azbil

Infilex™ VC
Variable Air Volume Controller with Actuator
for LonTalk® Communication

General

Infilex VC (Infilex: named for "Infinity" and "Flexible") Model WY5306C is a VAV controller with an actuator that communicates via LonTalk® protocol. Infilex VC provides high-performance DDC of VAV unit in a building air-conditioning system. Thus, Infilex VC, networked even within a complicated HVAC system, controls VAV unit.

Besides, Infilex VC offers building owners and operators the flexible and enhanced controls of temperature and VAV for various VAV units.

Infilex VC sends unique energy-saving information to its networked zone controller, enhancing overall controllability of a building management system.

DDC: Direct digital control
HVAC: Heating, ventilation, and air conditioning
VAV: Variable air volume
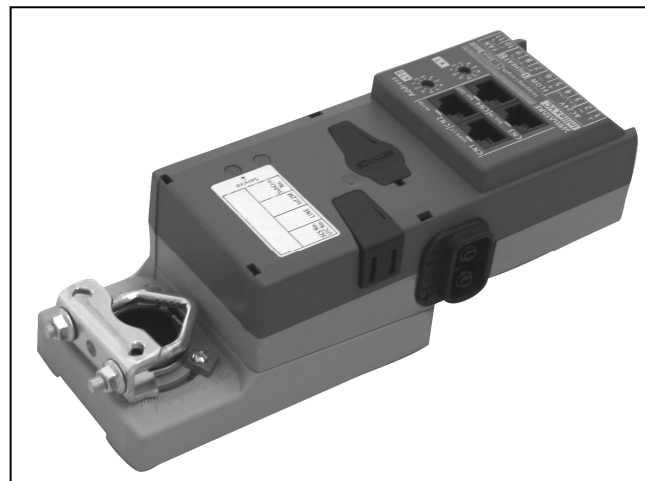
Features

- Economical efficiency:
  - Temperature and air-volume are controlled by a single controller.
  - VAV controller that resides on an actuator offers great value.

- Wide range of application:
  Most of the major VAV types for industry are preconfigured in the controller.

- Unique energy conservation control:
  - VAV damper opens wide to minimize the fan power consumed by static pressure.
  - Network with a zone controller allows supply air temperature to be modified at an optimum level.

- Advanced building management integrated into BMS:
  Our digital user terminal Neopanel enables users and operators to modify the preset setting of temperature and operating schedule (to extend) and offers flexibility of temperature control and schedule control.

- LONMARK® certified product
  VAV system is configured with LonTalk® protocol. Also, Infilex VC is LONMARK® (version 3.4) certified and thus interoperable integrated in the LONWORKS® system.

- CE Marking certified product:
  Infilex VC Model WY5306C conforms to all the applicable standards of CE Marking.

∗ Our controller Infilex series: Infilex is named for "Infinity" and "Flexible".

LONMARK®3.4

Safety Precautions ──

Please read instructions carefully and use the product as specified in this manual. Be sure to keep this manual nearby for quick reference.

Restrictions on Use

| |
|---|
| This product was developed, designed, and manufactured for general air conditioning use. |
| Do not use the product in a situation where human life may be at risk or for nuclear applications in radiation controlled areas. If you wish to use the product in a radiation controlled area, please contact Azbil Corporation. |
| Particularly when the product is used in the following applications where safety is required, implementation of fail-safe design, redundant design, regular maintenance, etc., should be considered in order to use the product safely and reliably.
· Safety devices for protecting the human body
· Start/stop control devices for transportation machines
· Aeronautical/aerospace machines |
| For system design, application design, instructions for use, or product applications, please contact Azbil Corporation. |
| Azbil Corporation bears no responsibility for any result, or lack of result, deriving from the customer's use of the product. |

Warnings and Cautions

⚠ WARNING	Alerts users that improper handling may cause death or serious injury.
⚠ CAUTION	Alerts users that improper handling may cause minor injury or material loss.

Signs

⚡	Alerts users possible hazardous conditions caused by erroneous operation or erroneous use. The symbol inside △ indicates the specific type of danger. (For example, the sign on the left warns of the risk of electric shock.)
🚫	Notifies users that specific actions are prohibited to prevent possible danger. The symbol inside ⊘ graphically indicates the prohibited action. (For example, the sign on the left notifies that disassembly is prohibited.)
❗	Instructs users to carry out a specific obligatory action to prevent possible danger. The symbol inside ● graphically indicates the actual action to be carried out. (For example, the sign on the left indicates general instructions.)

⚠ WARNING
⚡ Before wiring and maintenance, be sure to turn off the power to the product. Failure to do so might cause electric shock.
🔥 To control a VAV unit with electric heater, be sure to provide a circuit to prevent temperature rise. Failure to do so might cause fire or overheating.
🔥 To control a VAV unit with electric heater, configure the system so that air conditioning unit will not stop when the VAV unit is turned off. This allows the electric heater to cool down after it is turned off. Failure to do so might cause fire or device damage.

⚠ CAUTION	(1/2)
❗ Installation and wiring must be performed by qualified personnel in accordance with all applicable safety standards.	
❗ Install and use the product in a location that meets the operating conditions (temperature, humidity, power, vibration, shock, mounting direction, atmospheric condition, etc.) as listed in the specifications. Failure to do so might cause fire or device failure.	
❗ All wiring must comply with applicable codes and ordinances.	
❗ Make sure all the wires are tightly connected to the corresponding terminals. Failure to do so might cause device failure or overheating.	

⚠ CAUTION	(2/2)
❗	For wiring, strip each wire insulation as specified in this manual. If the strip length is longer than the specified, the stripped part of the wires will be exposed, causing electric shock or short circuit between adjacent terminals. If it is shorter, the stripped part will not contact the connector.
❗	If more than the rated power voltage is applied to the product, replace the product with new one for your safety. Failure to do so might cause device failure or overheating.
❗	Be sure to provide a circuit breaker for the power to the product as the product does not have a power switch.
🚫	Do not test the withstand voltage of the product. Doing so might cause accident or device failure.
🚫	Do not disassemble the product. Doing so might cause electric shock or device failure.
🚫	Do not touch the moving parts of the product. Doing so might cause injury.
🚫	Do not incinerate the product for waste disposal. The cover will generate toxic gas when being incinerated. Do not reuse all or part of this product after disposal of the product.
❗	Dispose of the product as industrial waste in accordance with your local regulations. Do not reuse all or part of this product.

System Configuration

Infilex VC integrated into our building management system (BMS): *savic-net™ FX*
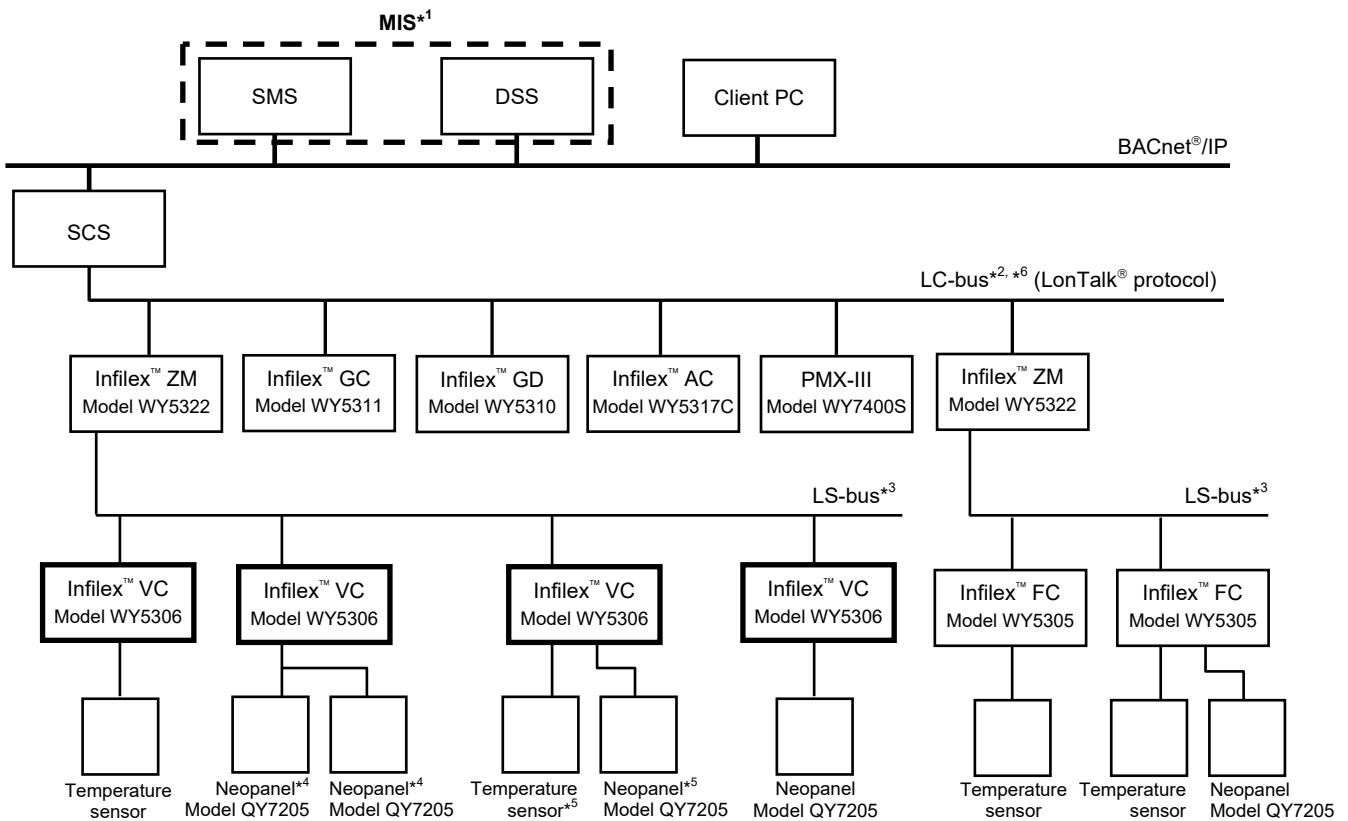
DSS: Data Storage Server
MIS: Management Integration Server
PMX-4: PARAMATRIX™ 4
SCS: System Core Server
SMS: System Management Server

Notes:
*1 MIS may be used instead of SMS and DSS for your savic-net FX system. Note that MIS cannot coexist with SMS or DSS in the same system.
*2 Maximum number of remote units (also known as "controllers") that can be connected to SCS via LC-bus varies depending on the system configurations.
*3 Maximum number of sub remote units (also known as "sub controllers") such as Infilex VC and Infilex FC that can be connected to Infilex ZM via LS-bus varies depending on the system configurations.
*4 Up to two Neopanel can be connected to one Infilex VC.
  For two Neopanel connection, provide Model QY7205CXXX1 for the address 1 and Model QY7205CXXX2 for the address 2.
*5 Neopanel and a temperature sensor can be connected to the same Infilex VC.
*6 Network variable enables Infilex VC to directly connect to other controllers via LC-bus without Infilex ZM.

Figure 1. System configuration example: Infilex VC integrated into *savic-net FX* BMS

Model Numbers

Base model number	Power	—	Actuator	DO output	—	Description
WY5306						Inflex VC for LonTalk® protocol (of savic-net™ FX system)
	C					24 V AC
		5				Fixed.
			1			5 N·m torque
			2			10 N·m torque
				1		With internal air flow sensor, DO: 0 pt.
				3		With internal air flow sensor, DO: 3 pts. (2 pts. for reheat control, 1 pt. for fan control)
					0	Fixed.

Part Numbers of Optional Parts and Tools

Item	Part number
Universal bracket	12595-00001
Modular branch unit	DY7203A0000
Modular relay units (5 pieces/set)	DY7202A0000
Adapters for connecting to a Pt100 temperature sensor (10 pieces/set)	DY7204A0003
Adapters for connecting to a user terminal (10 pieces/set)	DY7204A0008
Modular plugs (100 pieces/set)	DY7207A0100
Modular crimper	DY7205A0002
Modular cable tester	DY7206A0000
Free topology terminator	DY7212A1100
Bus topology terminator	DY7212A1101

Note:
 * For details of the optional parts and tools shown above, see the **Optional Parts** and **Optional Tools** sections.

Specifications

Basic specifications

Item		Specification		
Power supply		24 V AC ± 15 % (50 Hz/60 Hz)		
Power consumption		5 N·m: 9 VA / 10 N·m: 10 VA		
Rated torque		5 N·m / 10 N·m		
Operating range		To 95°		
Operating time (for 95° operating angle)		Operation mode	5 N·m torque type	10 N·m torque type
		Forced open/close	150 seconds	150 seconds
		Synchronisation (An operation mode to synchronise the actuator position with the damper position.)	75 seconds	86 seconds
		Automatic control (with variable speed)	120 to 300 seconds	120 to 300 seconds
Attachable damper shaft		5 N·m torque type	10 N·m torque type	
	Thickness	Φ6 mm toΦ20 mm (circular cross section)	Φ8 mm toΦ26.7 mm (circular cross section)	
		4.5 mm square to 14 mm square (square cross section)	5.7 mm square to 18.8 mm square (square cross section)	
	Length	37 mm or longer	40 mm or longer	
Operating environmental conditions		Temperature	0 °C to 50 °C	
		Humidity	10 %RH to 90 %RH (Non-condensing)	
		Vibration	Max. 3.2 m/s² (10 Hz to 150 Hz)	
Transport/storage conditions		Temperature	-20 °C to 60 °C	
		Humidity	5 %RH to 95 %RH (Non-condensing)	
		Vibration	Max. 9.8 m/s² (10 Hz to 150 Hz)	
Enclosure rating		Equivalent to IEC IP30: Dust-proof (in wired, covered, and plugged state)		
Sound power level		35 dB or lower		
Installation		In VAV control box		
Address setting		Rotary switch × 2		
Materials		Back plate: Zinc plated steel Clamps and screws : Zinc plated steel Housing: PC-ABS Cover of air flow sensor: Thermoplastic elastomer Cover of nonuse connector (for setting): Thermoplastic elastomer Universal bracket: Zinc plated steel		
Weight		5 N·m torque type: 500 g 10 N·m torque type: 800 g		
Accessory		2 RC snubbers (required when connecting a device/devices to the terminals 7, 8, and 9.)		

IEC: International Electrotechnical Commission
PC-ABS: Polycarbonate acrylonitrile butadiene styrene
VAV: Variable air volume

Input/output specifications

Unit to be connected	Input/output description		Input/output specification	Connection type	Wire/tube specification
VAV unit	Air flow signal input	Air flow pulse	Voltage pulse input Voltage: 5 V DC $\pm$ 20 % for high level 0 V DC to 0.5 V DC for low level Current: Max. 10 mA Pulse width: 450 μs or more for high level 450 μs or more for low level Frequency: Max. 1000 Hz + 10 % or less 100 Hz or higher for full span Current restriction resistance: 470 Ω	Terminal connection: Push-in terminal block	2.5 mm^2 or smaller Max. 5 m
		Direct air flow sensor	Differential pressure input sensor Differential pressure sensing range: ΔP = 0 Pa to 250 Pa Temperature characteristics: $\pm$ 0.5 % of full span $^\circ$C (0 $^\circ$C to 50 $^\circ$C, 1013 hPa)	Tube connection	Length: Max. 1m at each port Inner diameter (flexible tube): 5.0 mm to 6.0 mm Inner diameter (inflexible tube): 5.5 mm to 6.5 mm Outer diameter: Max. 10.0 mm Material: PVC, silicon rubber (e.g., TYGON$^\circledR$ Model R-3603)
	Heater and fan		Dry contact 30 V AC, 0.8 A or 30 V DC, 0.5 A	Terminal connection: Push-in terminal block	2.5 mm^2 or smaller Max. 5 m
Temperature sensor	Pt100 input		Pt100 temperature sensor Input temperature range: 0 $^\circ$C to 50 $^\circ$C	Connector connection[1]	LAN cable[2] Max. 50 m
User terminal	Temperature setting Air conditioning ON/OFF		Serial voltage transmission Transmission speed: 100 bps	Connector connection[1]	LAN cable[2] Max. 50 m
Communication line	LonTalk protocol		Transmission system: LonTalk protocol (TP/FT-10) Transmission speed: 78 kbps	Connector connection[1]	LAN cable[2] Max. 900 m (for bus communication)
Power supply	—		Power supply voltage: 24 V AC $\pm$ 15 %	Terminal connection: Push-in terminal block	2.5 mm^2 or smaller

Notes:
*1 For connector connection, use Bel Stewart Connector's Plug: Model SS-37000-002.
 This plug is also available at Azbil Corporation. (Part No. DY7207A0100, 100 pieces/set)
*2 LAN cable compliant with EIA/TIA-568 Category 3 or over (Φ0.5 mm $\times$ 4 poles) is required.
 For *1 and *2, the connector cable (regular cable: Part No. DY7210, short cable: Part No. DY7220) are available at Azbil Corporation.

Dimensions

5 N·m torque type
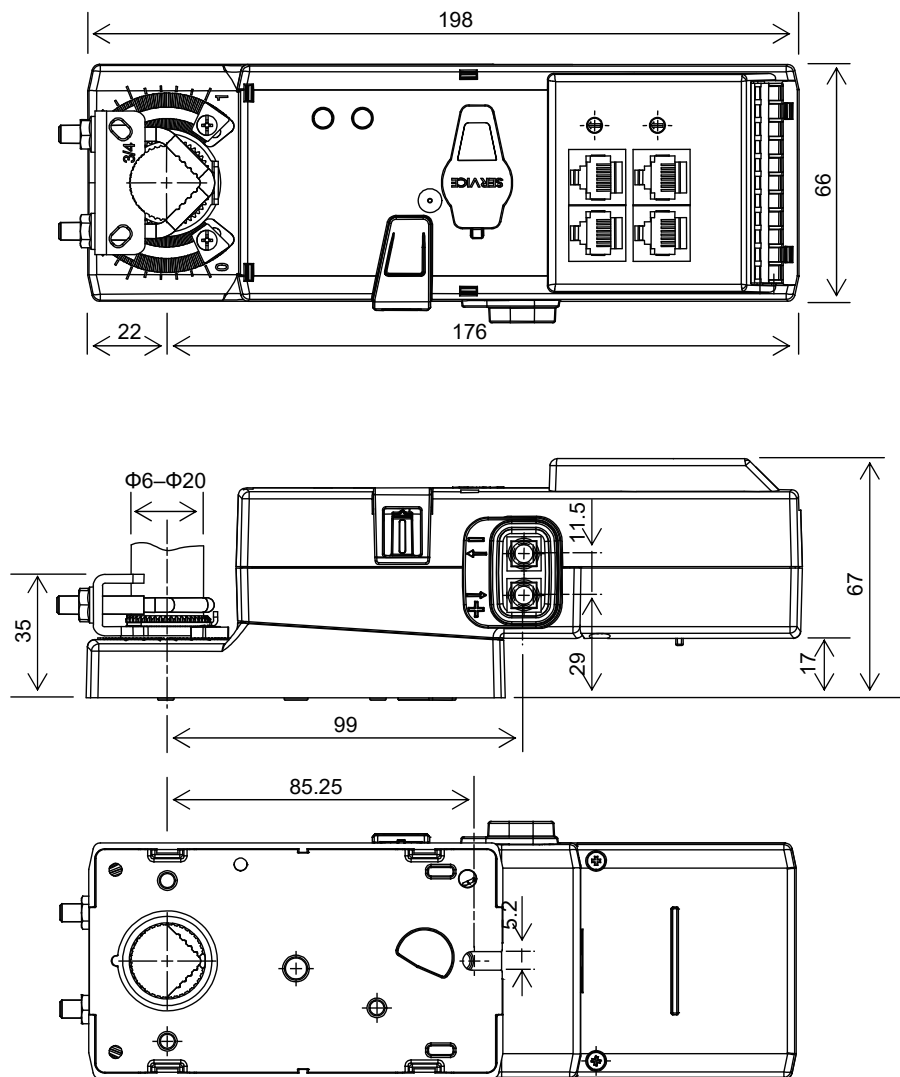
Figure 2. Dimensions: 5 N·m torque type (mm)

10 N·m torque type
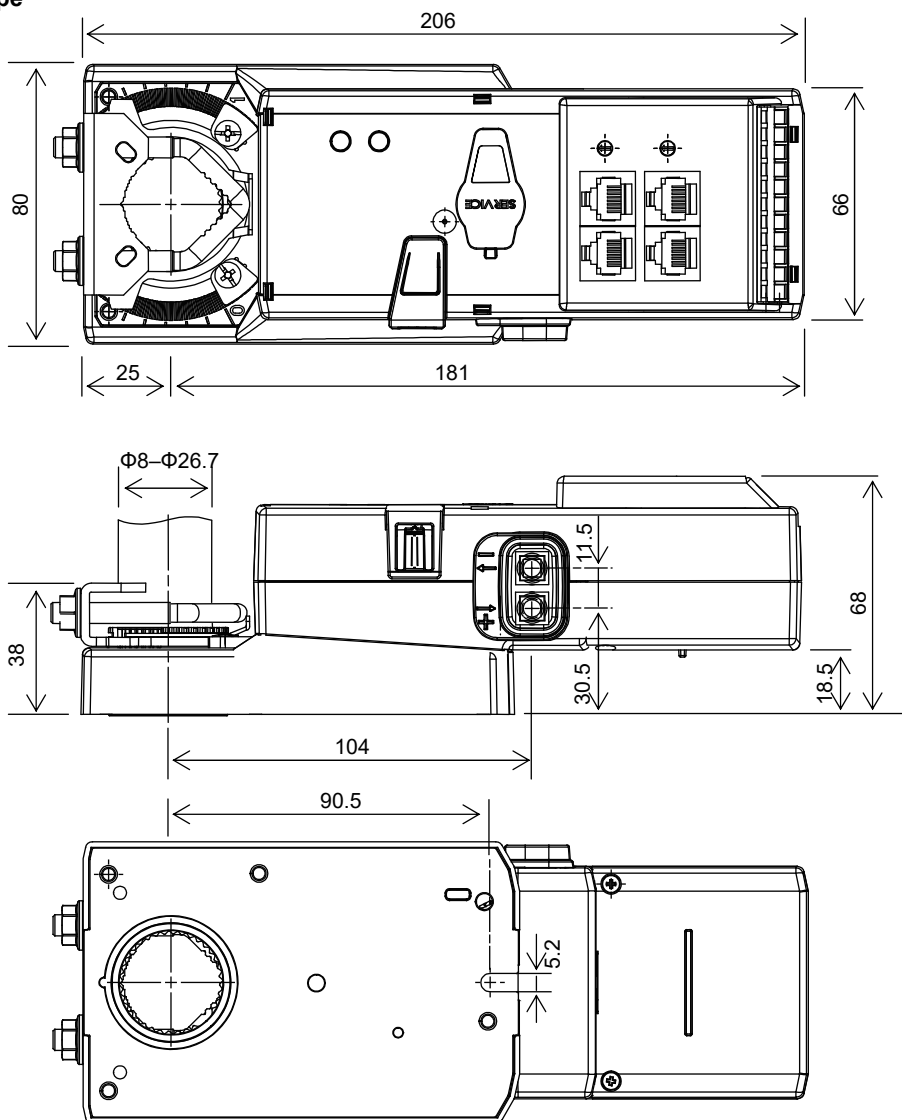
Figure 3. Dimensions: 10 N·m torque type (mm)

Universal bracket (requiring separate order)
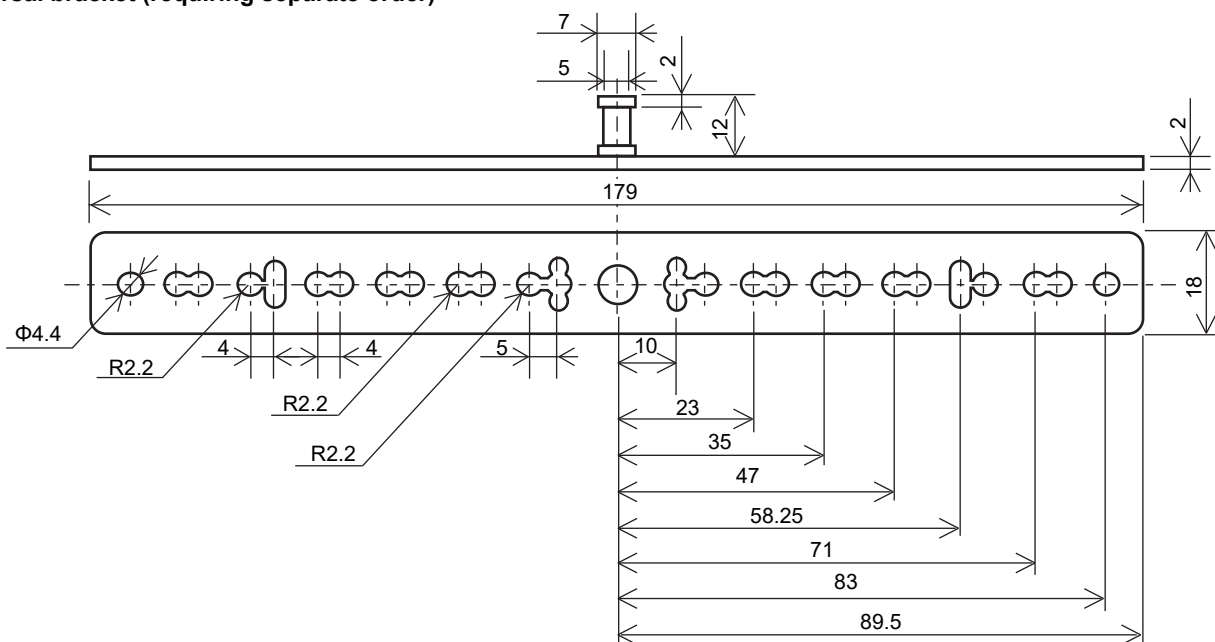
Figure 4. Dimensions: Universal bracket (mm)

Parts Identification

Rotation angle adjuster

Green LED

Orange LED

Address switch

Wire connection indication
(printed on the body)
(See Fig. 6.)

Terminal block (11 pin)

Rotation angle adjuster

Connector (modular jack)

Nonuse connector (for setting)

Gear release button

Damper shaft

Low pressure port
for differential pressure pickup

High pressure port
for differential pressure pickup

Mounting slit

Figure 5. Parts identification

Wire Connection Indication
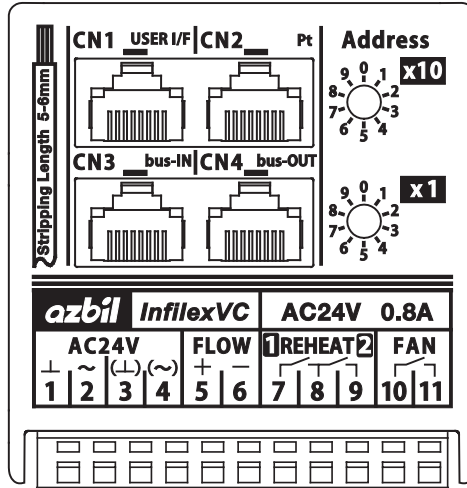
Figure 6. Wire connection indication printed on Model VY5306C5X30

Wire Connection Examples

Electric heater connection
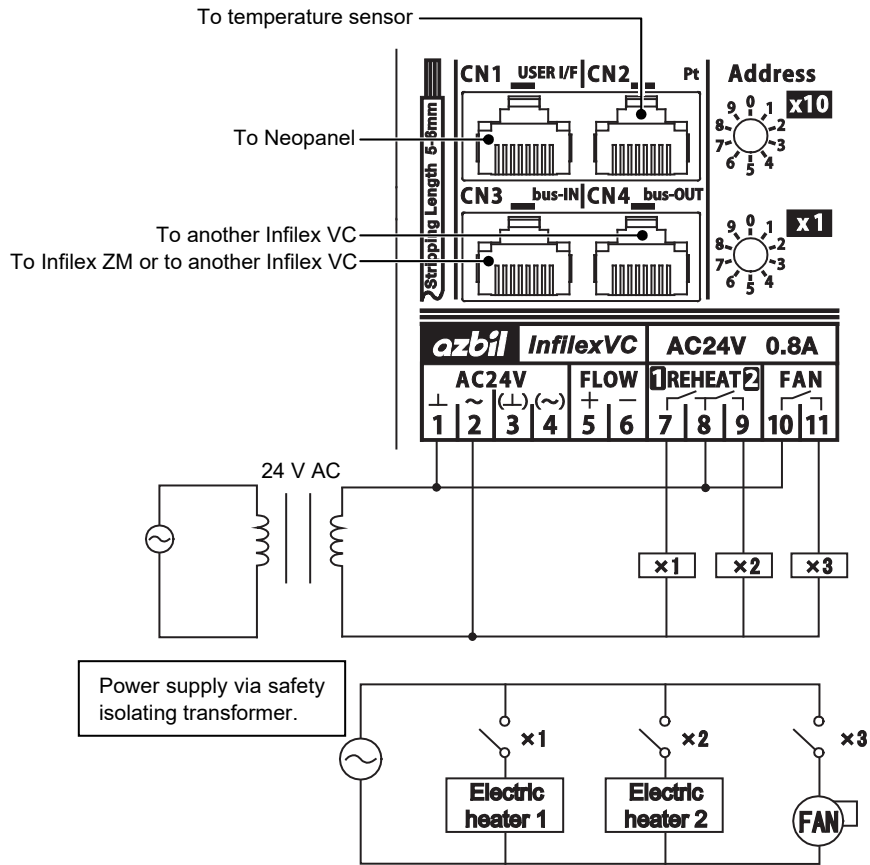
Notes:
* Operate electric heater and fan by a relay with 24 V AC operating voltage.
* When an electric heater is connected, additionally provide a circuit to prevent temperature rise.

Figure 7. Connection example for two-step electric heater + fan output control (Model WY5306C5X30)

Floating control valve connection

CN1 USER I/F CN2 Pt Address

x10

x1

CN3 bus-IN CN4 bus-OUT

Stripping Length 5-6mm

azbil InflexVC AC24V 0.8A

AC24V FLOW 1 REHEAT 2 FAN
⊥ ~ (⊥) (~) + −
1 2 3 4 5 6 7 8 9 10 11

Power supply via safety isolating transformer.

×1

M

FAN ×1

Notes:
* Operate fan by a relay with 24 V AC operating voltage.
* Rated voltage of reheater output is 30 V AC. If the voltage of reheater output exceeds 30 V AC, operate reheater valve by a relay.
* For accurate control of Inflex VC installed in a 24-hour system, floating valves are automatically closed when they are kept unclosed for 48 hours.

Figure 8. Wiring example for floating control (Model WY5306C5X30)

Two-step control valve connection

To temperature sensor

CN1 USER I/F CN2 Pt Address

x10

To Neopanel

CN3 bus-IN CN4 bus-OUT

x1

To another Inflex VC
To Inflex ZM or to another Inflex VC

Stripping Length 5-6mm

azbil InflexVC AC24V 0.8A

AC24V FLOW 1 REHEAT 2 FAN
⊥ ~ (⊥) (~) + −
1 2 3 4 5 6 7 8 9 10 11

24 V AC

Power supply via safety isolating transformer.

×1

FAN ×1

Notes:
* Operate fan by a relay with 24 V AC operating voltage.
* Rated voltage of reheater output is 30 V AC. If the voltage of reheater output exceeds 30 V AC, operate reheater valve by a relay.
* For ON/OFF valve, use a valve with automatic return or spring return function.

Figure 9. Wiring example for two-step control (Model WY5306C5X30)

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Installation

Installation precautions

● Before installation, be sure to turn off the power to the product.

● Leave the maintenance clearance as shown in the figure below.
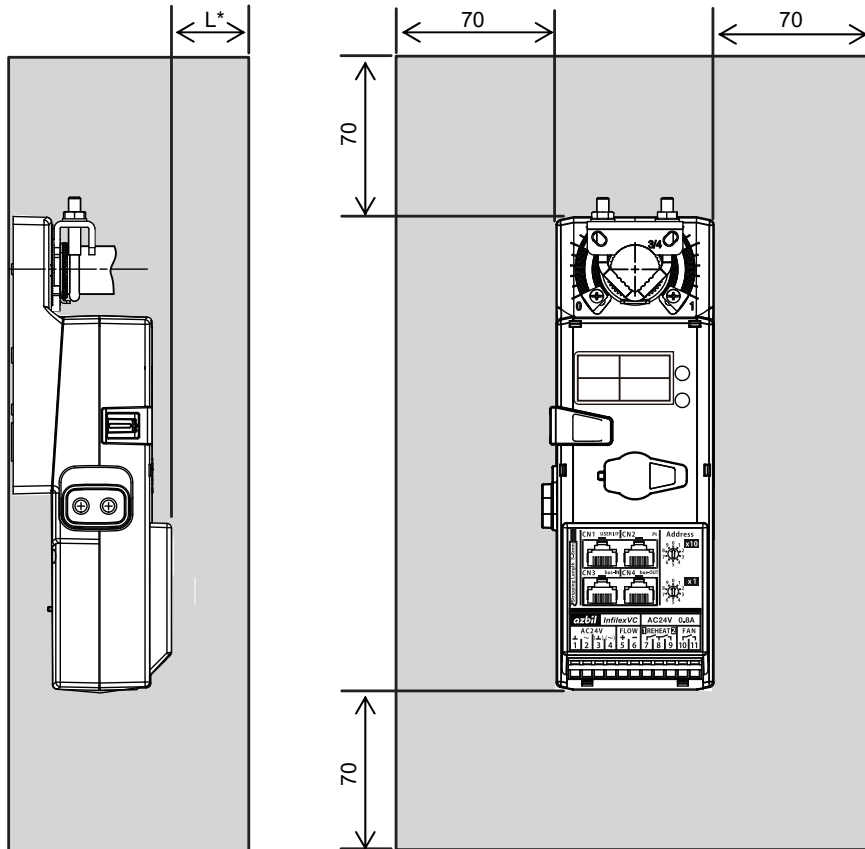
Note:
  * Dimension L must be larger than [size Φ of the modular cables to be connected x 4] for the bend radius.
    (e.g., Dimension L for Φ6 mm modular cable is larger than 24 mm for bend radius.)

Figure 10. Maintenance clearance (mm)

Installation procedure

1) Fully close the VAV damper shaft.
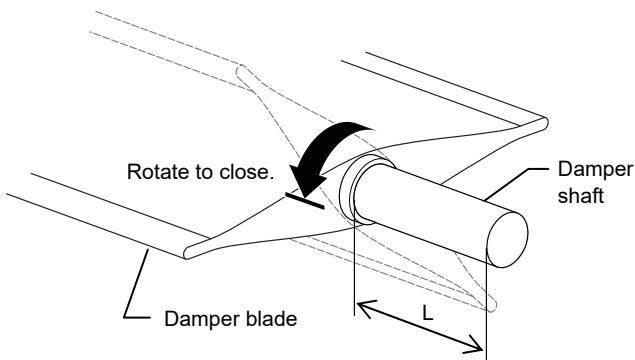
Figure 11. Damper shaft

Actuator torque type	L: Minimum length of the shaft (mm)	Diameter of the shaft (mm)	
		◯ ↕	☐ ↕
5 N·m	37	6 to 20	4.5 to 14
10 N·m	40	8 to 26.7	5.7 to 18.8

2) Fully close the actuator of this product, and mount it to the damper shaft. Finger-tighten the fastening nuts of the shaft clamp to temporarily fix the actuator.
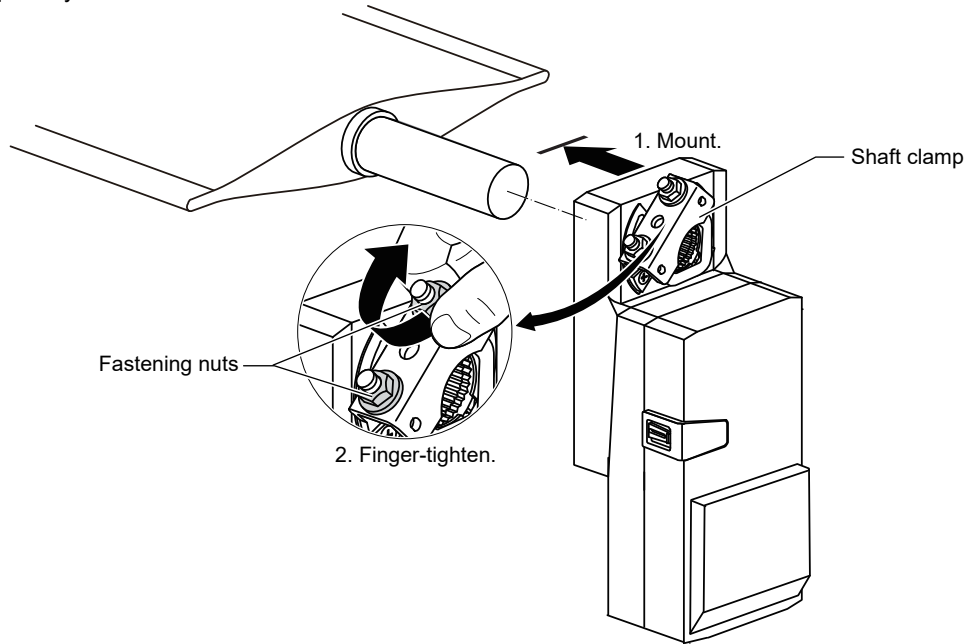
Figure 12. Temporal installation of the actuator body

3) While pressing the gear release button, manually rotate the shaft clamp until it is in the upright position. Then, insert the universal bracket (protruding part) into the slit of this product and fix the bracket with the two M4 tapping screws.
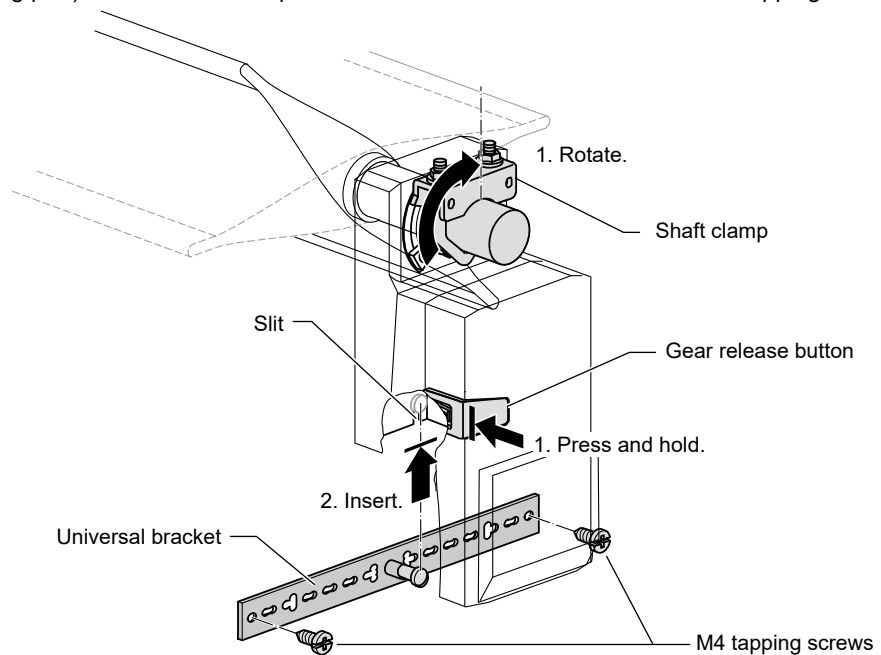
Note:
   The universal bracket, required for the installation of this product, is commercially available. The universal bracket is also available at Azbil Corporation (Universal bracket: Part No. 12595-00001). Be sure to separately order if necessary.

Figure 13. Attaching the universal bracket

4) Manually rotate the shaft clamp back to the fully closed position while pressing the gear release button. At this time, be sure to leave a clearance (approx. 1 mm) between the shaft clamp and the rotation angle adjuster (mechanical stopper) for the fully closed position. This will allow the actuator to shut off the damper. Using a wrench, tighten the fastening nuts of the shaft clamp to completely fix this product. See the following table for the nut fastening torque.

Actuator torque type	Nut fastening torque (N·m)
5 N·m	5 to 6
10 N·m	8 to 9
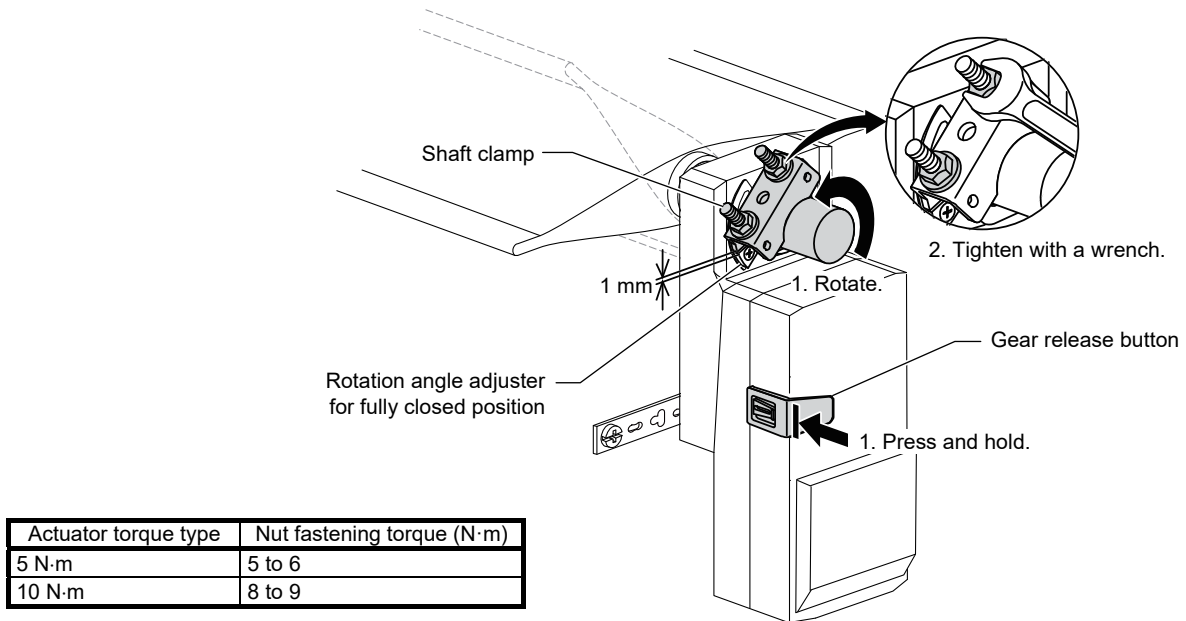
Figure 14. Complete installation of the actuator body

5) Manually rotate the shaft clamp to fully open the damper and set the rotation angle adjuster for the fully open position.
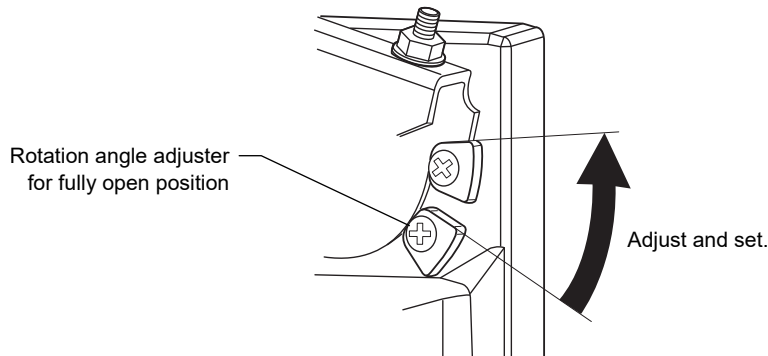
Figure 15. Setting the operating angle for the fully open position

Connection of the air flow sensor

For differential pressure pickup, connect the tube for the total pressure measuring port of the air flow sensor to the high pressure port (indicated with "+") of Infilex VC. Also connect the tube for the static pressure measuring port of the air flow sensor to the low pressure port (indicated with "-") of Infilex VC.

Low pressure port
for differential pressure pickup

High pressure port
for differential pressure pickup
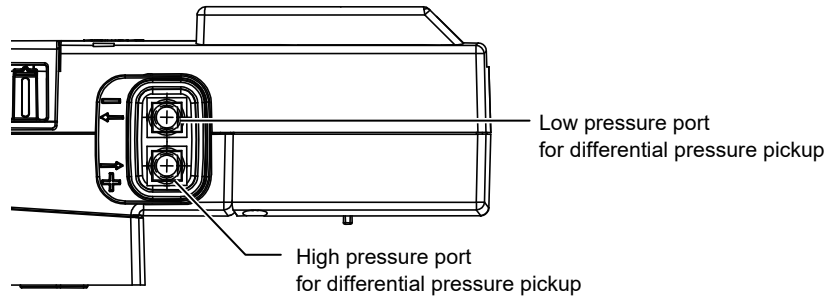
Required specification of the air flow sensor tube

Type	Length	Inner diameter	Outer diameter	Material
Flexible tube	Max. 1 m	5 mm to 6 mm	Max. 10 mm	PVC, silicon rubber
Inflexible tube		5.5 mm to 6.5 mm		

PVC: Polyvinyl chloride

Notes:
 * Use the tube as specified in the above table.
 * If the tube of the differential pressure pickup does not meet the required specification shown in the above table, use a joint to meet the specification.
 * Total tube length must be 1 m max. even if two tubes with different diameters are connected by the joint.

Figure 16. High and low pressure ports for differential pressure pickup

Wiring

Push-in terminal connection

Wires of power supply and DO (digital output) are connected to the push-in terminal block. Follow the procedure below for the wiring connections.

1) Strip the 5-6 mm insulation of the wire end. (If the insulation stripped part is longer than the specified, it will be exposed causing electric shock or short-circuit between adjacent terminals. If it is shorter, the wire may not contact the terminal.)

2) Make sure that any wire fiber is unbound from the wire end.

3) Insert a slotted screwdriver into a smaller square hole (for clamp release) on the terminal block located on the front surface.

   To insert the screwdriver to the deep end (approx. 10 mm deep), push and tilt it (towards the front surface of Infilex VC main unit) along the curving surface inside the square hole.

   When the screwdriver is inserted to the deep end, the clamp is completely released.

   Notes:
   * A slotted screwdriver with the blade 3.5 mm wide and 0.5 mm thick (straight type) is acceptable. A screwdriver with the blade tip narrower than the shaft may not be acceptable.
   * Appropriate screwdriver (an example):
     Model 9900 (3 mm wide ´ 100 mm long) or Model 910 (3 mm wide ´ 75 mm long) manufactured by Vessel Co., Inc.
   * Since the terminal block has the inclined surface, required clearance for maintenance varies depending on the length of the screwdriver to be used.

4) Insert the wire end into a larger square hole. When the wire end is fully inserted, remove the screwdriver.

5) Gently pull out the wire to make sure it is completely held by the clamp.

Wiring to user terminal / temperature sensor
LonTalk protocol wiring

User terminal and temperature sensor are wired to Infilex VC with modular connection. LS-bus line (LonTalk protocol) is also connected with modular connection.
For correctly crimping modular plugs on a LAN cable, refer to the following.

<u>Modular connector connection</u>

Modular connector is composed of a modular plug (male) and a modular jack (female). Modular jacks are provided on Infilex VC, and modular plugs will be crimped on LAN cables as required. Refer to the following procedure for crimping the modular plugs on the LAN cables and connecting them to the modular jacks.

Note:
 * For modular plugs, refer to **Note *1** of the **Input/output specifications** section.

Procedure for modular connector connection

1) Strip the outer sheath of a LAN cable end. Be sure not to scratch or peel off any wire insulation when stripping the sheath.
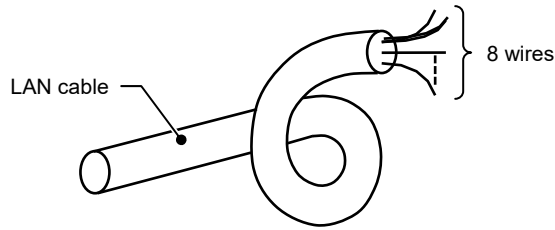
LAN cable

8 wires

Figure 17. Stripping the sheath

Make sure there are eight wires inside the sheath.

2) Align the eight wires in the order specified by the LAN cable manufacturer.
An alignment example of the LAN cable wires is shown in the table below.

Pin numbers → 12345678

LAN cable
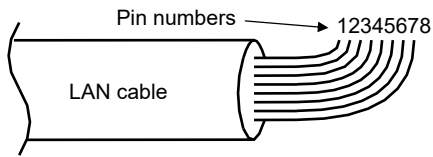
Figure 18. Alignment of the wires

Modular plug pin number	Wire alignment	Wire color code
1	Line 2 of pair 2	White and orange
2	Line 1 of pair 2	Orange
3	Line 2 of pair 3	White and Green
4	Line 1 of pair 1	Blue
5	Line 2 of pair 1	White and blue
6	Line 1 of pair 3	Green
7	Line 2 of pair 4	Brown and white
8	Line 1 of pair 4	Brown

Note:
* The color alignment shown above may not agree with your LAN cable specification. Ask your LAN cable manufacturer for the latest specification.

3) Insert the aligned wires into a modular plug.

Cable stopper

Contacts

Insert.

LAN cable

Modular plug

10 mm ± 3 mm
(For the recommended modular plug)

Pin assignment of the modular plug

8
7
6
5
4
3
2
1

Pin numbers
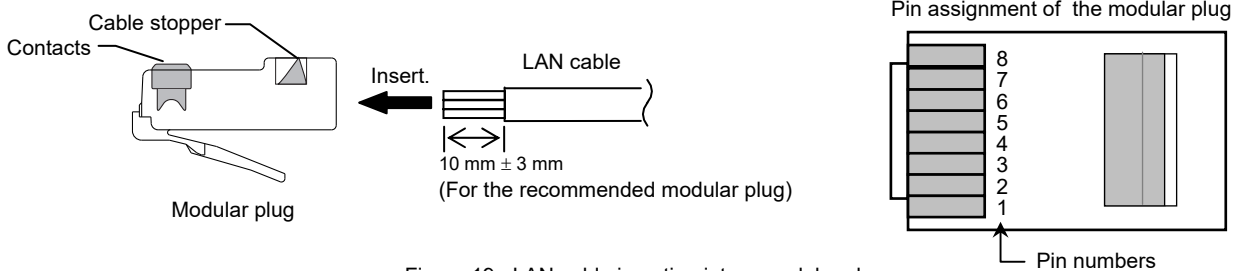
Figure 19. LAN cable insertion into a modular plug

Pin assignment of the modular plug in Fig. 19 is the image when the contacts and the cable stopper of the modular plug are viewed from above.

Before inserting the wires into the modular plug, even out the length using a nipper. Note that the modular plug may not be crimped on wires if the wire insulation is stripped too long.

4) Crimp the modular plug using a crimper. Insert the wires into the modular plug so that the contacts of the modular plug stick into the wires after crimping. Crimped modular plug is secured on the LAN cable by the cable stopper of the modular plug. Check the contacts and the cable stopper when crimping the modular plug.

5) Follow 1) to 4) for the other end of the LAN cable.

6) Check continuity of the LAN cable. Modular cable tester (Part No. DY7206A0000) facilitates the continuity check. At the same time, make sure that the wires are aligned in the specified order, the modular plug contacts stick into the wires, and that there is no cable damage or disconnection.

7) Connect the modular plugs to the modular jacks.
After successfully finishing the continuity check, insert a modular plug of the LAN cable into the modular jack of Inflex VC and the other modular plug into the modular jack of the user terminal / temperature sensor / sub remote unit (also known as "sub controllers") connected via LS-bus.

Insert a modular plug until it clicks and gently pull the cable to check complete connection.

Terminator

For communication with LonTalk protocol, terminator is required to ensure the communication reliability. For bus topology, a terminator is connected at each end of the devices on the bus (= 2 terminators for bus topology). For free topology, a terminator is connected at any end of the devices on the bus (= 1 terminator for free topology) throughout the whole system.

> IMPORTANT:
>
> Terminator types vary depending on network topology (bus topology or free topology). Refer to the table below.

Connection for bus topology (Total wiring length: Max. 900 m)

Connect a terminator at each end of the devices on the bus (2 terminators in total) as shown in Fig. 20.

If the wiring length is 250 m or shorter, connect a terminator at one (not both) end of the devices on the bus (1 terminator in total) as shown in Fig. 21. In this case, be sure to use a free topology terminator.

■ : Terminator Part No. DY7212A1101
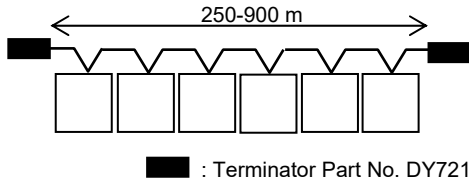
Figure 20. Terminator connection example for bus topology
(Wiring length: 250-900 m)

■ : Terminator Part No. DY7212A1100
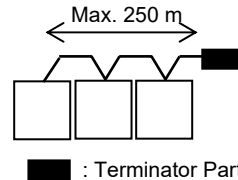
Figure 21. Terminator connection example for bus topology
(Wiring length: Max. 250 m)

Connection for free topology
(Total wiring length: Max. 450 m, longest wiring length between one end to another end of the devices: Max. 250 m)

Connect a terminator to any end of the devices on the bus throughout the system (1 terminator in total) as shown in Fig. 22.
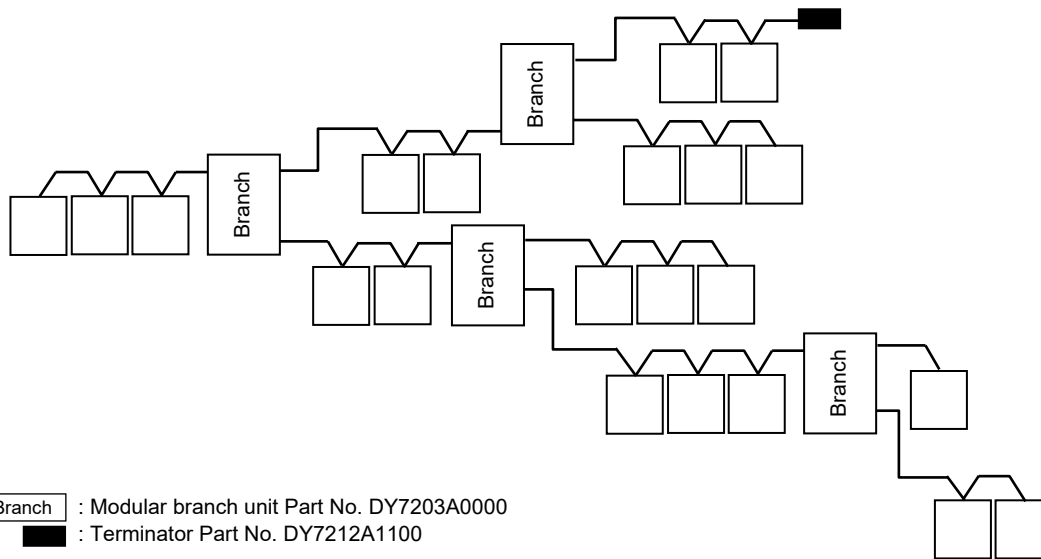
Branch : Modular branch unit Part No. DY7203A0000
■ : Terminator Part No. DY7212A1100

Figure 22. Terminator connection example for free topology
(Wiring length: Max. 450 m, longest wiring length between one end to another end of the devices: Max. 250 m)

Optional terminators (modular connection type)

	Part number	Indication on the labels	Network topology	Applicable transceiver
(30 ±10)	DY7212A1100	FREE	Free topology	TP/FT-10 channel
	DY7212A1101	BUS	Bus topology	TP/FT-10 channel

Notes:
* Separate order is required for our terminators shown above. Be sure to separately order your applicable terminator(s).
* Our optional terminators shown above are available only for a normal use. Since the channel of the onboard transceivers our devices have is TP/FT-10, they are not available for a special use (e.g., the power supplied via communication line).

Software Details

Item	Function	Description	Remark
Operation	VAV ON/OFF	Turns on/ off the variable air volume (VAV) unit by operating the BMS client PC or the user terminal.	- Each Infilex VC can individually turn on/off the VAV unit. - The latest user terminal/BMS client PC operation is effective. - VAV ON/OFF function using the user terminal can be disabled by the BMS client PC. - Once *VAV ON/OFF* function is set, you can not turn on the *Setback* function with the user terminal. (The user terminal allows you to operate either *VAV ON/OFF* or *VAV ON/Setback ON*.)
	Setback	Adds/Subtracts the setback value to/from the set temperature. Changes the set temperature by operating the BMS client PC or the user terminal. The setback value is preset at Infilex VC.	- Each Infilex VC can individually change the set temperature for the *setback* operation. - The latest user terminal/BMS client PC operation is effective. - Setback function using the user terminal can be disabled by the BMS client PC. - Once *Setback* function is set, you can not turn off the VAV unit with the user terminal. (The user terminal allows you to operate either *VAV ON/Setback ON* or *VAV ON/OFF*.)
	Temperature setting	Changes the set temperature by operating the BMS client PC or the user terminal.	- The latest user terminal/BMS client PC operation is effective. - High/low limit of the setpoint is set by the BMS client PC. - Dual setting is available[2].
	VAV interlocking with air conditioning unit[1]	Interlocks the ON/OFF operations of the VAV units with those of the air conditioning units.	- One Infilex ZM controls up to 4 AHU groups. - Do not operate *VAV ON/OFF* with the user terminal when you set the *VAV interlocking with air conditioning unit* function. - Do not set the *air conditioning unit interlocking with VAV* function when you set the *VAV interlocking with air conditioning unit* function.
	Air conditioning unit interlocking with VAV[1]	Interlocks the ON/OFF operations of the air conditioning units with those of the VAV units.	- One Infilex ZM controls up to 4 groups. - Do not set the *VAV interlocking with air conditioning unit* function when you set the *air conditioning unit interlocking with VAV* function.
Control (1/2)	Temperature control	Controls VAV damper to meet the actual (measured) temperature with the set temperature.	Each Infilex VC can individually controls the VAV damper.
	Fan speed control[1]	Detects over/short static pressure of the VAV unit and optimally controls the revolution speed of the supply air fan to minimize the fan power.	- One Infilex ZM controls up to 4 groups. - AHU controller and Infilex ZM must be connected to the same NC-bus line.

AHU: Air handling unit
BMS: Building management system
VAV: Variable air volume

Notes:
*1 These functions are enabled by Infilex VC being combined with Infilex ZM and integrated in our BMS.
*2 Dual setting is the method to have cooling setting and heating setting separately.

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Item	Function	Description	Remark
Control (2/2)	Optimum temperature control of supply air[1]	Controls the supply air temperature of the air conditioning unit at the optimum level to provide comfort and to save energy.	- One Infilex ZM controls up to 4 groups. - AHU controller and Infilex ZM must be connected to the same NC-bus line.
	Mixing loss control[1]	Sets the difference between the set temperature of the perimeter air conditioning unit and the interior air conditioning unit that are interlocked. This prevents the mixing loss.	- One (group of) Infilex VC interlocks with another (group of) Infilex VC and/or Infilex FC. - Slave Infilex VC and/or Infilex FC can not interlock with a different Infilex VC and/or Infilex FC. - Do not operate the slave Infilex VC and/or Infilex FC with the user terminal.
	Parallel operation of multiple VAV[1]	Concurrently turns on/off the multiple VAV units or changes fan speed of the multiple VAV units (supply air VAV unit and return air VAV unit).	- One-to-one Infilex VC or one-to-multiple Infilex VC are interlocked. - For the parallel operation, Infilex VC must be connected to the same SC-bus line.

	Fan powered control	Turns on/off the fan of the VAV unit with fan to maintain enough airflow.	Fan output corresponds with heating/cooling conditions and each fan type.
			  - Series fan:
			    Fan is ON when VAV unit is ON.
			  - Parallel fan (for temperature):
			    Fan is ON when VAV unit is ON in heating mode.
			  - Parallel fan (for air volume):
			    Fan is ON when VAV unit is ON in heating mode with low airflow.

	Reheat control[1]	Enables the heating mode by electric heater or hot water valve.	- Electric heater and ON/OFF valve allow up to two-position control. Floating valve allows single-position control. - Reheat control is forcibly performed by operating the BMS client PC (manual override function).
Monitoring (with the BMS client PC)	Individual monitoring[1]	Monitors and controls the point data (measuring, setting, operation, and control data) of Infilex VC from the BMS client PC. The following are examples of the point data for individual monitoring: VAV ON/OFF, VAV failure, room temperature, cool setting/main setting, heat setting, heat high limit/set high limit, cool low limit/set low limit, setback, reheater output, fan output, measured air volume, max. air volume, damper position (Not all of the items above are required to monitor or control with the client PC.)	
	Group monitoring[1]	Forms a group of multiple Infilex VC, monitors and controls the following point data of the grouped Infilex VC through the BMS client PC: VAV ON/OFF, VAV failure, room temperature[3], cool setting/main setting, heat setting, heat high limit/set high limit, cool low limit/set low limit, setback (Not all of the items above are required to monitor or control with the client PC.)	- All of Infilex VC connected from a single Infilex ZM are divided into up to 25 groups. (Various grouping is available.) - The point data for the group monitoring can not be individually monitored. - Both of the group monitoring and the individual monitoring can be applied to the grouped Infilex VC. (e.g., VAV ON/OFF for group monitoring and room temperature for individual monitoring)
	Batch operation[1]	Forcibly sets the airflow of all the VAV units (that are included in each air conditioning unit group) at the maximum or minimum volume by operating the BMS client PC.	- One Infilex ZM controls up to four groups. - Batch operation is enabled with Infilex ZM as well as with the BMS client PC.

BMS: Building management system
VAV: Variable air volume

Notes:
*1   These functions are enabled by Infilex VC being combined with Infilex ZM and integrated in our BMS.
*3   Room temperature for the group monitoring calculates either the average value in a group or the representative value of a group.

LED Indication

After the power is applied to Infilex VC, check that the status indicator LED (orange) blinks in approx. 10 seconds. If it stays ON, Infilex VC is in abnormal status. Note that the orange LED stays ON immediately after the power is applied to Infilex VC, which does not indicate error.

Communication (with LonTalk protocol) LED (green) instantly flashes when the power is applied. Then, the green LED goes OFF when LonTalk communication becomes normal.

For the description of the orange and green LED indications, refer to Figs. 23 and 24.

Green LED (for service pin/communication indication)
Orange LED (for status indication)
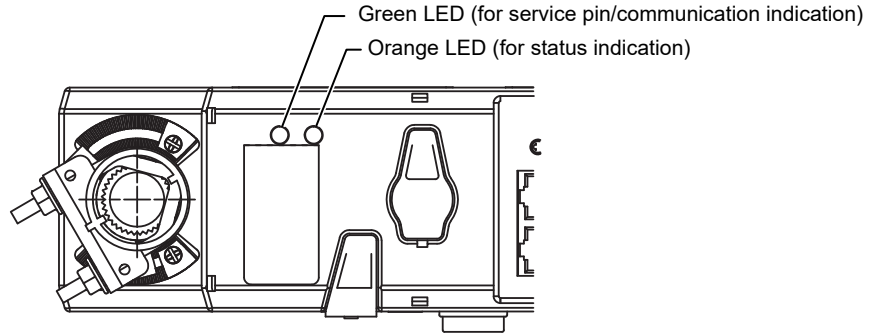
Figure 23. LED location

Status		LED indication (□: ON / ■: OFF)
Normal	Normal	
Power OFF	Power Off	
LS-bus error	LS-bus Error	
Initializing / Error	Error 1	
Minor error	Error 2	

Figure 24. Descriptions of orange LED indications (status)

Status	LED indication (□: ON / ■: OFF)
Normal	Normal
Applicationless	Appli-less
Unconfigured	Unconfig
LS-bus error	Any indication other than the above

Figure 25. Descriptions of green LED indications (communication with LonTalk protocol)

IMPORTANT:

Do not press the LED button. Operation of Infilex VC will be stopped, and the automatic operation mode will switch to the adaption mode. (Infilex VC will fully close and open the VAV damper.)

Setting

The following settings must be performed by a technical engineer.

● Address setting
 Two address setting switches are located on the front surface of Infilex VC. The switch with "X10" indicates tens of the address, and the switch with "X1" indicates ones of the address.
 For setting the address, use the slotted screwdriver used for the wiring connection. (See the **Push-in terminal connection** section.)

● Parameter setting
 Infilex VC parameters are set in response to the size and type of VAV unit, room characteristics, and applications.
 For setting the parameters, our engineering tool is required.

To Connect Two User Terminals (for Remote Control)

Up to two digital user terminals (Neopanel Model QY7205) can be connected to one Infilex VC.

To connect the two user terminals, the following are required.

● Modular branch unit (Model DY7203A0000)
  See the **Optional Parts** section for details.

● Neopanel with address 1 and with address 2
  (Note that two Neopanel with address 1 connected to the Infilex VC will not work.)

For two Neopanel connection, provide Model QY7205CXXX1 for the address 1 and Model QY7205CXXX2 for the address 2. Address number is indicated on the shipping carton and on the label attached to the inside surface of the Neopanel main unit (with the base cover removed).

Notes:
 * The latest VAV unit ON/OFF operation or temperature setting operation with a Neopanel or with the BMS client PC is effective.
 * Neopanel with address 2 (Model QY7205CXXX2) does not have the temperature measuring function.

Optional Parts

Unit: mm
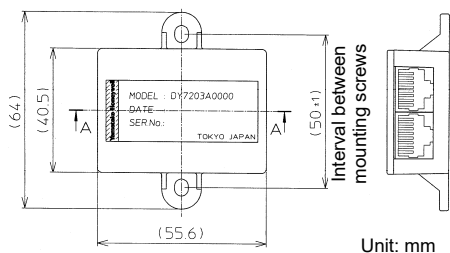
Figure 26. Modular branch unit: Part No. DY7203A0000

Modular branch unit (See Fig. 26):
Used to branch out the communication line for two user terminals to be connected.

Unit: mm
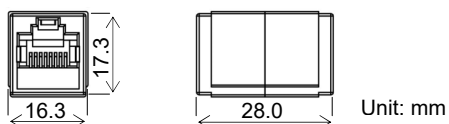
Figure 27. Modular relay unit: Part No. DY7202A0000

Modular relay unit (See Fig. 27):
Used to extend the communication line by connecting to another communication line.
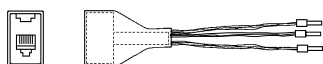
Figure 28. Adapter for connecting to a Pt100 temperature sensor: Part No. DY7204A0003

Adapter for connecting to a Pt100 temperature sensor (See Fig. 28):
Used to connect a temperature sensor to Inflex VC with a modular connector.
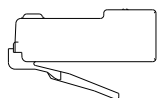
Figure 29. Modular plug: Part No. DY7207A0100

Precautions for use

- Modular branch unit, modular relay unit, adapter for connecting to a Pt100 temperature sensor, and adapter for connecting to a user terminal must be used in an outlet box or inside a panel.

- For the modular connector connection, be sure to insert the modular plugs into the modular jacks until they click. Then, lightly pull out the cables to make sure they are completely connected.

Optional Tools

Figure 30. Modular crimper: Part No. DY7205A0002

Modular crimper (See Fig. 30.):
Used to crimp a modular plug on a LAN cable.

Figure 31. Modular cable tester: Part No. DY7206A0000

Modular continuity tester (See Fig. 31.):
Used to check continuity of a LAN cable with modular plugs crimped on.

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Network Interface between Infilex VC and Other Devices

Program ID   80:00:5F:50:0A:03:04:XX

Documentation   &3.4@0Node,8010VAVControl;Infilex VCA WY5306

Program ID revision

80:00:5F:50:0A:03:04	:22	WY5306C5**0

Object details (continued to the following page)

● **Node object**   ● **Infilex VC controller object**

Node object Type #0

| nv1 | nviRequest SNVT_obj_reques | Mandatory Network Variables | nv2 | nvoStatus SNVT_obj_status |

| nv3 | nviTimeSet SNVT_time_stamp |

| nv5 | nviFIleReq SNVT_file_req | Optional Network Variables | nv6 | nvoFileStat SNVT_file_status |

| nv7 | nviFilePos SNVT_file_pos |

Configuration Properties
nc25-nciNetConfig(SCPT_nwrk_cnfg)
nc165-nciDevMajVer(SCPTdevMajVer)
nc166-nciDevMinVer(SCPTdevMinVer)

Device Documentation

Node Object

CP & Data File Transfer
Configuration Properties

VAV Object

Configuration Properties

Explicit Messages

Hardware outputs

VAV Device
object Type #8010

| nv1 | nviSpaceTemp SNVT_temp_p | | nv3 | nvoSpaceTemp SNVT_temp_p |
| nv2 | nviSetPoint SNVT_temp_p | Mandatory Network Variables | nv4 | nvoUnitStatus SNVT_hvac_status |

nv5	nviApplicMode SNVT_hvac_mode		nv16	nvoEffectSetPt SNVT_temp_p
nv6	nviManOverride SNVT_hvac_overid		nv17	nvoFlowControlPt SNVT_flow
nv8	nviOccCmd SNVT_occupancy	Optional Network Variables	nv18	nvoBoxFlow SNVT_flow
nv12	nviFanSpeedCmd SNVT_switch			
nv14	nviHeaterOverid SNVT_switch			
nv15	nviDuctInTemp SNVT_temp_p			

Configuration Properties
nc49-nciSndHrtBt(Mandatory)
nc60-nciSetPnts(Mandatory)
nc54-nciMinFlow(Mandatory)
nc51-nciMaxFlow(Mandatory)
nc48-nciRcvHrtBt(Optional)
nc52-nciMinOutTm(Optional)

nviOutdoorTemp SNVT_temp_p		nvoOccCmd SNVT_occupancy
nviRainState SNVT_switch	Manufacture Defined Section	nvoStaticPress SNVT_switch
nviAHUState SNVT_switch		nvoLoadResetSt SNVT_count
nviAirFlowSetPt SNVT_flow		nvoDampPosition SNVT_lev_percent
nviReheatCmd SNVT_switch		nvoFanSpeed SNVT_switch
nviOpeVav1 UNVT_op_vav2		nvoReheater SNVT_lev_percent
nviOperation UNVT_operation		nvoSpaceTemp2 SNVT_temp_p
		nvoSpaceRH SNVT_lev_percent
		nvoBattExchange SNVT_state
		nvoFlowSetPt SNVT_lev_percent
		nvoCtrlDataVav UNVT_dat_vav1_3
		nvoIODataVav1 UNVT_dat_vav2_3a
		nvoIODataVav2 UNVT_dat_vav2_3b
		nvoIODataVav3 UNVT_dat_vav2_3c
		nvoIODataVav4 UNVT_dat_vav2_3d
		nvoUTDataVav UNVT_dat_vav3_3
		nvoControlMode UNVT_ctrl_mode
		nvoErrorState1 UNVT_error_st1
		nvoErrorState2 UNVT_error_st2
		nvoErrorState3 UNVT_error_st2
		nvoEepromState UNVT_eeprom_st
		nvoUpdateData UNVT_v_update

Configuration Properties
nc51-nciMaxFlow
nc54-nciMinFlow
nc1-nciSetPtHiLimit
nc2-nciSetPtLoLimit
nc44-nciParaVav01
nc45-nciParaVav02
nc46-nciParaVav03
nc69-nciParaVav04
nc48-nciParaVav05a
nc49-nciParaVav05b
nc50-nciParaVav05c
nc51-nciParaVav05c
nc8-nciParaVav06
nc52-nciParaVav07
nc53-nciParaVav08
nc11-nciParaVav11
nc54-nciParaVav21

Hardware inputs

Network variables

● Node object

Input network variables (according to LONMARK® Functional Profile: Node object)

Variable name	SNVT name	Valid range	Default value	Description	SB[*1]	RB[*2]	MT[*3]
nviRequest	SNVT_obj_request	—	—	Object request	—	—	—
nviTimeSet	SNVT_time_stamp	—	—	Time setting	—	—	—
nviFileReq	SNVT_file_req	—	—	File request	—	—	—
nviFilePos	SNVT_file_pos	—	—	File position	—	—	—

Output network variables (according to LONMARK® Functional Profile: Node object)

Variable name	SNVT name	Valid range	Default value	Description	SB	RB	MT
nvoStatus	SNVT_obj_status	—	—	Object request	—	—	—
nvoFileStat	SNVT_file_status	—	—	File status	—	—	—

Configuration network variables (according to LONMARK® Functional Profile: Node object)

Variable name	CP type	Valid range	Default value	Description
nciNetConfig	SCPTnwrkCnfg	0 to 1	CFG_LOCAL	Changeover between self-installation mode and SNVT connection mode

User-defined configuration network variables (according to LONMARK® Functional Profile: Node object)

Variable name	CP type	Valid range	Default value	Description
nciDevMajVer	SCPTdevMajVer	0 to 255	—	Device major version
nciDevMinVer	SCPTdevMinVer	0 to 255	—	Device minor version

Note:
*1, *2, and *3 are applicable LON communication protocols.
    *1. SB: Send Heartbeat
    *2. RB: Receive Heartbeat
    *3. MT: Minimum Out Time

● **Controller object**

Input network variables (according to LONMARK® Functional Profile: VAV Controller)

Variable name	SNVT name	Valid range	Default value	Description	SB	RB	MT
nviSpaceTemp	SNVT_temp_p	-10.00 to 50.00 °C	327.67	Space temperature input (external space temperature sensor)	—	✓	—
nviSetPoint	SNVT_temp_p	10.00 to 35.00 °C	327.67	Temperature setpoint input	—	—	—
nviApplicMode	SNVT_hvac_mode	—	HVAC_AUTO	Application mode input	—	✓	—
nviManOverride	SNVT_hvac_overid	—	—	VAV manual override input	—	—	—
nviOccCmd	SNVT_occupancy	—	OC_NUL	Occupancy input	—	—	—
nviFanSpeedCmd	SNVT_switch	—	—	Fan ON/OFF/AUTO command	—	—	—
nviHeaterOverid	SNVT_switch	—	—	Reheater enable/disable	—	—	—
nviDuctInTemp	SNVT_temp_p	-10.00 to 50.00 °C	327.67	Duct inlet temperature input	—	✓	—

Output network variables (according to LONMARK® Functional Profile: VAV Controller)

Variable name	SNVT name	Valid range	Default value	Description	SB	RB	MT
nvoSpaceTemp	SNVT_temp_p	-10.00 to 50.00 °C	327.67	Space temperature output (inside: differential pressure sensor)	✓	—	✓
nvoUnitStatus	SNVT_hvac_status	—	—	Unit status output	✓	—	✓
nvoEffectSetPt	SNVT_temp_p	10.00 to 35.00 °C	0.00	Effective setpoint output	✓	—	✓
nvoFlowControlPt	SNVT_flow	0 to 65535 liters/sec	0	Effective flow control point output	✓	—	✓
nvoBoxFlow	SNVT_flow	0 to 65535 liters/sec	65535	Box flow output (inside: differential pressure sensor)	✓	—	✓

Configuration network variables (according to LONMARK® Functional Profile: VAV Controller)

Variable name	CP type	Valid range	Default value	Description
nciSndHrtBt	SCPTmaxSendTime	0.0 to 6553.4 sec	0.0	Send Heartbeat
nciSetPnts	SCPTsetPnts	—	—	Occupancy temperature setpoints
nciMinFlow	SCPTminFlow	0 to 65535 liters/sec	0	Minimum flow
nciMaxFlow	SCPTmaxFlow	0 to 65535 liters/sec	65535	Maximum flow
nciRcvHrtBt	SCPTmaxRcvTime	0.0 to 6553.4 sec	0.0	Receive Heartbeat
nciMinOutTm	SCPTminSendTime	0.0 to 6553.4 sec	0.0	Minimum send time

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User-defined network variables

User-defined input network variables

Variable name	SNVT name	Valid range	Default value	Description	SB	RB	MT
nviOutdoorTemp	SNVT_temp_p	-99.9 to 99.9 °C	327.67	Outdoor temperature input	—	✓	—
nviRainState	SNVT_switch	—	—	Wet weather indication input	—	—	—
nviAHUState	SNVT_switch	—	—	AHU ON/OFF status input	—	—	—
nviAirFlowSetPt	SNVT_flow	0 to 65535 liter/sec	65535	Flow setpoint input	—	—	—
nviReheatCmd	SNVT_switch	—	—	Reheater override input	—	—	—
nviOpeVav1	UNVT_op_vav2	—	OP_NUL	Command (damper override operation, error indication cancel, etc.) input	—	—	—
nviOperation	UNVT_operation	—	OP2_NUL	Command (memory read/write, etc.) input	—	—	—

User-defined output network variables

Variable name	SNVT name	Valid range	Default value	Description	SB	RB	MT
nvoOccCmd	SNVT_occupancy	—	OC-NUL	ON/OFF status output	✓	—	✓
nvoStaticPress	SNVT_switch	—	—	Static pressure over/short output	✓	—	✓
nvoLoadResetSt	SNVT_count	0 to 9	0	Control status output	✓	—	✓
nvoDampPosition	SNVT_lev_percent	0.000 to 100.000 %	0.000	Damper position output	✓	—	✓
nvoFanSpeed	SNVT_switch	—	—	Fan output	✓	—	✓
nvoReheater	SNVT_lev_percentq	0.000 to 100.000 %	0.000	Reheater output	✓	—	✓
nvoSpaceTemp2	SNVT_temp_p	-10.00 to 50.00 °C	327.67	Analog input (temperature)	✓	—	✓
nvoSpaceRH	SNVT_lev_percent	0.000 to 100.000 %	0.000	Analog input (humidity)	✓	—	✓
nvoBattExchange	SNVT_state	—	—	Battery run-down warning output	✓	—	✓
nvoFlowSetPt	SNVT_lev_percent	0.000 to 100.000 %	0.000	Flow setpoint ÷ max. flow output	✓	—	✓
nvoCtrlDataVav	UNVT_dat_vav1_3	—	—	Internal VAV control data output	—	—	—
nvoIODataVav1	UNVT_dat_vav2_3a	—	—	Input/output data 1	—	—	—
nvoIODataVav2	UNVT_dat_vav2_3b	—	—	Input/output data 2	—	—	—
nvoIODataVav3	UNVT_dat_vav2_3c	—	—	Input/output data 3	—	—	—
nvoIODataVav4	UNVT_dat_vav2_3d	—	—	Input/output data 4	—	—	—
nvoUTDataVav	UNVT_dat_vav3_3	—	—	UT-1 data	—	—	—
nvoControlMode	UNVT_ctrl_mode	—	—	Control mode, dummy flag, memory read data	—	—	—
nvoErrorState1	UNVT_error_st1	—	—	Error indication 1 (error flag)	—	—	—
nvoErrorState2	UNVT_error_st2	—	—	Error indication 2 (error log)	—	—	—
nvoErrorState3	UNVT_error_st2	—	—	Error indication 3 (error log)	—	—	—
nvoEepromState	UNVT_eeprom_st	—	—	EEPROM data	—	—	—
nvoUpdateData	UNVT_v_update	—	ST_NUL	Internal data notification during update	—	—	—

User-defined configuration network variables

Variable name	CP type	Valid range	Default value	Description
nciCovPara	UCPTvavMinDelta3	—	—	Load reset type + COV value
nciVavAux	UCPTvavAux	—	—	Auxiliary parameter

User-defined parameters

Variable name	CP type	Valid range	Default value	Description
nciMaxFlow	SCPTmaxFlow	0 to 65535 liters/sec	65535	Max. flow
nciMiniFlow	SCPTminFlow	0 to 65535 liters/sec	0	Min. flow
nciSetPtHiLimit	UCPTsetPointHighLimit	0.00 to 50.00 °C	30.00	Setpoint high limit
nciSetPtLoLimit	UCPTsetPointLowLimit	0.00 to 50.00 °C	15.00	Setpoint low limit
nciParaVav01	UCPTvavCtrlType3	—	—	Operation control parameter
nciParaVav02	UCPTvavTempCtrl3	—	—	Temperature control parameter
nciParaVav03	UCPTvavDischargeAirTempCtrl2	—	—	Duct inlet temperature optimization parameter
nciParaVav04	UCPTvavFlowCtrl1_3	—	—	Flow control parameter 1
nciParaVav05a	UCPTvavFlowCtrl2_3a	—	—	Flow control parameter 2-1
nciParaVav05b	UCPTvavFlowCtrl2_3b	—	—	Flow control parameter 2-2
nciParaVav05c	UCPTvavFlowCtrl2_3c	—	—	Flow control parameter 2-3
nciParaVav05d	UCPTvavFlowCtrl2_3d	—	—	Flow control parameter 2-4
nciParaVav06	UCPTctrlDisable	—	—	Assign/delete point parameter, assign/delete control parameter
nciParaVav07	UCPTvavAI_Adjustment3	—	—	Input/output adjustment parameter
nciParaVav08	UCPTvavManufAdjustment3	—	—	Manufacturer adjusted parameter
nciParaVav11	UCPTvavMiscellaneous	—	—	Basic parameter
nciParaVav21	UCPTsetPointKnob2	—	—	AI processing table

C€ This product complies with the essential requirements of the Electromagnetic Compatibility Directive (EMCD) and the Restriction of Hazardous Substances Directive (RoHSD).

EMCD: EN 61000-6-2
EN 61000-6-3

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Specifications are subject to change without notice.

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