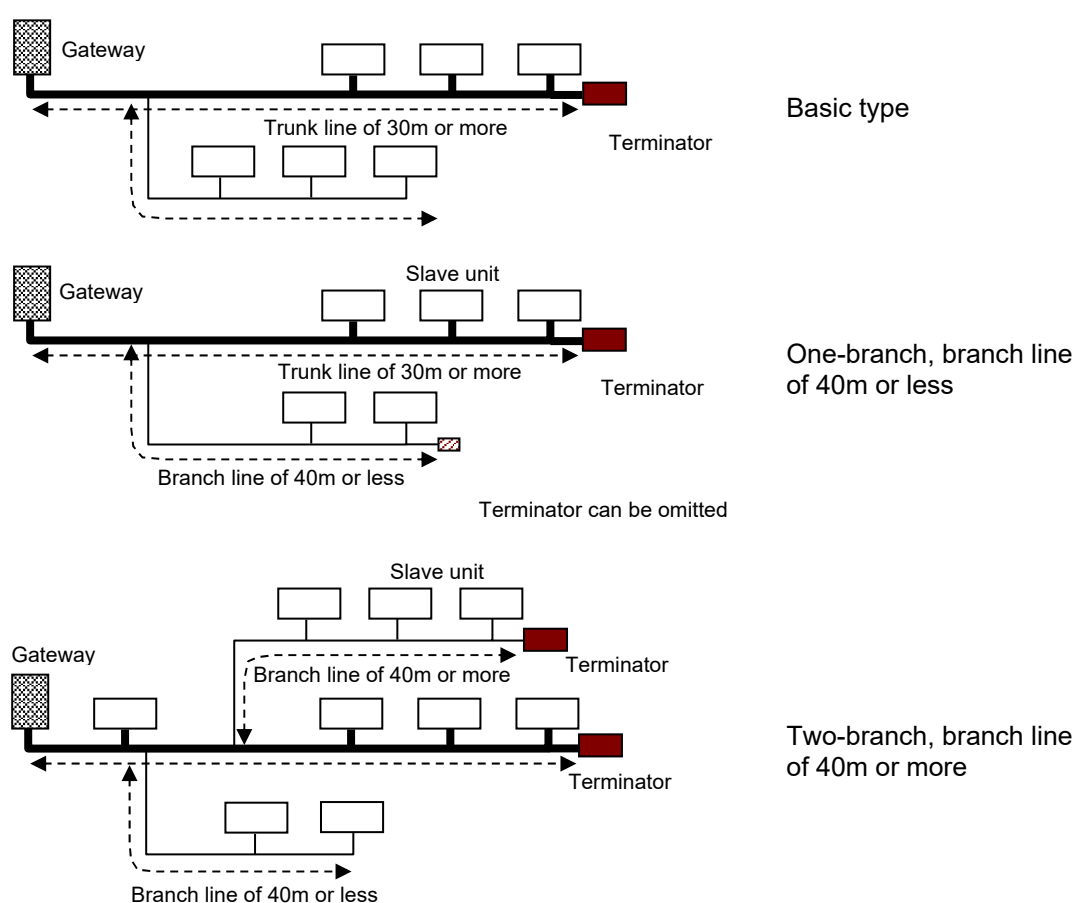
Reverse connection may result in transmission fault.

The line extended from the master unit (line wired to the very end) is called the trunk line, and the line wired and branched from the trunk line is called a branch line.

A terminator for one master unit must be connected at the farthest end of the trunk line.

When extending branch lines out from the trunk line, one terminator must be connected at the end of the branch line if the length of the branch lines is more than 40m.

Although it is possible to omit terminators if the length of the branch line of the transmission line is less than 40m, it is recommended to connect a terminator to any long branch lines of the system.



A maximum of three terminators can be connected.

4.9 AnyWire filter

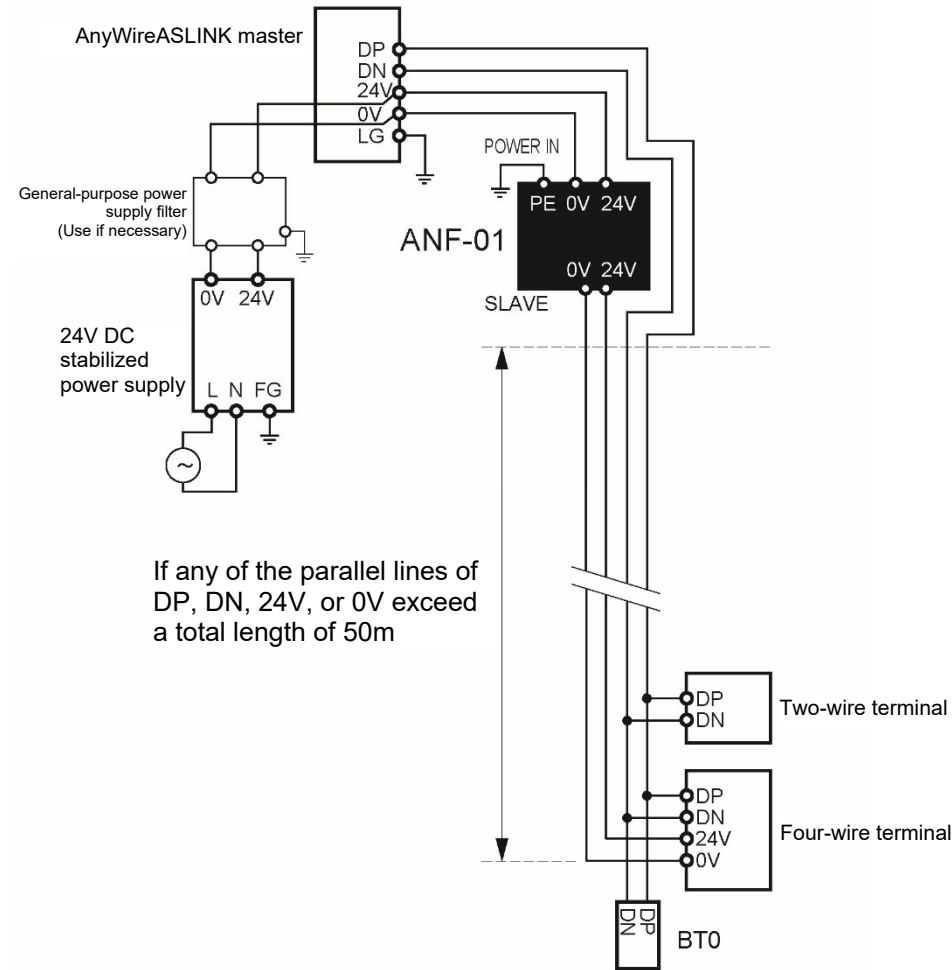
If any of the parallel lines of DP, DN, 24V, or 0V exceeds the total length of 50m in a power supply system to be supplied, connect in series the “ASLINK filter [Type ANF-01]” or a “COSEL filter [Type EAC-06-472]” to 24V and 0V in the starting position of the parallel lines.
This will improve noise resistance, reduce the impact of crosstalk by transmission signals, and stabilize the signals.
Insert a filter whether using a master power supply for the entire system or using a local power supply.

When complying with CE Standards, insert the “ANF-01” regardless of installation method and distance.

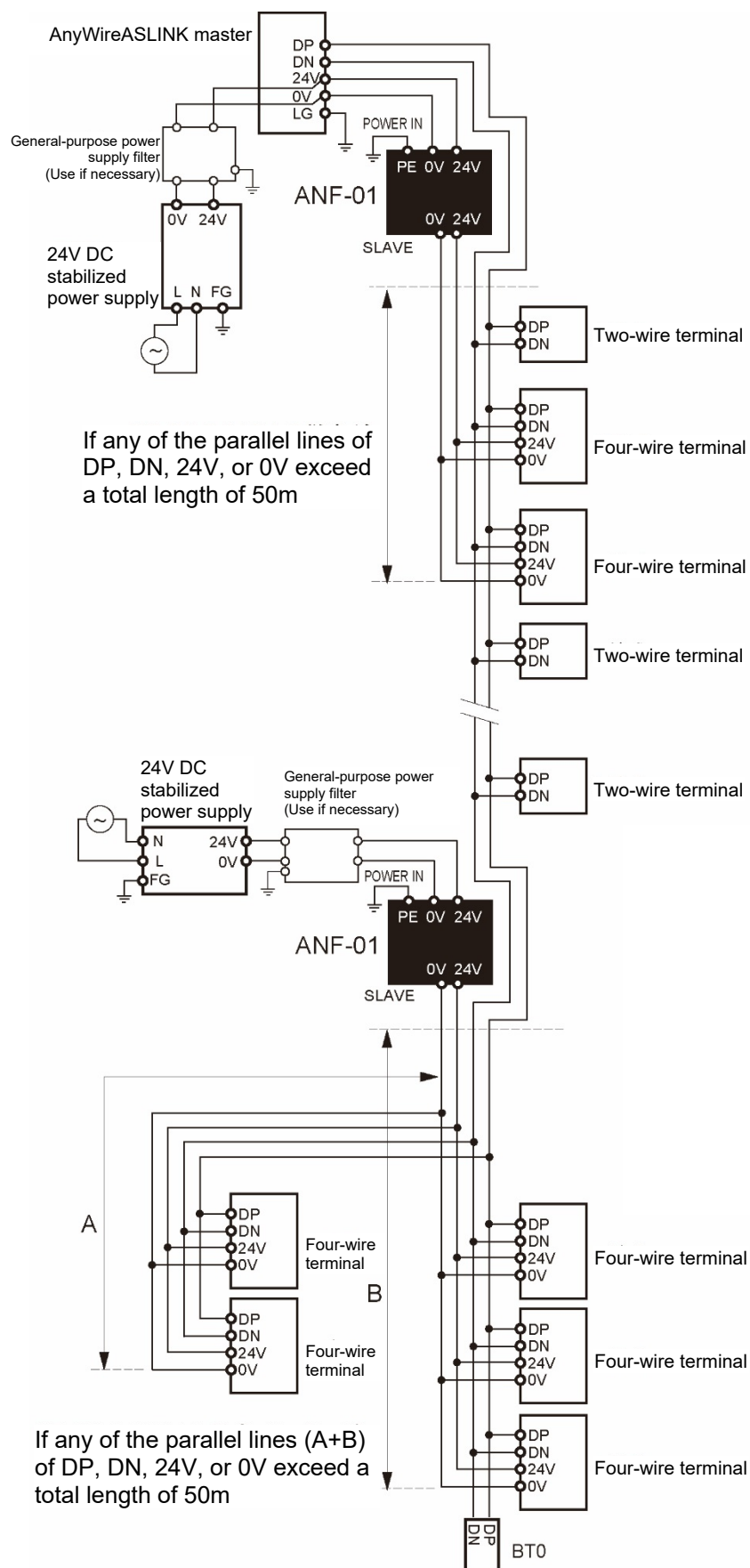
■ Filter allowable current

Model	Type	Allowable current
ASLINK filter	ANF-01	MAX 5A/24V DC
COSEL filter	EAC-06-472	MAX 6A/24V DC

■ ASLINK filter (ANF-01) connection example when there is a power supply to the entire system



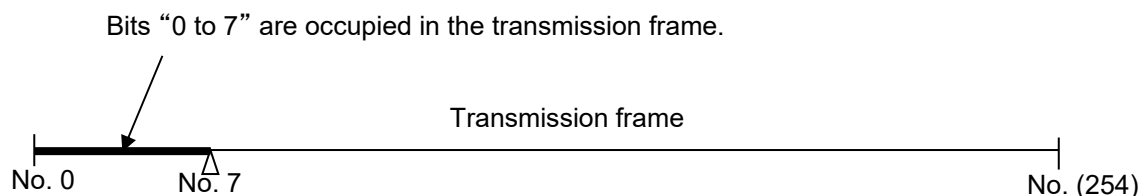
■ ASLINK filter (ANF-01) connection example when there is a local power supply



4.10 Address setting (reference)

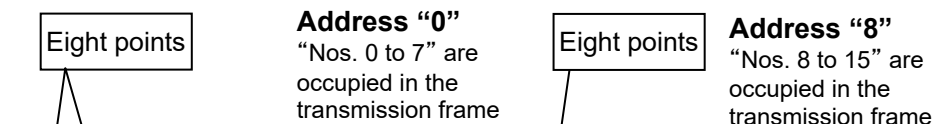
The "Address setting" of a slave unit is **determined by which number bit (in order) in the AnyWireASLINK transmission frame the slave unit is associated with.**
Each terminal occupies the location of its own point number (with the set address number placed at the beginning) from that position.
Addresses can be freely set from "0 to 254" for both input and output.

Example: Eight-point terminal: When address is "0"



Set addresses so as to avoid bit interference.

Example:



The address of a slave unit is processed as a decimal number.

Write the value that you want to set to the slave unit, using a dedicated address writer (ARW-04, ARW-03).

Bit address "255" or "511," showing that the address has not been set, is set before shipment.

Address before shipment differs depending on the slave unit.*

Input/output operations are not performed as long as an address before shipment remains unchanged.

There is no problem if "255" is included in the occupied numbers.

Example: Set address "254" to a two-point occupied terminal, and use "254" and "255."

It is necessary to be careful that the area which the slave unit occupies does not exceed the setting for the number of transmission point that is set on the master side.

* For more information, refer to the manual for the slave unit.

5. Input/output data

5.1 Input memory map

Offset byte address		bit No.															
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	0	Number of units connected								H	G	F	E	D	C	B	A
3	2	Number of alarms								Number of errors							
5	4	—	—	—	—	Latest error code											
7	6	—	—	—	—	Latest error occurrence ID											
9	8	Status details															
11	10	Sensing level															
13	12	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
15	14	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
17	16	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
19	18	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
.	.	.															
27	26	127	126	125	124	123	122	121	120	119	118	117	116	115	114	113	112
.	.	.															
43	42	255	254	253	252	251	250	249	248	247	246	245	244	243	242	241	240

The numbers from 0 to 255 in the list indicate AnyWireASLINK addresses.

- A: Unit READY
- B: Automatic address recognition flag
- C: DP, DN short-circuit error
- D: Transmission power supply voltage drop error
- E: DP-DN disconnection error
- F: Slave unit alarm signal
- G: Slave access completion flag
- H: Slave access error flag
- .: Spare

5.2 Output memory map

Offset byte address		bit No.															
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	0	—	—	—	—	—	—	—	—	—	L	—	—	—	—	K	J
3	2	—	—	—	—	Access target ID											
5	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7	6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9	8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11	10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
13	12	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
15	14	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
17	16	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
19	18	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
.	.	.															
27	26	127	126	125	124	123	122	121	120	119	118	117	116	115	114	113	112
.	.	.															
43	42	255	254	253	252	251	250	249	248	247	246	245	244	243	242	241	240

The numbers from 0 to 255 in the list indicate AnyWireASLINK addresses.

- J: Error flag clear
- K: Automatic address recognition command
- L: Slave access request command
- .: Spare

5.3 Latest error code/Latest error occurrence ID

It is possible to check the latest error code and target ID that the B2G78-D1 detected.

The latest error code list is as follows:

Error code		Name	Error occurrence ID	Countermeasures taken by customer
DEC	HEX			
200	C8	Transmission power supply voltage drop error	As this error is not dependent on individual slave units, the "0x0FFF" value is stored.	<p>The cause may be insufficient voltage of the external power supply. Perform the following:</p> <ul style="list-style-type: none"> • Adjust the voltage of the external power supply to lie within the rated range (21.6 to 27.6V). (Recommended voltage is 26.4V.) • Check that the power line (24V, 0V) is not disconnected or short-circuited. Check that the pin assignment was correct when the link connector was crimped. • Check that external power supply is correctly connected to the terminal block. Also check that there are no short-circuits, miswiring, or insufficient tightening of screws.
201	C9	DP-DN short-circuit error	As this error is not dependent on individual slave units, the "0x0FFF" value is stored.	<p>The transmission lines (DP-DN) may be short-circuited or a current exceeding the maximum allowable supply current may be flowing through them. Perform the following:</p> <ul style="list-style-type: none"> • Check that the transmission line is not short-circuited. Check that the pin assignment was correct when the link connector was crimped. • In addition, check the contact of each transmission line and that there is no improper wiring in the terminal wiring. • Modify the cable (line diameter and total length) and units (type and number of units connected) so that the consumption current of all slave units does not exceed the supply current.

Error code		Name	Error occurrence ID	Countermeasures taken by customer
DEC	HEX			
202	CA	DP, DN disconnection error	Error ID is stored.	<p>The DP, DN signal lines may be disconnected, or there may be no response from slave units. The system configuration may have been changed after slave unit failure or automatic address recognition. Narrow down the disconnected area by using error ID information or similar method, and then perform the following:</p> <ul style="list-style-type: none"> • Check that there are no disconnections in any transmission line. Also check that a link connector that is appropriate for the particular wire diameter is used and it is crimped with the correct pin assignment. • Check that signal lines are correctly connected to the terminal block. Also check that there is no miswiring or insufficient tightening of screws. • When newly creating a system or altering the system (adding or eliminating slave units, changing addresses), please carry out automatic address recognition. Then, check that the number of slave units and addresses are the same as those of the actual system. • If the slave unit "LINK" LED is not flashing, check the transmission line for disconnection, short-circuit, miswiring, or contact failure near the unit.
300 301	12C 12D	Slave unit hardware error	Occurrence ID is stored.	<p>Slave unit hardware malfunction has been detected. Turn the power of the slave unit off and on. Also, check for any problems due to noise.</p>

Error code		Name	Error occurrence ID	Countermeasures taken by customer
DEC	HEX			
302	12E	Parameter access target ID error	As this error is not dependent on individual slave units, the "0x0FFF" value is stored.	<p>Parameter access has been performed for an ID whose address has not been automatically recognized. Narrow down error IDs by checking the alarm ID information in the memory.</p> <ul style="list-style-type: none"> • Next, perform the following: Check if the slave unit ID of the parameter access target in the program matches the ID of the actual system. Note that the ID of the input slave unit and the ID of the input/output mixed slave unit are their addresses +200H. • Carry out automatic address recognition when newly creating a system or altering the system (adding or eliminating slave units, changing addresses). Then, check that the number of slave units and addresses are the same as those of the actual system.
303	12F	Parameter set value error	Occurrence ID is stored.	The slave unit has detected a signal for writing a parameter which cannot be set to itself. After narrowing down error IDs, check that the set value of the slave unit parameter is within the settable range.
304	130	Parameter access error	Occurrence ID is stored.	Check for any problems due to noise.
305	131	Parameter access error	Occurrence ID is stored.	The slave unit provides notification of error status. Check the details of the target unit status and remove the cause of the fault.
400	190	ID redundancy error	Occurrence ID is stored.	<p>A redundant address (ID) is set for a connected slave unit.</p> <p>After narrowing down error IDs, check the setting of the slave unit address (ID), and set the ID so that there will be no redundancy.</p>
401	191	ID not set error	Occurrence ID is stored. (255 or 767)	<p>There is a slave unit whose address has not been set (default setting). Perform the following:</p> <ul style="list-style-type: none"> • Set the slave unit address. • Check that the slave unit address is not set to 255.

5.4 Status details

Status details are in the following format:

Status details data															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
⑮	⑭	⑬	⑫	⑪	⑩	⑨	⑧	⑦	⑥	⑤	④	③	②	①	①

① Unit power supply status (common)

Bit status	Meaning
ON	Slave unit voltage drop
OFF	No error

② Sensing level status (link amplifier, link sensor)

Bit status	Meaning
ON	Sensing level drop
OFF	No error

③ I/O disconnection (non-isolated linker, non-isolated I/O)

Bit status	Meaning
ON	I/O disconnection
OFF	No error

④ I/O short-circuit (non-isolated linker, non-isolated I/O)

Bit status	Meaning
ON	I/O short circuit
OFF	No error

⑤ Reserved

⑥ Voltage drop on I/O power supply side (isolated linker, isolated I/O)

Bit status	Meaning
ON	Voltage drop on I/O power supply side
OFF	No error

⑦ to ⑮ Reserved

5.5 Status details/sensing level access method

After storing data of access target IDs, turn on the slave access request command to store details of the designated slave unit status and sensing level.

<Access target ID>

The ID format is as follows:

11	10	9	8	7	6	5	4	3	2	1	0
		(Type)		Address (0x00 to 0xFE)							

Type: 00: Output, 01: Input (input/output mixed)

	Description
0x000 to 0x0FE	Output slave unit
0x200 to 0x2FE	Input (input/output mixed) slave unit

Example: Input slave unit address 10 = 0x020A
Output slave unit address 3 = 0x0003

5.6 Error clear

If an error such as wire disconnection is resolved, turning on the error flag clear bit will turn off the disconnection flag and reset the number of error addresses to "0."

If the error status has not been resolved, the error flag, the number of error addresses, and the error addresses are set again.

Turning the power on again will also clear errors.

6. Monitoring function

6.1 Overview

AnyWireASLINK slave units have their own addresses, and when this machine sends out an address, a response from the slave unit with that address allows for disconnection detection and verifies the existence of the slave unit.

This machine stores the addresses of the slave units that are connected at the time via the automatic address recognition operation (described later) into EEPROM. This information is memorized even if the power is turned off.

Then, the registered addresses are sent out sequentially, and if there is no response, it is displayed by the machine's "ALM" LED as a disconnection. ssible to know the address of any slave unit that has an error via the "INFORMATION" display of this device.

6.2 Automatic address recognition

Storing addresses of the connected slave units into the EEPROM of this machine is called "Automatic address recognition."

Procedure

- 1 Check that all of the slave units operate normally.
- 2 Keep pressing the "SET" switch on this equipment until the "SET" LED (green) lights.
3. After a while, the "SET" LED will turn off. Then, address registration is completed.



CAUTION

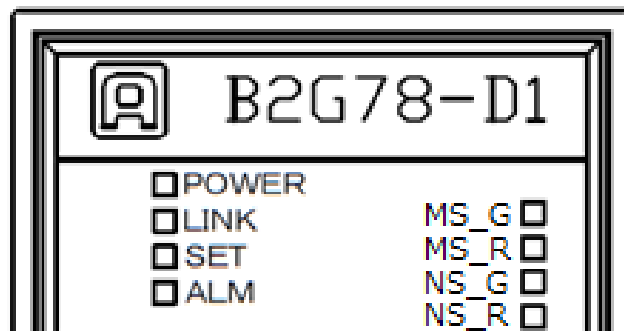
- Signals may not be inputted or outputted while an address is automatically recognized. To execute automatic address recognition, perform it in a condition not hampering the operation of the device, for instance, with the execution of a PLC program suspended.
- It is not possible to perform the automatic address recognition if there was an error in the AnyWireASLINK system, such as a short circuit, and for about five seconds after turning on the power or a reset operation.

6.3 Monitoring operation

Registered addresses are sequentially sent out, and if there is no response, it is displayed by the machine's "ALM" LED as a disconnection.

This error information is retained until the power supply is turned OFF, or until the alarm is reset. (Refer to 7. LED display.)

7. LED display



Power supply LED display

LED symbol	Color	Name	■: Lit/flashing		□: Unlit
POWER	Green	Power status	Lit	Power is ON.	Power is OFF.

DeviceNet side LED display

LED symbol	Color	Name	■: Lit/flashing		□: Unlit
MS_G	Green	Module status	Lit	Normally operating	Power is OFF, or check the state of MS_R as there is an error.
MS_R	Red	Module status	Lit	An unrecoverable error has occurred. Replacement is necessary.	
			Flashing	The node address while the power is on is changed.	Power is OFF, or check the state of MS_G as there is no error.
NS_G	Green	Network status	Lit	Online and normally operating	
			Flashing	Online but connection is not established.	Power is OFF, or node address redundancy is being checked by the master. Or check the state of NS_R as there is an error.
NS_R	Red	Network status	Lit	Node address redundancy, Busoff detection.	
			Flashing	Communication timeout	Power is OFF, or check the state of NS_G as there is no error.

ASLINK side LED display

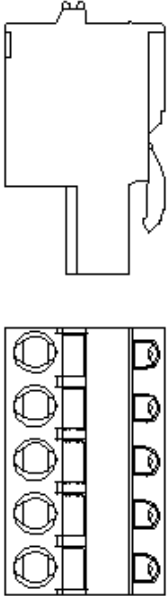
LED symbol	Color	Name	■: Lit/flashing		□: Unlit
LINK	Green	Data link status	Lit	Data link not possible.	Data link not possible.
			Flashing	Data link possible.	
SET	Green	Address recognition status	Lit	Automatic address recognition is operating.	Normally operating
			Flashing	Writing to EEPROM	
ALM	Red	Alarm status	Lit	DP, DN disconnected. No slave unit response.	Normally operating
			Slow flashing (every second)	Short-circuit between DP-DN.	
			Quick flashing (every 0.2 seconds)	24V DC is not supplied or voltage is low.	

8. Connections

8.1 Connectors

8.1.1. DeviceNet connector

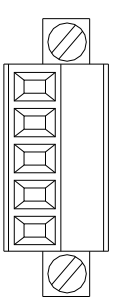
This is a DeviceNet connector terminal block. The following shows the terminal arrangement.

	Signal name	Connector color
	V+	Red
	CAN H	White
	SHIELD	Transparent
	CAN L	Blue
	V-	Black
Connector type: FKCT 2,5/ 5-ST-5,08 AUM (manufactured by Phoenix Contact)		

8.1.2. AnyWireASLINK connector terminal block

This is a connector terminal block for connecting a 24V DC power supply and AnyWireASLINK transmission lines (DP, DN).

The following shows the terminal arrangement.

	Signal name	Dedicated flat cable wire color	
		0.75sq	1.25sq
	24V	Green	Brown
	0V	White	White
	DP	Red	Red
	DN	Black	Black
	FG	--	--
Connector type: MC1,5/5-STF-3,81 (manufactured by Phoenix Contact)			

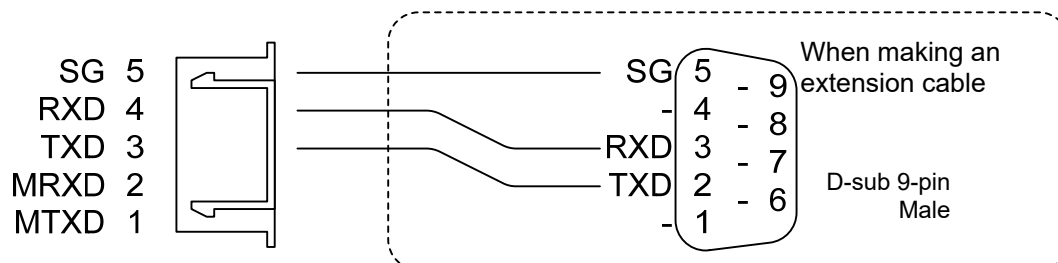
8.1.3. Monitor connector

This is a connector for connecting a debugging monitor. Signals are RS232 compatible.

Connector: Manufactured by JST

Housing: XHP-5

Contact: BXH-001T-P0.6



* Connect the above extension cable and the personal computer with a cross cable.

9. Transmission Required Time

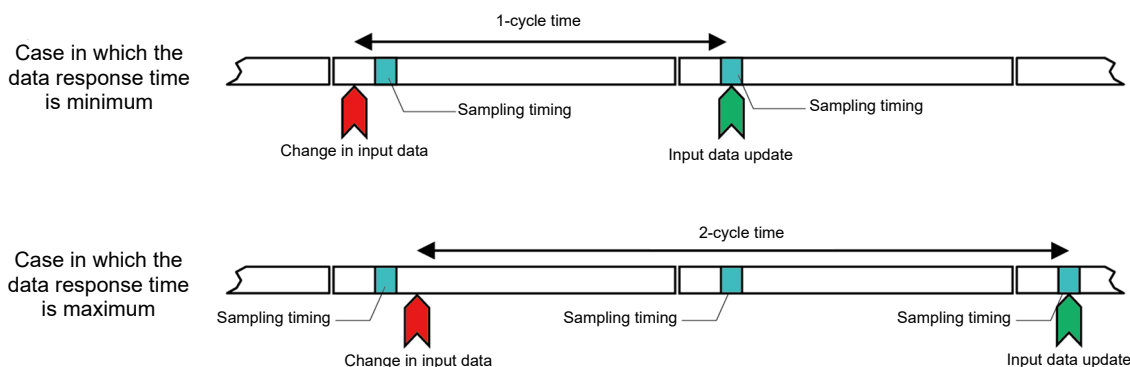
9.1 Double check

AnyWireASLINK does not update input area data unless it receives the same data consecutively twice (double check). For data update, therefore, it needs a transmission cycle time of one cycle at least and of two cycles at maximum.

[Cautions in handling an input signal]

If the signal transmission time is shorter than two cycles, the signal may not be recognized depending on the input timing. Therefore, **signal input should be longer than a two-cycle time to obtain secure response time.**

* Data is updated on a 16-bit basis between this device and the higher-order controller. With double-checking performed on a 1-bit basis, however, data cannot be guaranteed on a 16-bit basis in a strict sense.



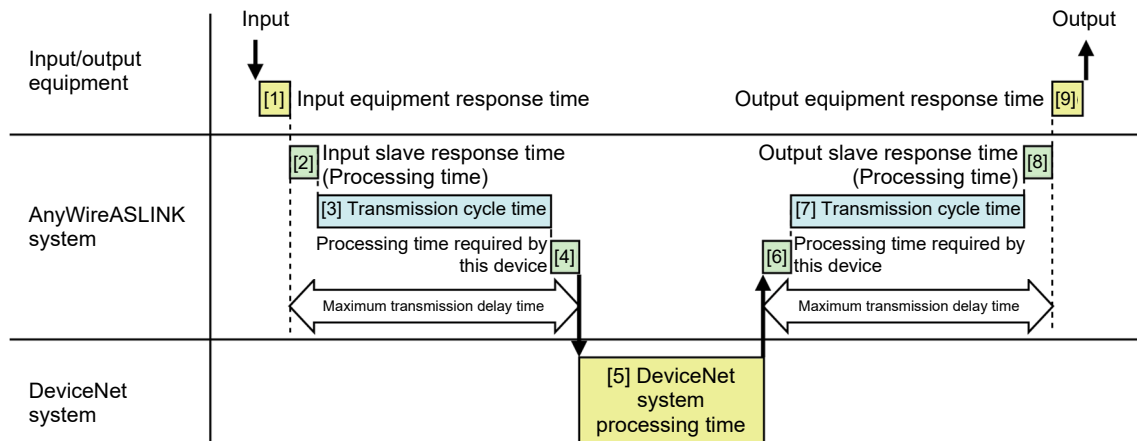
[Cautions in handling an output signal]

Data is double-checked within the output slave unit, too. For this reason, a transmission delay time of one to two cycles is needed to receive the output from the controller and to reflect that output.

Therefore, **hold the output signal from the controller for at least two cycles.**

9.2 Maximum transmission delay time

The transmission delay time from the input to the output is as shown in the following illustration.



No	Content	Time required
[1] [9]	Input/output equipment response time	Check the specifications of the input/output equipment you use.
[2] [8]	AnyWireASLINK slave unit response time (Processing time)	The specifications differ by slave unit. * For more information, refer to the manual of each slave unit.
[3] [7]	Transmission cycle time	A delay time of the transmission cycle time multiplied by one to two will occur. The transmission cycle time differs depending on how the number of transmission I/O points is set up. For more information, refer to 2.2 Performance specifications.
[4] [6]	Processing time required by this device	0.6 [ms]
[5]	Controller processing time	Controller's processing time (DeviceNet communication time, program scan time, etc.)

10. Device profile

Use the following EDS file.

- B2G78-D1.eds

EDS files can be downloaded from the AnyWire Homepage.

<http://www.anywire.jp>

Top page>Support & Download>Download

11. Troubleshooting

11.1 Visual check

Each unit has an LED status display function so that errors related to the operating state of the unit or communication can be narrowed down by checking the LEDs.

When any LED displays an error, review the setting and wiring to correct the error.

(1) Check the LED state of the gateway

1. LED display on the DeviceNet side

The "MS_G" LED is lit ⇒ Normal

If the LED is not lit, this may be due to the power being OFF or an error. See the "MS_R" state.

The "MS_R" LED is unlit ⇒ Normal (or power is OFF)

If the LED is flashing, refer to P7-1 and check the power supply, the address setting, and remove the cause of the error.

If the LED is lit, replace this device.

→ P7-1

The "NS_G" LED is lit ⇒ Normal

If the LED is not lit, this may be due to the power being OFF or an error. See the "NS_R" state.

The "NS_R" LED is unlit ⇒ Normal (or power is OFF)

If the LED is flashing or lit, refer to P7-1 and check the power supply, the address setting, and reception of the communication signal. Remove the cause of the error.

→ P7-1

2. LED display on the AnyWireASLINK side

Check the "LINK" LED.

The "LINK" LED is flashing ⇒ Normal

If the LED is unlit, check that 24V power is being supplied.

Replace this device if 24V power is being supplied or if the LED is lit.

→ P7-1

Check the "ALM" LED.

The "ALM" LED is unlit ⇒ Normal

If the LED is flashing or is lit, refer to P7-1, P11-3 to remove the cause of the alarm.

→ P7-1, P11-3

(2) Check the LED state of the slave unit

1. Check the "LINK" LED.

The "LINK" LED is flashing ⇒ Normal

If the LED is not flashing, refer to P11-4 and remove the cause of the error.

→ P11-4

2. Check the "ALM" LED.

The "ALM" LED is unlit ⇒ Normal

If the LED is not unlit, refer to P11-4 and remove the cause of the alarm.

→ P11-4

11.2 Check using input/output data

(1) Check error detail information

Gateway error codes are stored in the latest error code storage area (input offset byte addresses 4, 5).

→ P5-3

(2) Check error ID number information, alarm ID number information

Error ID numbers are stored in the error ID number information storage area (input offset byte address 2).

Alarm ID numbers are stored in the alarm ID number information storage area (input offset byte address 3).

Remove any problems until the error number or alarm number becomes "0."

→ P5-1

(3) Check error occurrence ID information

Error occurrence ID information is stored in the latest error occurrence ID information storage area (input offset byte addresses 6, 7).

→ P5-1

(4) Check status detail information

If the occurring error is a slave unit status error, status details (input offset byte addresses 8, 9) of the target ID can be checked by specifying the target ID (output offset byte addresses 2, 3) and turning on the slave access request command (6 of output offset byte 0).

→ P5-1, P5-2, P5-6, P5-7

11.3 LED state of the gateway

(1) When the “ALM” LED is lit or is flashing

① “ALM” flashes slowly (every second): DP-DN short-circuit error

Items to check	Description of measures
Check that transmission line (DP, DN) is not short-circuited	Check that the transmission line (DP, DN) is not short-circuited. Check that the pin assignment was correct when the link connector was crimped.
Check the wiring of the terminal block	Check that there is no contact of the transmission line (DP, DN) and no miswiring of the terminal block in the master or slave unit.
Check that the consumption current of the AnyWireASLINK system meets the specification	Modify cables (wire diameter, total length) and units (type, number of connections) so that the consumption current of all slave units does not exceed the transmission line supply current value of the master unit.

② “ALM” flashes quickly (every 0.2 seconds): Transmission circuit drive voltage drop error

Items to check	Description of measures
Check the voltage of the 24V DC external supply power	Make adjustments so that the voltage of the 24V DC external supply power does not exceed the rating (21.6 to 27.6V DC). (Recommended voltage is 26.4V.)
Check that the power line (24V, 0V) is not short-circuited	Check that the power line (24V, 0V) is not disconnected or short-circuited. Check that the pin assignment was correct when the link connector was crimped.
Check the wiring of the terminal block	Check that the 24V DC external supply power is properly wired to the master unit and the slave unit terminal block. Also check that there is no short-circuit, miswiring, or insufficient tightening of the screws.

③ “ALM” is lit: DP-DN (transmission line) disconnection error

Items to check	Description of measures
Check that the transmission line (DP, DN) is not disconnected	Check connection parts and continuity between lines.
Check the wiring of the terminal block	Check that there is no miswiring.
Carry out automatic address recognition	ALM lights up at initial continuity. Carry out automatic address recognition.

11.4 LED state of the slave unit

The slave unit also has a status display function using LEDs.
The display status and primary causes are described respectively.

(1) When “LINK” is lit

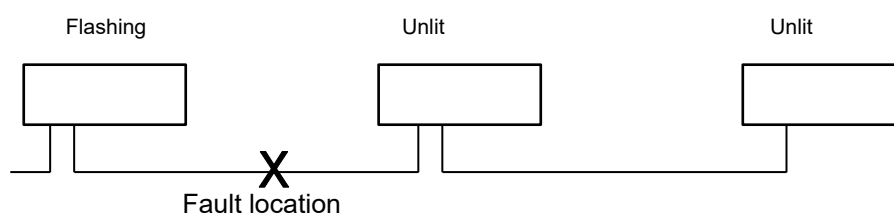
The slave unit is not receiving transmission signals. (Transmission waveform error)
Under normal conditions, a voltage of approximately 17V to 18V is observed when measuring between transmission lines (DP-DN) using a tester in DC mode.
If the measured voltage is the same as the power supply voltage, check that there is no miswiring of the transmission line.
Also check that there are no master unit errors.

(2) When “LINK” is not lit

The slave unit is not receiving transmission signals. (Transmission signal disconnection error)
Check that there is no contact failure such as looseness in the connection parts of the transmission line (DP-DN).
Check that power is being supplied to the master unit.
Check that transmission signals are reaching the terminal of the transmission line (DP-DN).
Under normal conditions, a voltage of approximately 17V to 18V is observed using a tester in DC mode.

When the transmission line is disconnected or suffers a similar fault, the position can also be identified by a difference in the “LINK” display of the terminal.

Example:



(3) When “ALM” is lit

A slave unit status error has occurred. Check the status details and remove the cause of the fault.

(4) When “ALM” is flashing

The signal voltage of the transmission line (DP-DN) is in a low state.
Check that the supply voltage of the gateway is within the allowable voltage range.
Check that the connection unit and load capacity are appropriate for the total length of the transmission line and allowable supply current.

(5) When “LINK/ALM” alternately flashes

The gateway has detected that there is a redundant ID (address) of the applicable unit or the ID is not set.
Check if there is a redundant address or if the ID has been set, and then set again.

(6) When “ALM” is lit, and “LINK, I/O” is flashing in synchronization

The connection cable of the two-wire type sensor connected to this unit is disconnected.
* Disconnection can be detected for two-wire type sensors only.

12. Warranty

■ Warranty period

The warranty on the delivered Product shall continue to be effective for one (1) year after the delivery thereof to a location as designated by the original owner.

■ Scope of warranty

Should a defect occur in any part of the Product during the foregoing warranty period when it is used normally in accordance with the specifications described in this User's Manual, the Company shall replace or repair the defect free of charge, except when it arises as a result of:

- (1) Misuse or abuse of the Product by the owner;
- (2) Faults due to a cause other than the delivered Product;
- (3) Unauthorized modification or repair of the Product by any party other than Anywire;
- (4) Any act of God, disaster, or other cause beyond the control of Anywire.

The term "warranty," as used herein, refers to the warranty applicable to the delivered product alone.

The Company shall not be liable for any damages consequential or incidental to a malfunction of the delivered product.

■ Extra-cost repair

All investigation and repair after the warranty period are made for pay.

During the warranty period, we will accept, for pay, repair of a breakdown or investigation of the cause of a breakdown due to reasons outside the above scope of warranty.

■ Changes in the product specifications and the descriptions in the manual.

The descriptions in this user's manual may be subject to change without previous notice.

13. Change history

Version	Date	Description of changes
First edition	March 20, 2015	Released
1.0	November 20, 2015	Standardization of structure, additions
1.1	August 24, 2016	"4.2 Slave units" Updated content "4.6 Transmission cable type and precautions" Revised description "4.9 AnyWire filter" Corrected allowable current from 10A to 5A
1.2	May 25, 2017	"4.2 Slave units" Updated content Added Chinese RoHS Directive, unified other expressions
1.3	August 6, 2019	Corrections to 2.1 General specifications Corrections to 2.2 Performance specifications Corrections to 4.2 Slave units Corrections to 4.10 Address setting (reference) Corrections to 6. Monitoring function Corrections to 9. Transmission Required Time Corrections to 12. Warranty Unification of other expressions Updates of the contents of Chinese RoHS Directive, new contact addresses, unification of expressions, and other matters



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