

Inflex™ FC

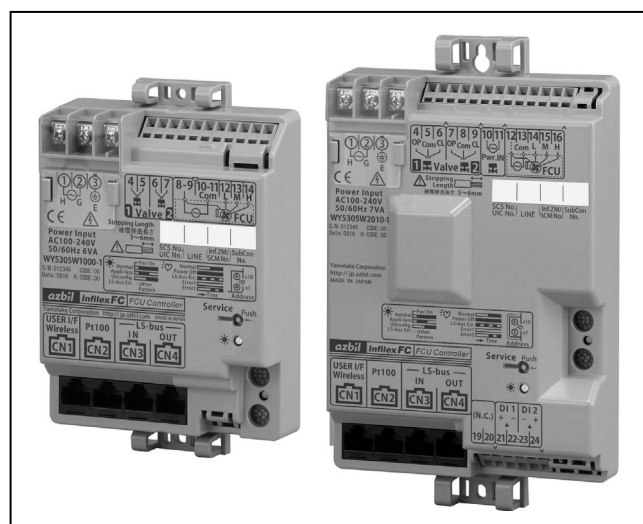
Fan Coil Unit Controller

Overview

Inflex FC (Inflex: named for “Infinity” and “Flexible”) Model WY5305 provides digital control of fan coil units (FCU). In addition to FCU start/stop operation, valve control, and fan speed changeover, Inflex FC provides advanced controls such as setback and interlock operations with outdoor air handling unit (OAHU).

Inflex FC can interface with user terminals to allow the end users to operate the FCU.

Inflex FC can directly communicate with the center unit of an integrated Building Management System (BMS), Azbil Corporation's savic-net™ series. That is, scheduled operation, operating status, and temperature measurement of the FCU can be centrally monitored and controlled.



Features

- Compact size
Small sized body fits inside an FCU.
- Easy installation
Connectors facilitate wiring installation.
- Two kinds of FCU control
Valve ON/OFF control and valve proportional control for FCU are available.
- Various connectable terminals
In addition to the temperature sensor, digital and analog user terminals can be connected to the Inflex FC.
- LONMARK® certified product
FCU control network is configured with LonTalk® protocol. Inflex FC (Model WY5305WXXXX-1) is LONMARK® (version 3.4) certified and thus interoperable integrated in the LONWORKS® system.
- CE Marking certified product
Inflex FC Models WY5305W1000, WY5305W2010 conform to all the applicable standards of CE Marking (Class A).

Model Numbers

WY5305						Base model number
	W					Power: 100 V AC to 240 V AC
		1				Valve ON/OFF control
		2				Valve proportional control
			0			Fixed
			0			Without DI (digital input)
			1			With DI × 2 pts.
				0		Fixed
				-0		LONMARK® uncertified
				-1		LONMARK® certified

Note:

Base model number is available with the following suffix numbers:
W1000-1, W1000-0, W2010-1, W2010-0

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 to 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 means 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	
	• DANGER: To prevent the risk of severe or fatal electrical shock, always disconnect power source and product power supply before performing any wiring.
	• Do not disassemble the product. Disassembly may result in electrical shock or equipment damage.
	• Make sure all the wires are tightly connected. Loose connection can cause burn injury due to heat generation or fire.
	• Be sure to ground with 100 Ω or lower ground resistance. Improper ground can cause electrical shock or product fault.
	• Wire strip length to be connected to the quick-fit screwless terminal block must be 5 mm to 6 mm. If the strip length is longer than 5 to 6 mm, the conductor will be exposed, causing electrical shock or short circuit between adjacent terminals. If it is shorter, the conductor will not contact the connector.

 CAUTION		(1/2)
	• Installation and wiring must be performed by qualified personnel in accordance with all applicable safety standards.	
	• All wiring must comply with local codes of indoor wiring and electric installation rules.	
	• Use crimp terminal lugs with insulation for electric wires connected to the screw terminals.	
	• Connect cables to the power source with terminals lugs or the like for permanent connection.	

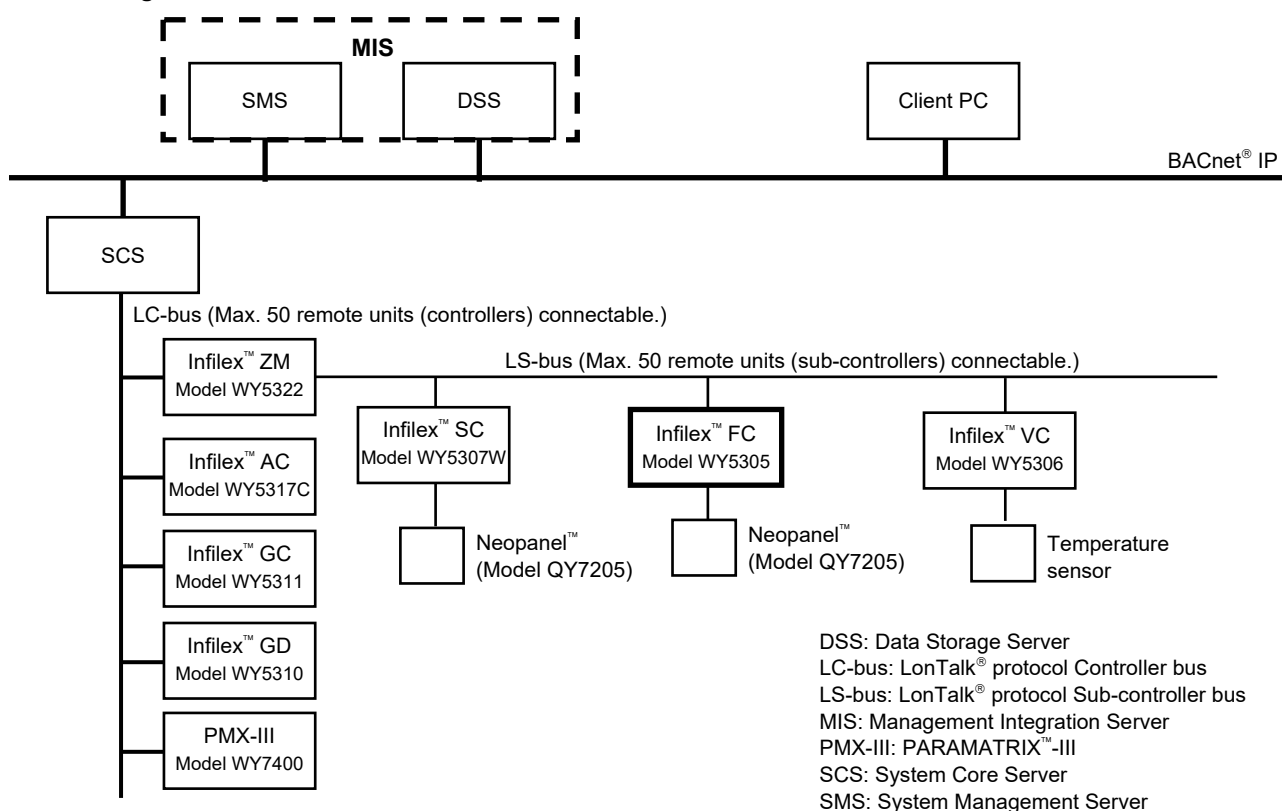
⚠ CAUTION

(1/2)

- ! Do not detach the terminal cover except when connecting or disconnecting wires. After connecting or disconnecting them, be sure to reattach the terminal cover. Make sure that the terminals and wires are not current-carrying when attaching or detaching the terminal cover.
- ! This product does not have a power switch. Be sure to install a power circuit breaker for the power source.
- ! This product must be operated under the operating conditions (power, temperature, humidity, vibration, shock, installation position, atmospheric condition, etc) specified in this manual to prevent equipment damage.
- ! This product must be operated within its rated operating ranges specified in this manual. Failure to comply will cause equipment damage.
- ! If more than the rated power supply voltage is applied, product replacement is required for safety.
- ! Dispose of this product for waste disposal in accordance with your local regulations. Do not reuse all or a part of this product.

System Configurations

Inflex FC integrated into savic-net™ FX BMS



Note:

- * MIS may be used instead of SMS and DSS for your system. Note that MIS cannot be mixed with SMS or DSS in the same system.
- * On LS-bus, max. 50 remote units (also called 'sub-controllers') can be connected.
- * On LC-bus (2 lines for 1 channel), max. 50 remote units (also called 'controllers') can be connected. For Inflex ZM, however, max. 10 units can be connected on LC-bus (5 units per line, 2 lines for 1 channel).
- * Inflex FC, Inflex VC, and Inflex SC can directly connected to LC-bus with their network variables.
- * One Neoplate (analog user terminal) or two Neopanel (digital user terminal) can be connected to one Inflex FC. Neopanel or Neoplate can share the Inflex FC with a temperature sensor.

Figure 1. System configuration example: Inflex FC integrated into savic-net FX BMS

Specifications

Basic specifications

Item	Specification
Power supply	100 V AC to 240 V AC (85 V AC to 264 V AC) at 50 Hz/60 Hz
Power consumption	Valve ON/OFF control type: Max. 6 VA Valve proportional control type: Max. 7 VA
Operating environmental conditions	Temperature: 0 °C to 50 °C Humidity: 10 %RH to 90 %RH (non-condensing) Altitude: 2000 m or lower Vibration: Max. 3.2 m/s ² (at 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/s ² (at 10 Hz to 150 Hz) for transport Max. 3.2 m/s ² (at 10 Hz to 150 Hz) for storage
Mounting	With two M4 x 10 screws
Address setting	Rotary switch setting
Weight	Valve ON/OFF control type: 270 g (main unit only) Valve proportional control type: 480 g (main unit only)

Input/output specifications

Connecting unit	Input/output description	Input/output specification		Connection type	Wiring specification
Temperature sensor	Temperature input	Measuring range: 0 °C to 50 °C (RTD Pt100)		Connector* ¹	LAN cable* ² : Max. 50 m
Control valve* ⁴	ON/OFF output (for valve ON/OFF control type) Floating proportional output (for valve proportional control type)	Normally open (N.O.) contact Contact capacity: Max. 0.8 A AC, 125 V AC Max. 0.4 A AC, 250 V AC Min. applicable load: 10 mA AC For the power of valve ON/OFF control type, the power of the fan is used. Select the power rating of the ON/OFF valve to be the same as the FCU power rating.		Quick-fit screwless terminal block	JIS* ³ CVV 1.25 mm ² or equivalent (for 24 V AC)/ JIS* ⁴ CVV 2.0 mm ² or equivalent (for 100 V AC): Max. 50 m
Fan	Fan ON/OFF output Fan speed changeover output	Valve ON/OFF control type	N.O. contact (potential free) Contact capacity: Max. 3 A AC, 125 V AC Max. 1.5 A AC, 250 V AC Min. applicable load: 10 mA AC	Quick-fit screwless terminal block	JIS* ⁴ CVV 2.0 mm ² or equivalent: Max. 50 m
		Valve proportional control type (for 'M'/'H') Valve proportional control type (for 'L')	N.O. contact (potential free) Contact capacity: Max. 6 A AC, 125 V AC Max. 3 A AC, 250 V A Min. applicable load: 10 mA AC		
Digital user terminal	Temperature setting FCU start/stop, etc.	Serial voltage transmission Transmission speed: 100 bps		Connector* ¹	LAN cable* ² : Max. 50 m
Analog user terminal	FCU switch	Potential free contact (instantaneous) × 1 Applied voltage/current: 12 V DC / 10 mA DC		Connector* ¹	LAN cable* ² : Max. 50 m
	LED output	Output type	Transistor output		
		Output current/voltage	10 mA DC / 12 V DC		
		Output limited resistance	1.2 kΩ		
	Temperature setting input	Potentiometer input (1 kΩ to 10 kΩ)			
Communication line	LS-bus (LonTalk® protocol)	Transmission system: LonTalk® protocol (TP/FT-10) Transmission speed: 78 kbps		Connector* ¹	LAN cable* ² : Max. 900 m (for bus topology)
Power supply	—	100 V AC to 240 V AC (85 V AC to 264 V AC)		M3.5 screw terminal block	JIS* ⁴ CVV 2.0 mm ² or equivalent
External switch, etc.	Contact input	Potential free contact (maintained) × 1 Applied voltage/current: 12 V DC / 5 mA DC		Quick-fit screwless terminal block	JIS* ⁴ CVV 1.25 mm ² or equivalent: Max. 50 m

Notes:

- *1 For connector connection, use Stewart Connector's Plug: Model 940-SP-3088R.
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 × 4 poles) is required.
For *1 and *2, the cable with connector (Part No. DY7210) and the short cable with connector (Part No. DY7220) are available.
- *3 JIS: Japanese Industrial Standards.
- *4 Proportional control valve with less than 30-second operating time (for full stroke) is not applicable. Ask our sales personnel for details.

Dimensions

<Valve ON/OFF control type>

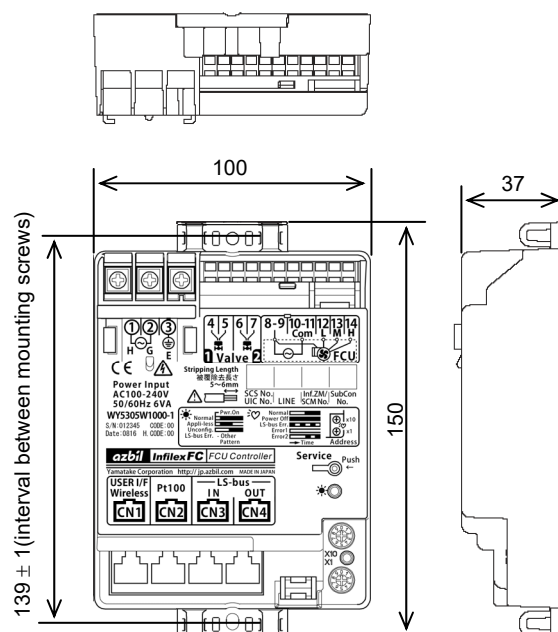


Figure 2. Dimensions (mm): Model WY5305W1000

<Valve proportional control type>

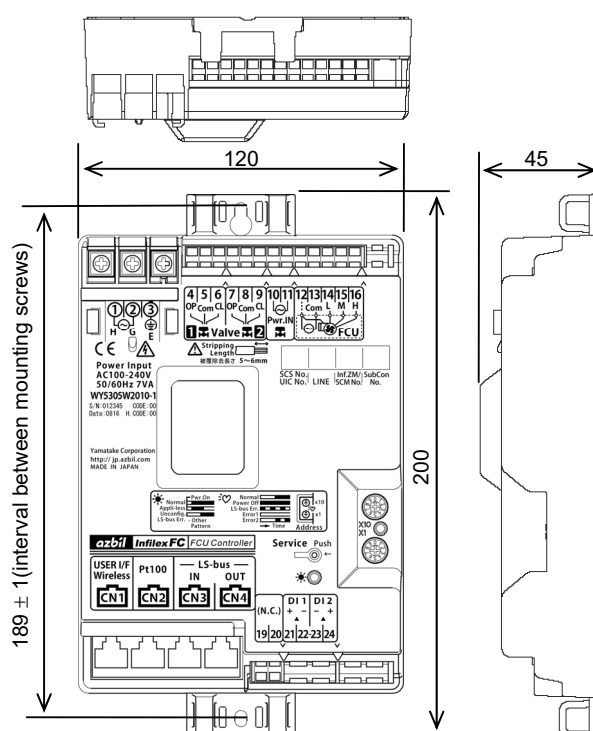


Figure 3. Dimensions (mm): Model WY5305W2010

Wiring Connection

⚠ WARNING

- DANGER: To prevent the risk of severe or fatal electrical shock, always disconnect power source and product power supply before performing any wiring.

- Make sure all the wires are tightly connected. Loose connection can cause burn injury due to heat generation or fire.

- Be sure to ground with 100 Ω or lower ground resistance. Improper ground can cause electrical shock or product fault.

- Wire strip length to be connected to the quick-fit screwless terminal block must be 5 mm to 6 mm. If the strip length is longer than 5 to 6 mm, the conductor will be exposed, causing electrical shock or short circuit between adjacent terminals. If it is shorter, the conductor will not contact the connector.

⚠ CAUTION

- Use crimp terminal lugs with insulation for electric wires connected to the screw terminals.

- If more than the rated power supply voltage is applied, product replacement is required for safety.

<Valve ON/OFF control type: Model WY5305W1000>

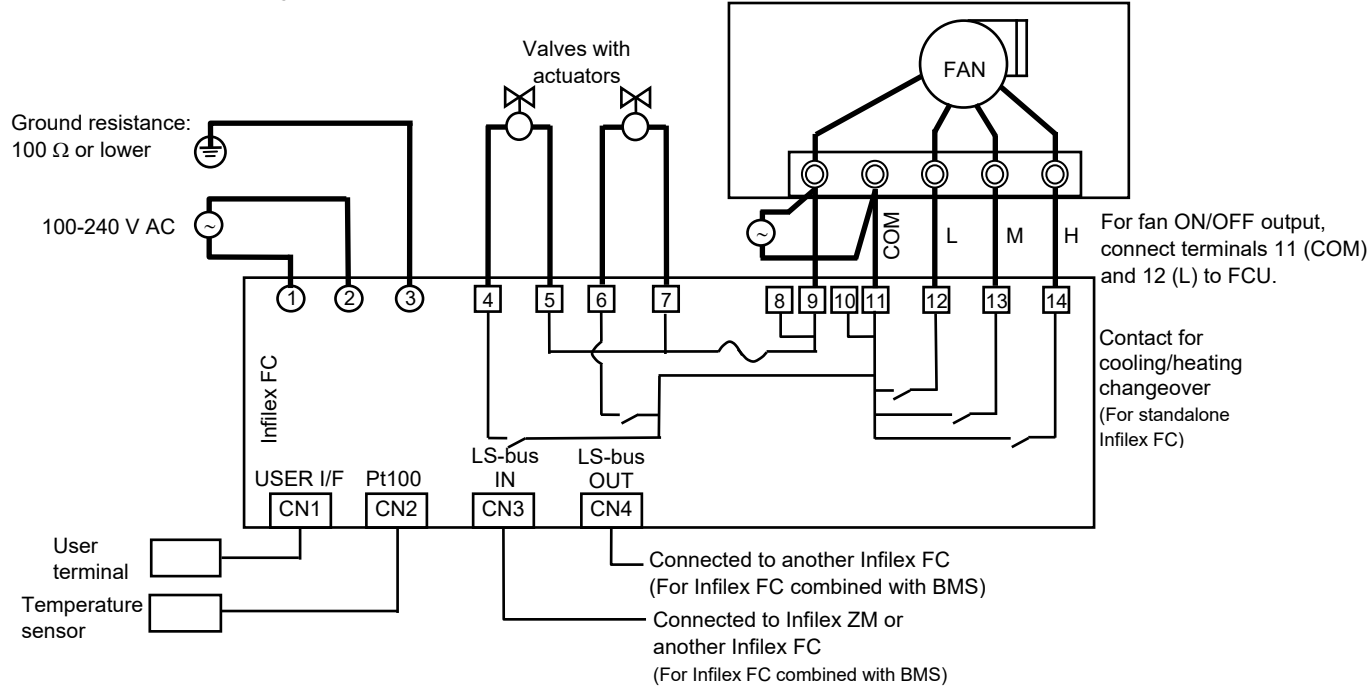


Figure 4. Wiring connection for Model WY5305W1000

Valve wiring

Chilled water valve	Connect to terminals 4 and 5. Leave terminals 6 and 7 unconnected.
Hot water valve	Connect to terminals 4 and 5. Leave terminals 6 and 7 unconnected.
Chilled/hot water valve	Connect to terminals 4 and 5. Leave terminals 6 and 7 unconnected.
Chilled water valve + hot water valve	Connect to terminals 4 and 5 for chilled water valve. Connect to terminals 6 and 7 for hot water valve.
Chilled water valve + chilled/hot water valve*	Connect to terminals 4 and 5 for chilled water valve. Connect to terminals 6 and 7 for chilled/hot water valve.

*Note: Order of valve open/close operation can be set with parameters.

IMPORTANT:

Power for the valve actuators is supplied from FCU via Inflex FC. Since the actuator power supply cannot be separated from the FCU, the valves, unless the valve type is spring-return, will not be fully closed (in 0% position) when the fan is turned off. (A valve in fully closed position is exceptional.)

<Valve proportional control type: Model WY5305W2010>

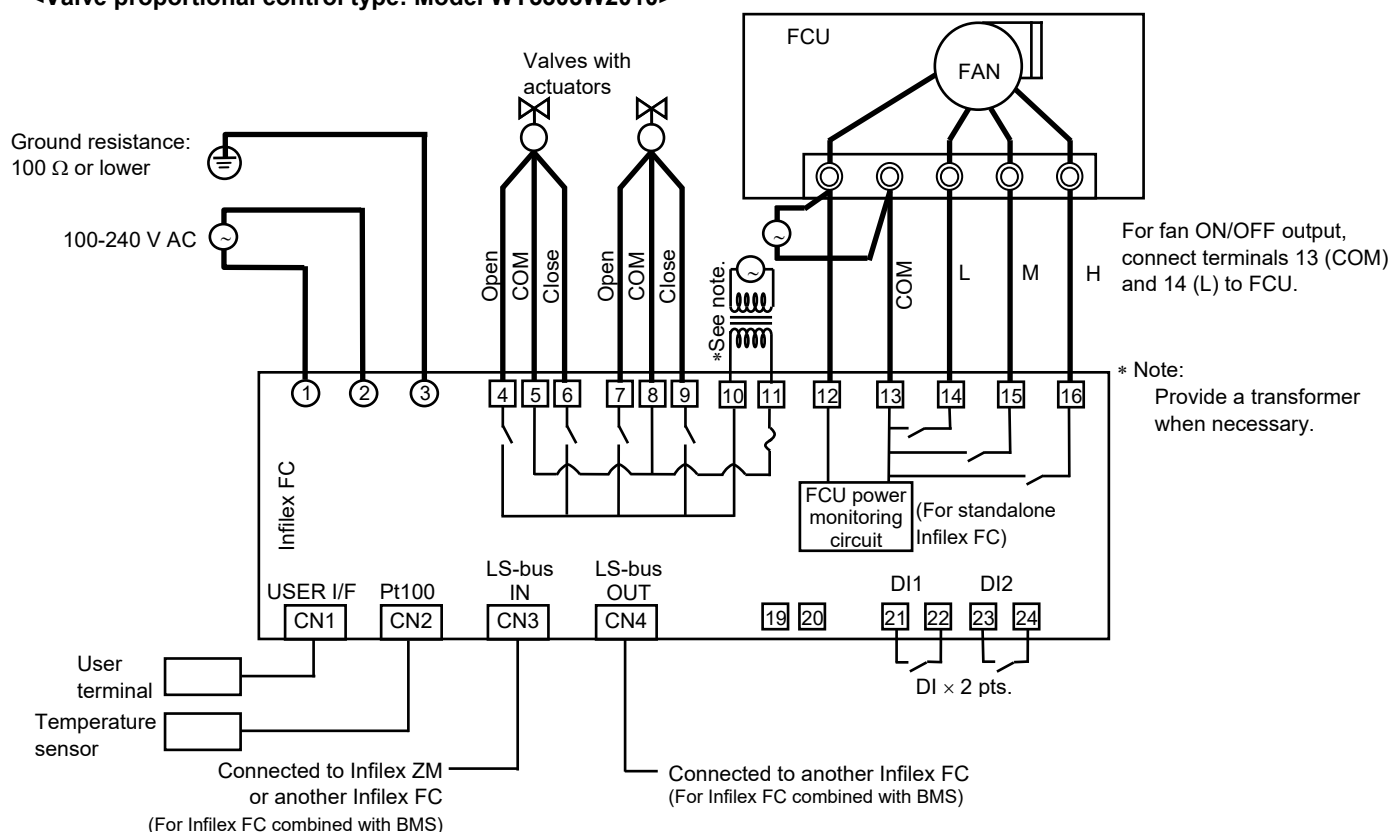


Figure 5. Wiring connection for Model WY5305W2010

Valve wiring

Chilled water valve	Connect to terminals 4, 5 and 6. Leave terminals 7, 8 and 9 unconnected.
Hot water valve	Connect to terminals 4, 5 and 6. Leave terminals 7, 8 and 9 unconnected.
Chilled/hot water valve	Connect to terminals 4, 5 and 6. Leave terminals 7, 8 and 9 unconnected.
Chilled water valve + hot water valve	Connect to terminals 4, 5 and 6 for chilled water valve. Connect to terminals 7, 8 and 9 for hot water valve.
Chilled water valve + chilled/hot water valve*	Connect to terminals 4, 5 and 6 for chilled water valve. Connect to terminals 7, 8 and 9 for chilled/hot water valve.

*Note: Order of valve open/close operation can be set with parameters.

IMPORTANT:

If Inflex FC is used in a 24-hour operation system, be sure to fully close/open the valves (in 0 %/100 % position) at least once a day. (The valves can be forcibly opened/closed with parameter setting.)

Installation and Wiring

- 1) Open the mounting hole.
Open two holes for M4 screws with a $139 \text{ mm} \pm 1 \text{ mm}$ interval for valve ON/OFF control type / a $189 \text{ mm} \pm 1 \text{ mm}$ interval for valve proportional control type.

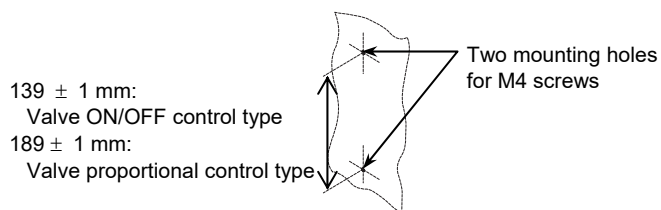


Figure 6. Mounting holes for Inflex FC

- 2) Mount Inflex FC with two M4 screws. Make sure that Inflex FC is tightly fixed with the screws.

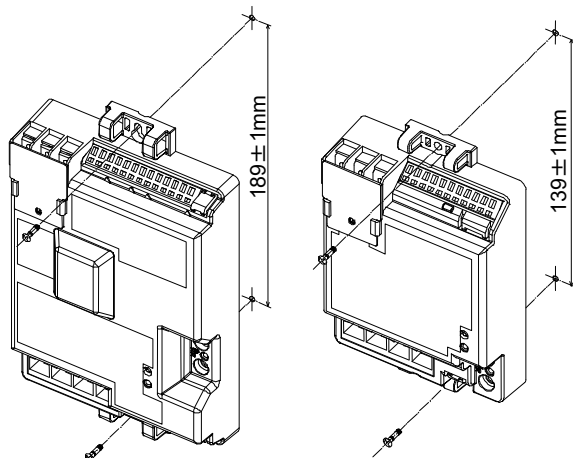


Figure 7. Mounting Inflex FC on a flat surface

IMPORTANT:

Mounting screw tabs of Inflex FC are 5 mm thick each. When you reuse the mounting screws for IFC (Intelligent FCU Controller), you may damage the mounting wall/panel (behind Inflex FC) since the screws used for IFC are inserted 15 mm deeper inside the wall/panel.

- 3) To mount Inflex FC on a threaded rod ($\phi 9 \text{ mm}$) in the ceiling, use two cable ties. Put a cable tie through two holes on the bilateral sides of the M4 screw hole on a screw tab. Instead of cable ties, two fasteners can be used to mount Inflex FC on the threaded rod. Refer to Fig. 8 for mounting with cable ties / fasteners.

Inflex FC mounted on the treaded rod may rotate as an axis. Do not allow the tension on the cables when wiring.

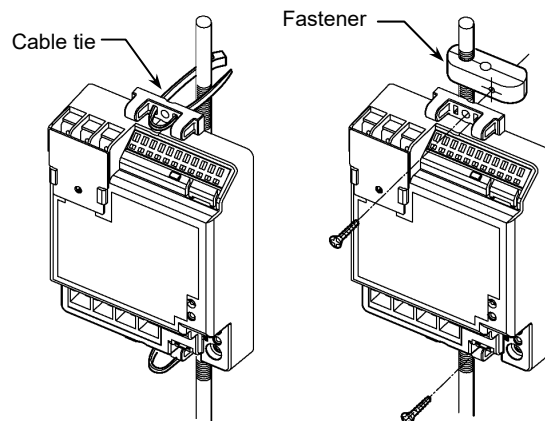


Figure 8. Mounting Inflex FC on a threaded rod

- 4) Crimp M3.5 terminal lugs on the power cables, and connect them to the screw terminals. Connect the modular cables of LS-bus, user I/F, and Pt100 to the modular jacks (on Inflex FC) until they click. Pull lightly out the cables to make sure the modular plugs are completely connected to the modular jacks.

IMPORTANT:

Do not apply 98 N·cm or larger torque for connecting the screw terminals.

⚠ WARNING



- To prevent electrical shock, be sure to turn off the power supply to Inflex FC before connecting the power cables.

- 5) Connect the cables to the quick-fit screwless (clamp) terminal blocks as follows:
 1. Insert a slotted screwdriver into a smaller square hole (for clamp release) on the terminal blocks located on the upper and lower side of the front surface.
 2. Tilt the screwdriver while pushing it into the hole. (Make sure the direction to tilt, as shown in Fig. 9.) When the screwdriver is proceeded to the deep end, the clamp is completely released.
 3. Insert a bare wire (5-6 mm long) into a larger square hole.
 4. Pull out the screwdriver with the bare wire inserted.

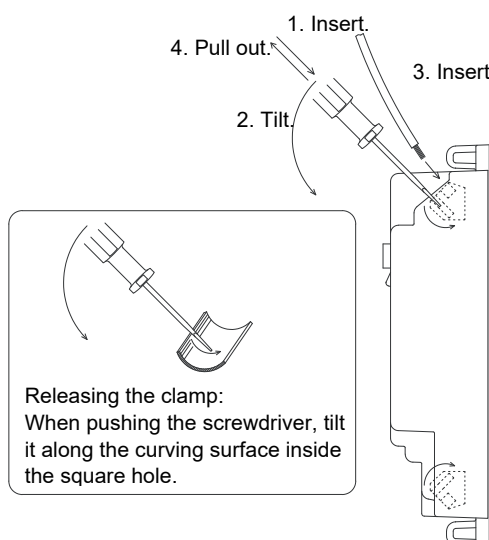


Figure 9. Connecting a wire to a quick-fit screwless terminal.

Note:

Regarding wire connection of FCU ON/OFF output, control valve output, and other inputs, refer to **Wiring for FCU ON/OFF output, control valve output, and other inputs** section.

- 6) Bind the cables with cable ties. If an unbound cable is strongly pulled, Inflex FC may get damaged. Be sure to bind the modular cables separately from power cables.

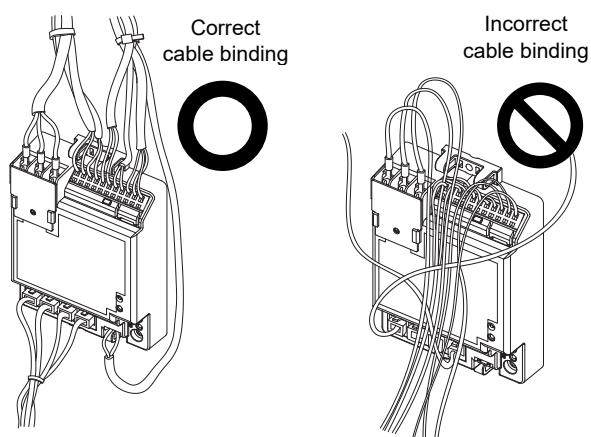


Figure 10. Correct and incorrect cable binding.

IMPORTANT:

Do not position any connected cable on the front surface of Inflex FC, as shown in Fig. 10.

Precautions for Installation

- For Inflex FC installation, tightly fix with the screws.
- Leave clearance as shown in Figs. 11 and 12. Vertically mount the Inflex FC (lengthwise). Be sure to mount it in a location where parts identification indication on the front surface can be checked.

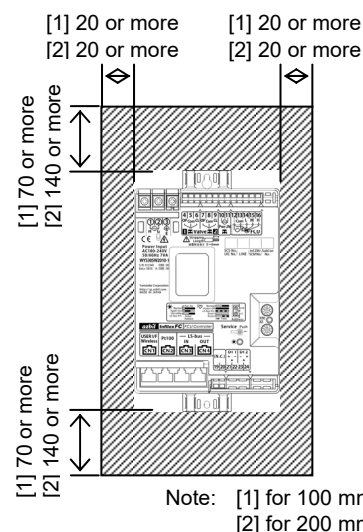


Figure 11. Clearances for maintenance (mm): front view

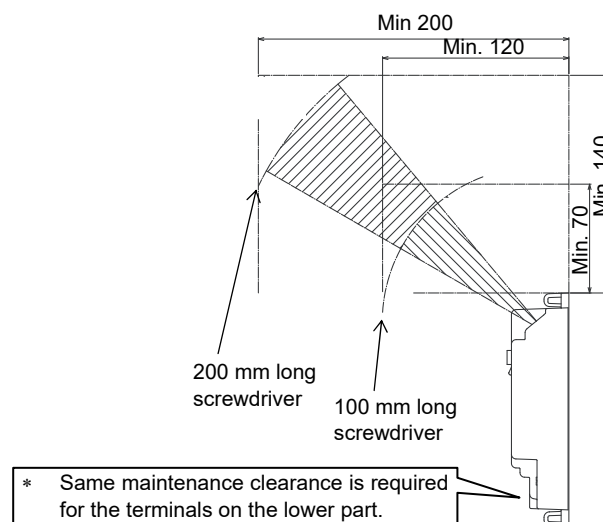


Figure 12. Clearances for maintenance (mm): side view

To replace a currently installed IFC (Intelligent Fan Coil Unit Controller) or Microstat™ with Inflex FC, a screwdriver with long grip may not be usable. In such a case, a screwdriver with short grip or wiring before the installation is required.

- Mount Inflex FC with the front surface facing horizontal direction unless it is protected in a dust-proof housing. (See 'B' in Fig. 13.) If the Inflex FC is mounted with its front surface facing the vertical direction (upwards), dust may accumulate on the connectors. (See 'A' in Fig. 13.)

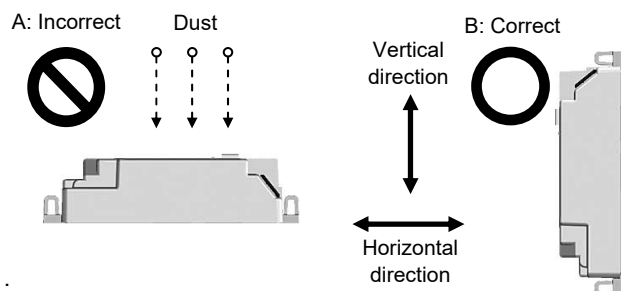


Figure 13. Mounding direction

- After a modular plug is inserted into the corresponding modular jack, lightly pull the modular cable to make sure the modular plug is completely connected to the modular jack.

Recommended wires and cables

For recommended wires and cables, refer to the wiring specifications of **Input/output specifications** section.

Wire connection for FCU ON/OFF output, control valve output, and other inputs

Quick-fit screwless terminals are provided for ON/OFF output, control valve output, status input, and trip alarm input. Follow the procedure below for connecting these wires. (Refer to Fig. 9.)

- Remove covers of the terminals to which wires are connected.
- Strip the 5-6 mm wire sheath to be connected to. (Scale is indicated on the front surface. If a bare wire is longer or shorter than 5-6 mm, it may get exposed or may come off from the connector.) Make sure that any wire fiber goes out of the bare wire.
- Insert a slotted screwdriver into a smaller square hole (for clamp release) on the terminal blocks located on the upper and the lower sides of the front surface. To insert the screwdriver to deep end (approx. 10 mm deep), push and tilt it (towards the front surface) along the curving surface inside the square hole. When the screwdriver is correctly inserted to the deep end, the clamp is completely released and the screwdriver remains inserted position by itself.

Notes:

- * A slotted screwdriver with the blade 3.5 mm wide and 0.5 mm thick (straight type) is applicable. A screwdriver with the blade end narrower than the beginning (shaft side) may not be applicable.
Applicable screwdriver (an example):
Vessel's Model 9900 (3 mm wide × 100 mm long) or Model 910 (3 mm wide × 75 mm long)
- * Since the terminal blocks have the inclined surfaces, required maintenance clearance varies depending on the length of the screwdriver to be used. Note that a long screwdriver (80 mm or longer) may not be usable for the Inflex FC replaced from IFC or Microstat since IFC or Microstat requires smaller maintenance clearance.

- After the a bare wire is fully inserted, remove the screwdriver with the bare wire inserted.
- Lightly pull the wires connected to make sure it is completely held by clamp.

Note for connecting stripped wire of 1.8 mm² or smaller cable

1.8 mm² or thinner cable connected to a quick-fit screwless terminal may cause short-circuit due to dust accumulated in clearance of the terminal. (See Fig. 14.)

To prevent short-circuit, put the tubes* through the wires so that the wire connected terminals are covered. (See Fig. 15.) Tubes are not supplied with Inflex FC and commercially available. See Fig. 24 for tube specifications.

- * Tubes are also available at Azbil Corporation.
(Part No. 83167219-001, 6 pieces/set)

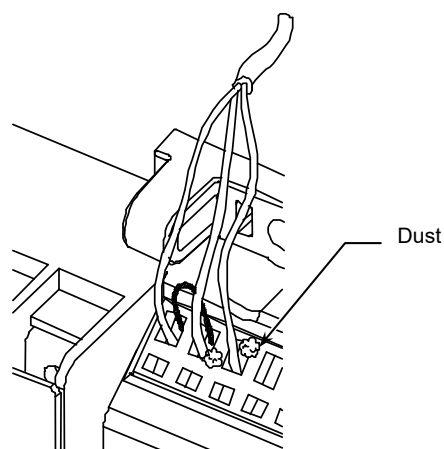


Figure 14. Dust accumulated in quick-fit screwless terminals

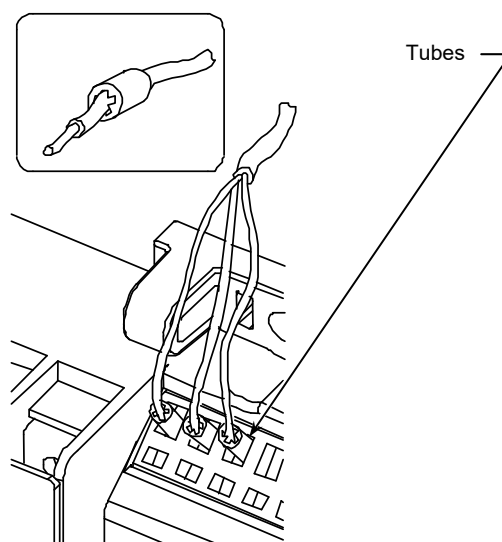


Figure 15. Tubes covering quick-fit screwless terminals

Connection to user terminal / temperature sensor

Wires from user terminal / temperature sensor are connected to Inflex FC with modular connection. For correctly crimping modular plugs on LAN cables, refer to the following section.

Modular Connector Connection

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

For modular plugs, refer to the note 1 in **Specifications** section.

Procedure for modular connector connection

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

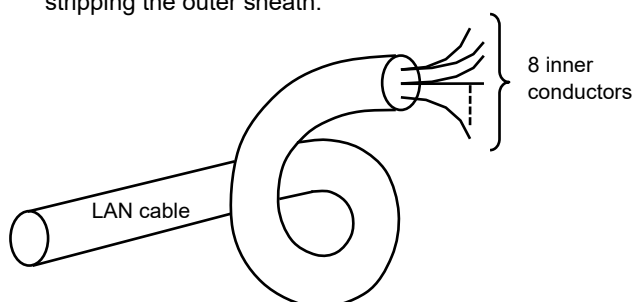


Figure 16. Stripping the outer sheath
Make sure there are 8 inner conductors inside the outer sheath.

- 2) Align the 8 inner conductors in a order specified by the LAN cable manufacturer.

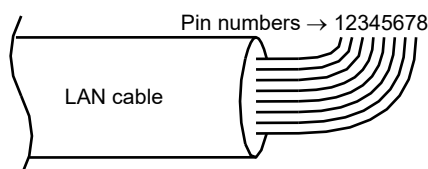


Figure 17. Alignment of the inner conductors
Alignment of the LAN cable inner conductors is shown in the table below.

Modular pin number	LAN cable inner conductor alignment	Color alignment example
1	Line 1 of pair 2	Orange
2	Line 2 of pair 2	White and orange
3	Line 1 of pair 3	Green
4	Line 2 of pair 1	Blue and white
5	Line 1 of pair 1	Blue
6	Line 2 of pair 3	Green and white
7	Line 1 of pair 4	Brown
8	Line 2 of pair 4	Brown and white

* Note:

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 inner conductors into a modular plug.

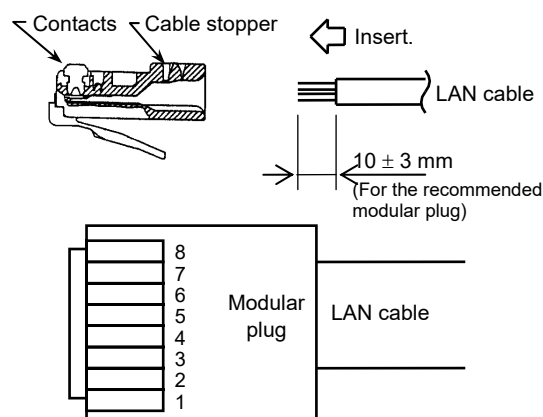


Figure 18. LAN cable insertion into a modular plug

Pin numbers of the modular plug in Fig. 18 shows the pin number arrangement when you face the side with contacts and cable stopper.

Before inserting the inner conductors into a modular plug, even out the length with a nipper. Note that the modular plug may not be crimped on inner conductors stripped too long.

- 4) Crimp the modular plug with the crimping tool. Completely insert the inner conductors into the modular plug so that the contacts of the modular plug stick into the inner conductors when the modular plug is crimped. Crimped modular plug is secured on the LAN cable with 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 continuity tester (Part No. DY7206A0000) facilitates continuity check. At the same time, make sure that the inner conductors are in order with the modular plug contacts sticking in the conductors and that there is no cable damage or disconnection.
- 7) Connect the modular plugs to the modular jacks. When the continuity check is successfully completed, insert the LAN cable modular plugs into the modular jacks of Inflex FC and of user terminal/temperature sensor. Be sure to completely insert a modular plug until it clicks.

Parts Description

- Modular branch unit:
Branches out the communication line for two user terminals to be connected.

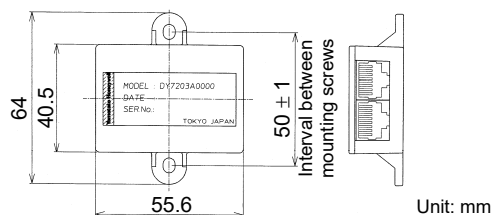


Figure 19. Modular branch unit: Part No. DY7203A0000

- Modular extension unit:
Extends the communication line by connecting to another communication line.

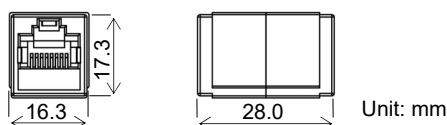


Figure 20. Modular extension unit: Part No. DY7202A0000

- Adaptor for connecting to a Pt100 sensor:
Connects temperature sensor to Inflex FC with modular connection.

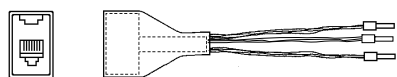


Figure 21. Adaptor for connecting to a PT100 sensor:
Part No. DY7204A0003

- Adaptor for connecting to a user terminal:
Connects humidity stat and filter differential pressure alarm to Inflex FC with modular connection.

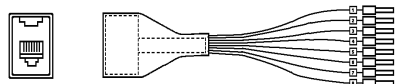


Figure 22. Adaptor for connecting to a user terminal:
Part No. DY7204A0008

- Modular plug

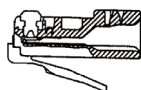
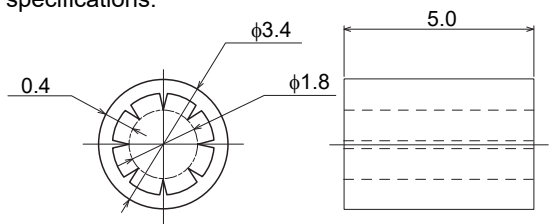


Figure 23. Modular plug: Part No. DY7207A0100 (100 pieces/set)

- Tube:
Prepare tubes (if necessary) that meets the following specifications.



Applicable wire: JCS KV 0.5 mm²

Figure 24. Tube (commercially available)

Precautions for use

- Modular branch unit, modular extension unit, adaptor for connecting to a Pt100 sensor, a user terminal must be used in an outlet box or inside a panel.
- For modular 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.

Tools Description

- Modular crimping tool:
Crimps modular plugs on LAN cables.

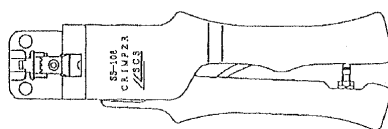


Figure 25. Modular crimping tool: Part No. DY7205A0002

- Modular continuity tester:
Checks continuity of LAN cables with modular plugs crimped on.

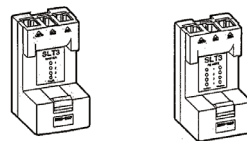


Figure 26. Modular continuity tester: Part No. DY7206A0000

Terminator

For 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.

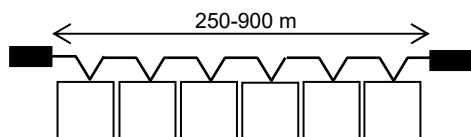
IMPORTANT:

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)

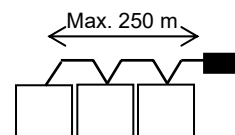
Connect a terminator at each end of the devices on the bus (2 terminators in total) as shown in Fig. 27.

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. 29. In this case, be sure to use a free topology terminator.



■ : Terminator Part No. DY7212A1101

Figure 27. Terminator connection example for bus topology
(Wiring length: 250-900 m)

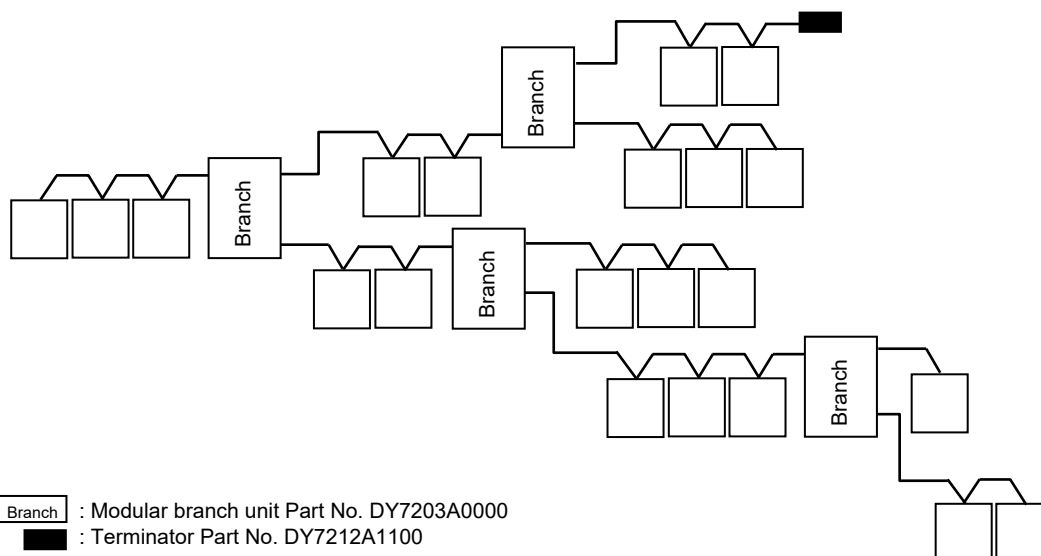


■ : Terminator Part No. DY7212A1100

Figure 28. 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. 29.



Branch : Modular branch unit Part No. DY7203A0000
■ : Terminator Part No. DY7212A1100

Figure 29. Terminal 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)

Terminators (modular connection type) part numbers

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

Notes:

- * Separate order is required for the terminators shown above. Be sure to separately order your applicable terminator(s).
- * The terminators shown above are applicable only to a normal use. Since the channel of the transceivers provided in the devices is TP/FT-10, they are not applicable to a special use (e.g., the same bus is used for both communication and power supply).

Software Details

Functions with the symbol * are available when Inflex FC is combined with Inflex ZM, other controllers, and the center unit in a BMS.

(1/3)

Item	Function	Description	Remarks
Operation (common to valve ON/OFF control and valve proportional control types)	FCU start/stop operation	FCU is turned on/off with the center unit, DI, or a user terminal.	Each Inflex FC can individually be started up and shut down.
	Setback operation	Set temperature is changed to save energy.	Each Inflex FC can individually control the setback operation..
	FCU interlocking with OAHU*	Inflex ZM can configure the sets composed of Inflex FC and AHU controller. (Multiple Inflex FC and AHU controllers can be included in a set.) In a specified set, all the FCUs interlock with the OAHU start/stop operation.	One Inflex ZM can control up to 4 sets. 'OAHU interlocking with FCU' is not available when 'FCU interlocking with OAHU' is active. Do not operate the user terminal(s) to start/stop Inflex FC.
	OAHU interlocking with FCU*	Inflex ZM can configure the sets composed of Inflex FC and AHU controller. (Multiple Inflex FC and AHU controllers can be included in a set.) In a specified set, all the OAHUs interlock with FCU start/stop operation if at least one FCU is started up.	One Inflex ZM can control up to 4 sets. 'FCU interlocking with OAHU' is not available when 'OAHU interlocking with FCU' is active.
Control (for valve ON/OFF control type)	Temperature control ¹⁾	Valve is ON/OFF-controlled so that the actual (measured) temperature matches the preset temperature.	
	Fan speed control	The fan speed is multistage-controlled depending on the difference between the actual temperature and the preset temperature. Fan multistage control has L/M/H(low/medium/high) type or L/M/H/OFF type.	Fan speed is automatically controlled when it is set to AUTO. When L/M/H is selected, the selected fan speed is output.
Control (for valve proportional control type)	Temperature control ¹⁾	Floating valve is PID-controlled so that the actual (measured) temperature matches the preset temperature.	
	Noise control	To prevent the water flushing noise, the valve is completely closed when its closing position reaches the specified degree.	
	Fan speed control	The fan speed is multistage-controlled depending on the difference between the actual temperature and the preset temperature. Fan multi-stage control has L/M/H type or L/M/H/Off type. Water- or fan speed-priority control can be selected in response to the applications. ²⁾	Fan speed is automatically controlled when it is set to AUTO. When L/M/H is selected, the selected fan speed is output.
Control (common to valve ON/OFF control and valve proportional control types)	Cooling/heating changeover*	The following items are sent from the center unit when cooling/heating changeover is required: Cooling available, heating available, cooling and heating available, fan only (cooling or heating not available).	Inflex ZM can configure the sets composed of Inflex FC. One Inflex ZM can control up to 8 sets for the cooling/heating changeover.
	Mixing loss control*	Indoor perimeter- and interior- FCU/VAV are interlocked, and mixing loss is controlled with the deviation between the preset temperature of the indoor perimeter- and the interior- FCU/VAV.	One (group of) Inflex FC can interlock with another/other Inflex FC and/or Inflex VC. Interlocked Inflex FC and/or Inflex VC cannot interlock with different Inflex FC and/or Inflex VC. Do not operate the user terminal(s) connected to the interlocked Inflex FC and/or Inflex VC.
	Optimum temperature control of OAHU supply air	The OAHU supply air is set at optimum temperature in response to FCU load. This enables comfortable temperature and OAHU fan power cutback.	Inflex ZM can configure the sets composed of Inflex FC and AHU controller. One Inflex ZM can control up to 4 sets.
	VWV/VWT control ^{*, 3)}	Pump feed power is cut back by adequately controlling supply water pump in response to FCU load. Additionally, chiller operating efficiency is enhanced by setting the optimum chiller outlet temperature.	Inflex ZM can configure the sets composed of Inflex FC and pump controller. One Inflex ZM can control up to 4 sets.

Item	Function	Description	Remarks
Control (common to valve ON/OFF control and valve proportional control types)	Parallel operation of multiple FCUs: fan start/stop, valve open/close, and fan speed changeover*	Fan start/stop, valve open/close, or fan speed changeover of multiple FCUs is concurrently operated.	Master- and slave- Inflex FC must have the same fan output type and must be connected to the same LS-bus. When the fan speed is set to AUTO, do not turn off Inflex FC with temperature control. Do not operate the user terminal(s) connected to the slave- Inflex FC.
Operation with a user terminal (common to valve ON/OFF control and valve proportional control types)	FCU start/stop operation	FCU is turned on/off with a user terminal.	The latest start/stop operation with a user terminal or with the center unit takes priority. ⁴⁾ Start/stop operation with a user terminal can be restricted by the center unit. Setback operation is not available when the start/stop operation is active.
	Temperature setting	Set temperature is changed with a user terminal.	The latest temperature setting with a user terminal or with the center unit takes priority. ⁵⁾ High/low limit setpoint can be set with the center unit. Dual setting is available ⁶⁾ .
	Setback operation	FCU operation is switched to setback operation with a user terminal.	The latest setback operation with a user terminal or with the center unit takes priority ⁵⁾ . Setback operation can be restricted by the center unit. FCU start/stop operation is not available when the setback operation is active.
	Fan speed control	Fan speed is changed over (L/M/H/AUTO) with a user terminal.	The latest changeover operation with a user terminal or with the center unit takes priority ⁵⁾ .
Operation with the center unit	Individual monitoring*	The following items are monitored and controlled by the center unit: FCU start/stop, temperature measuring, temperature setting, high/low limit setting, setback difference, fan speed control, valve position, cooling/heating conditions, control status ⁷⁾ (Not all the items above are required to centrally monitor or control.)	
	Group monitoring*	Multiple Inflex FC are divided into groups, and with the center unit, the following items can be monitored and controlled per grouped Inflex FC: FCU start/stop, temperature measuring ⁸⁾ , temperature setting, high/low limit setting, setback difference (Not all the items above are required to centrally monitor or control.)	All the Inflex FC connected from a certain Inflex ZM can be divided into up to 25 groups. (Various grouping is available.) Any item set for group monitoring can not be individually monitored. Group monitoring and individual monitoring can be combined (e.g. FCU start/stop for group monitoring and temperature measuring for individual monitoring). One Inflex FC can belong to only one group.
	Batch operation*	All valves can forcibly be opened/closed with the center unit. This facilitates pipe flushing.	Valves controlled by all the Inflex FC connected from a certain Inflex ZM are subject to batch operation. Batch operation can be performed with Inflex ZM as well as with the center unit.

Item	Function	Description	Remarks
External contact input (DI)	Alarm input	Input value of DI (digital input) 1 is reflected in the alarm point. When the contact of DI 1 is open, NML (0) is reflected. When the contact of DI 1 is closed, ALM (1) is reflected.	Alarm input is applicable only to Models WY5305W2010.
	State input	Input value of DI (digital input) 2 is reflected in the general DI point. When the contact of DI 2 is open, OFF (0) is reflected. When the contact of DI 2 is closed, ON (1) is reflected.	State input is applicable only to Models WY5305W2010.
Interlock operation with DI	FCU interlocking with alarm input	When alarm input is "ALM", FCU is turned off. Concurrently, FCU start/stop operation with a user terminal can be restricted.	FCU automatic start/stop operation is not available when FCU interlocking with alarm input is active.
	FCU interlocking with status input	When status input is "OFF", FCU is turned off/switched to setback operation. Concurrently, FCU start/stop operation with a user terminal can be restricted.	FCU automatic start/stop operation is not available when FCU interlocking with status input is active.

Notes:

- 1) Any combination of the following valves can be used for temperature control:
Chilled/hot water valve, chilled water valve, hot water valve, chilled water valve + hot water valve, and chilled water valve + chilled/hot water valve*
- * The order of valve open/close operation can be set with parameters.
(e.g. chilled water valve → chilled/hot water valve OR chilled/hot water valve → chilled water valve)
- 2) "Water-priority" control is the method to open the valves first BEFORE the fan speed is increased. This prevents excessive fan speed (airflow volume) and fan noise.
"Fan speed-priority" control is the method to widely open the valves AFTER the fan speed is increased. This ensures the temperature difference between the coil inlet and outlet, leading to the effective chiller plant control.
- 3) VWV: Variable Water Volume
VWT: Variable Water Temperature
- 4) The latest start/stop operation with an analog user terminal may not take priority.
- 5) The latest setting operation with an analog user terminal does not take priority.
- 6) Dual setting is the method to have cooling setting and heating setting separately.
- 7) Control status is an index of FCU load. The index is used for supply air temperature control of OAHU or VWV/VWT control.
- 8) Temperature measuring for group monitoring calculates either the average value in a group or the representative value of a group.

Check and Setting

The following check and settings must be performed by a technical engineer.

LED indication

After the power is applied to Inflex FC, check that the status indicator LED blinks in approx. 10 seconds. If it stays ON, Inflex FC is in an abnormal status. The LED stays ON for seconds immediately after the power is applied, which does not indicate an error. LED indication is described on the front surface of Inflex FC. (See Figs. 30 to 32.)

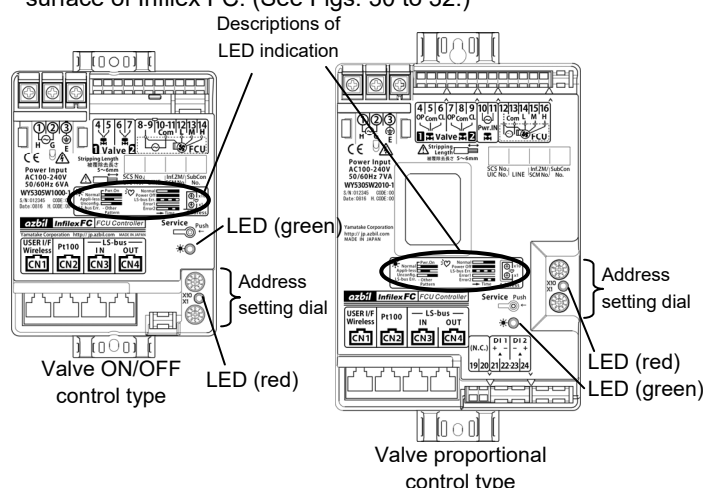


Figure 30. LED indication

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

Figure 31. Descriptions of red LED indication (status)

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

Figure 32. Descriptions of green LED indication (Communication with LonTalk protocol)

Address setting

Two address setting dials are located on the front surface of Inflex FC. The allow of the upper dial (with 'x10') indicates tens, and the allow of the lower dial (with 'x1') indicates ones. For setting the address, use a small Phillips screwdriver to turn the dial.

Parameter setting

Inflex FC parameters are set in response to the size and type of FCU, room characteristics, and applications.

To Connect Two User Terminals (for Remote Control)

Up to two digital user terminals (Neopanel Model QY7205C) can be connected to one Inflex FC.

To connect the two user terminals

- Modular branch unit (Model DY7203A0000)
- Neopanel with address 1 and with address 2

are required.

Note that two Neopanel with address 1 connected to the Inflex FC do not work. 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).

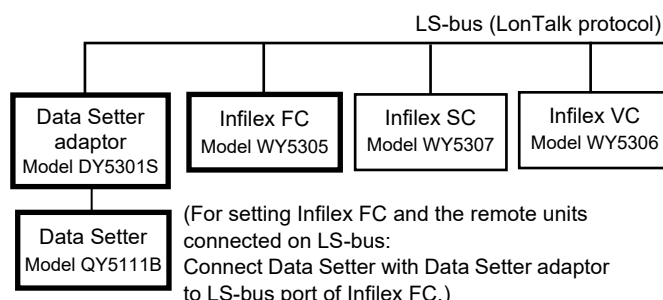
Notes:

- * The latest FCU start/stop operation or temperature setting operation with a Neopanel or with the BMS center unit takes priority.
- * Neopanel with address 2 does not have a temperature measuring function.

Connection of Data Setter for LonTalk Protocol

Connect the CompactFlash® memory type Data Setter (Model QY5111B) for LonTalk protocol to LS-bus port of Inflex FC with the Data Setter adaptor (Part No. DY5301S0000, with separate order required).

For details of the Data Setter adaptor, refer to its Specifications manual.



Note:

Parameters of a remote unit on LS-bus (sub-controller) can also be set and modified with the Data Setter with Data Setter adaptor connected on a remote unit on LC-bus (controller). Refer to Specifications/Instructions of the respective controllers.

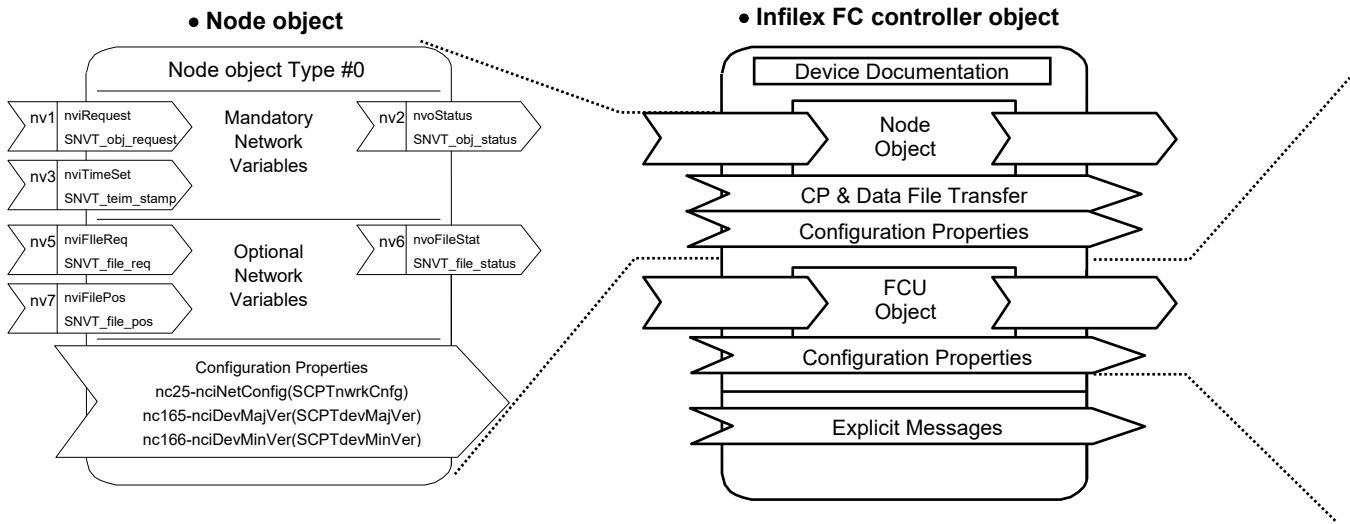
Figure 33. Connection example of Data Setter with Data setter adaptor to LS-bus port of Inflex FC

Network Interface between Infilex FC and Other Devices

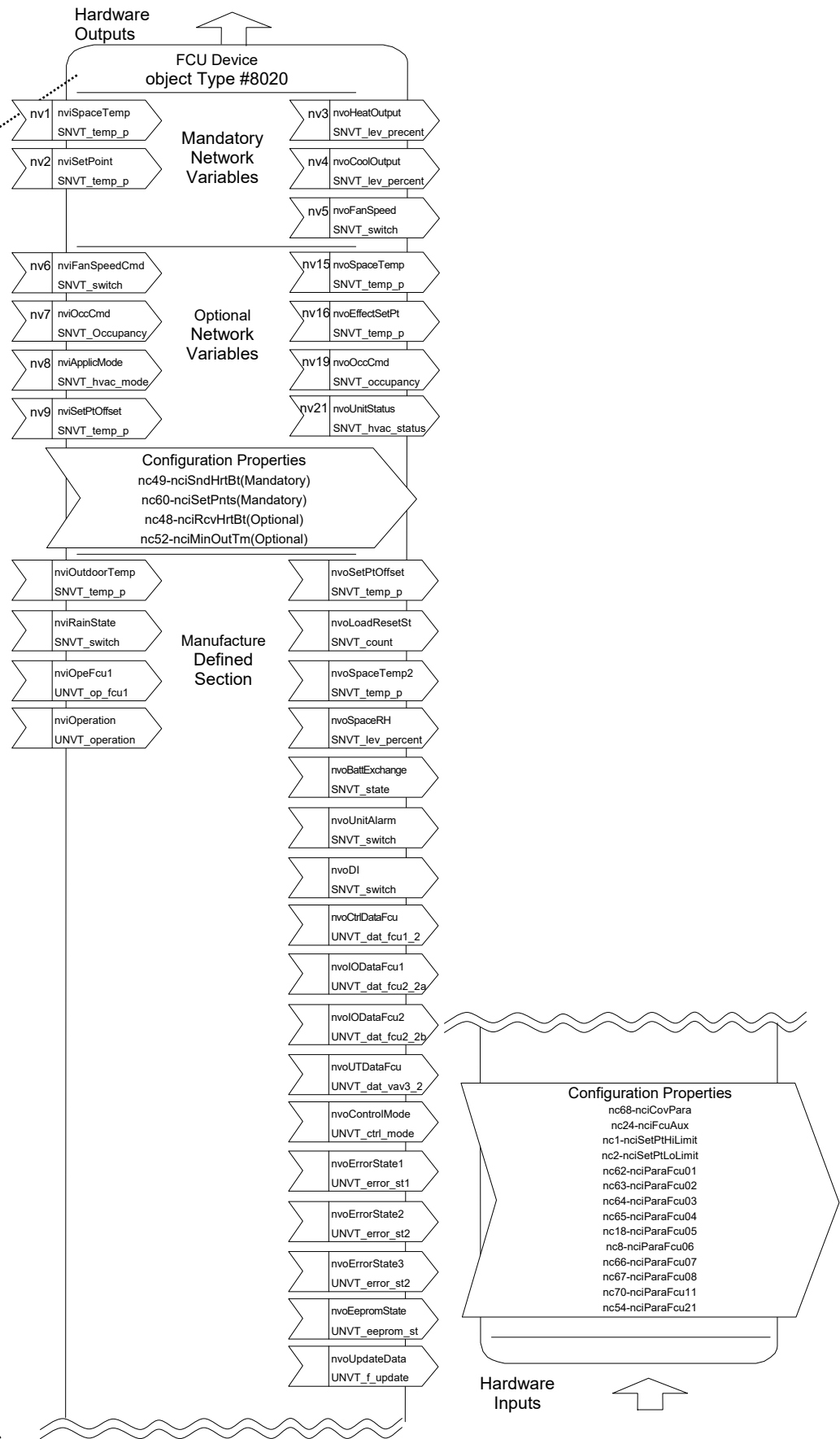
Program ID XX:00:5F:50:14:03:04:XX
Documentation &3.4@0Node,8020FCUControl;Inf-FC WY5305
Program ID revision

90:00:5F:50:14:03:04	:11	WY5305***** (rev. 01 - 02)
	:12	WY5305***** (rev. 03) WY5305*****-0
80:00:5F:50:14:03:04	:13	WY5305*****-1 (rev.04 -)

Object details (continued to the following page)



• **Controller object**



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 LonTalk® protocols.

*1. SB: Send Heartbeat

*2. RB: Receive Heartbeat

*3. MT: Minimum Out Time

• Controller object

Input network variables (according to LONMARK® Functional Profile: FCU 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	—	—	—
nviFanSpeedCmd	SNVT_switch	—	“AUTO	Fan ON/OFF + speed command	—	—	—
nviOccCmd	SNVT_occupancy	—	OC_NUL	Occupancy input	—	—	—
nviApplicMode	SNVT_hvac_mode	—	HVAC_AUTO	Application mode input	—	✓	—
nviSetPtOffset	SNVT_temp_p	-10.00 to 10.00 °C	0.00	Fine adjustment input	—	✓	—

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

Variable name	SNVT name	Valid range	Default value	Description	SB	RB	MT
nvoHeatOutput	SNVT_lev_percent	0.00 to 100.00 %	0	Hot water coil output	✓	—	✓
nvoCoolOutput	SNVT_lev_percent	0.00 to 100.00 %	0	Chilled water coil output	✓	—	✓
nvoFanSpeed	SNVT_switch	—	“OFF”	Fan ON/OFF + speed command	✓	—	✓
nvoSpaceTemp	SNVT_temp_p	-10.00 to 50.00 °C	327.67	Space temperature output (inside: differential pressure sensor)	✓	—	✓
nvoEffectSetPt	SNVT_temp_p	10.00 to 35.00 °C	0.00	Control setpoint output	✓	—	✓
nvoOccCmd	SNVT_occupancy	—	OC_NUL	Occupancy output	✓	—	✓
nvoUnitStatus	SNVT_hvac_status	—	—	Unit status output	✓	—	✓

Configuration network variables (according to LONMARK® Functional Profile: FCU 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
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

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	—	—	—
nviOpeFcu1	UNVT_op_fcu1	—	—	Command (valve override operation + error indication cancel, etc.) input	—	—	—
nviOperation	UNVT_operation	—	—	Command (memory read/write, etc.) input	—	—	—

User-defined output network variables

Variable name	SNVT name	Valid range	Default value	Description	SB	RB	MT
nvoSetPtOffset	SNVT_temp_p	-10.00 to 10.00 °C	0.00	Fine adjustment (local)	✓	—	✓
nvoLoadResetSt	SNVT_count	0 to 9	0	Control status 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	✓	—	✓
nvoUnitAlarm	SNVT_switch	—	—	Alarm	✓	—	✓
nvoDI	SNVT_switch	—	—	Digital input	✓	—	✓
nvoCtrlDataFcu	UNVT_dat_fcu1_2	—	—	Internal FCU control data output	—	—	—
nvoIODataFcu1	UNVT_dat_fcu2_2a	—	—	Input/output data 1	—	—	—
nvoIODataFcu2	UNVT_dat_fcu2_2b	—	—	Input/output data 2	—	—	—
nvoIODataFcu	UNVT_dat_vav3_2	—	—	User terminal 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_f_update	—	ST_NUL	Internal data notification during update	—	—	—

User-defined configuration network variables

Variable name	CP type	Valid range	Default value	Description
nciCovPara	UCPTfcuMinDelta2 (Resource file)	—	—	Load reset type + COV value
nciFcuAux	UCPTfcuAux	—	—	Auxiliary parameter

User-defined parameters

Variable name	CP type	Valid range	Default value	Description
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
nciParaFcu01	UCPTfcuCtrlType2	—	—	Operation control parameter
nciParaFcu02	UCPTfcuTempCtrl2	—	—	Temperature control parameter
nciParaFcu03	UCPTfcuDischargeAirTempCtrl2	—	—	Duct inlet temperature optimization parameter
nciParaFcu04	UCPTfcuUnitType2	—	—	FCU parameter
nciParaFcu05	UCPTfcuFanCtrl	—	—	Fan speed automatic control parameter
nciParaFcu06	UCPTctrlDisable	—	—	Assign/delete point parameter, assign/delete control parameter
nciParaFcu07	UCPTfcuAI_Adjustment2	—	—	Input/output adjustment parameter
nciParaFcu08	UCPTfcuManufAdjustment2	—	—	Manufacturer adjusted parameter
nciParaFcu11	UCPTfcuMiscellaneous2	—	—	Basic parameter
nciParaFcu21	UCPTsetPointKnob2	—	—	AI processing table

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Install this product where it is accessible only to people with sufficient knowledge concerning electrical equipment. This product complies with the following harmonised standards of the Electromagnetic Compatibility Directive (EMCD), the Low Voltage Directive (LVD) and the Restriction of Hazardous Substances Directive (RoHSD).

EMCD: EN 61326-1 Class A, Table 2 (for use in an industrial electromagnetic environment)

LVD: EN 61010-1 Overvoltage category II
 Pollution degree 2

RoHSD: EN 50581

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