Specifications of N2 RFID Reader

(CTS-STBR-AE-1-02/04)

Revision 1.1h
17/APR./ 2023

CanTops Co., Ltd

Approval Signatures:	☐Name (Job Position) Date:	☐Name (Job Position) Date:	☐Name (Job Position) Date:

Company ADDR:

A-1002~1008, Digital Empire BLDG, 16, Deogyeong-daero, 1556beon-gil, Yeongtong-gu, Suwon-si, Gyeonggi-do Korea 16690, Republic of Korea

(This page is intentionally left blank)

CONTENTS

Revision History:

Rev.	Date	Location	Description
1.1	2021. JUN.29	All	- Form change and cpmbination (02/04)
1.1a	2021. JULY.06	Cover	- Change in the document title and file name
	2021. SEP.15	Phase4	- Added max H-field strength
	2021. OCT.18	Phase5	- Added example of install, <5.d>, request of CE LVD
1.1F	2023. MAR.06	Phase4	- Changed max H-field strength"below 53.55"
1.1g	2023. APR.12	Phase7	- Changed input power data, temperature data
1.1h	2023. APR.17	-	- Added FCC warning

FCC Compliance Statement

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by one of the following measures:

- **Reorient or relocate the receiving antenna.**
- **Increase the separation between the equipment and receiver.**
- **Connect the equipment into an outlet on a circuit different from which the receiver is connected.**
- **Consult the dealer or an experienced radio/TV technician for help.**

FCC Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

1. PRODUCT OVERVIEW

This product is an RIFD Reader using 134.2kHz and is designed to communicate with TAG (Transponder) of ISO11785 standard.

This product is optimized for stable operation in various noise environments and is used for logistics management of semiconductor lines.

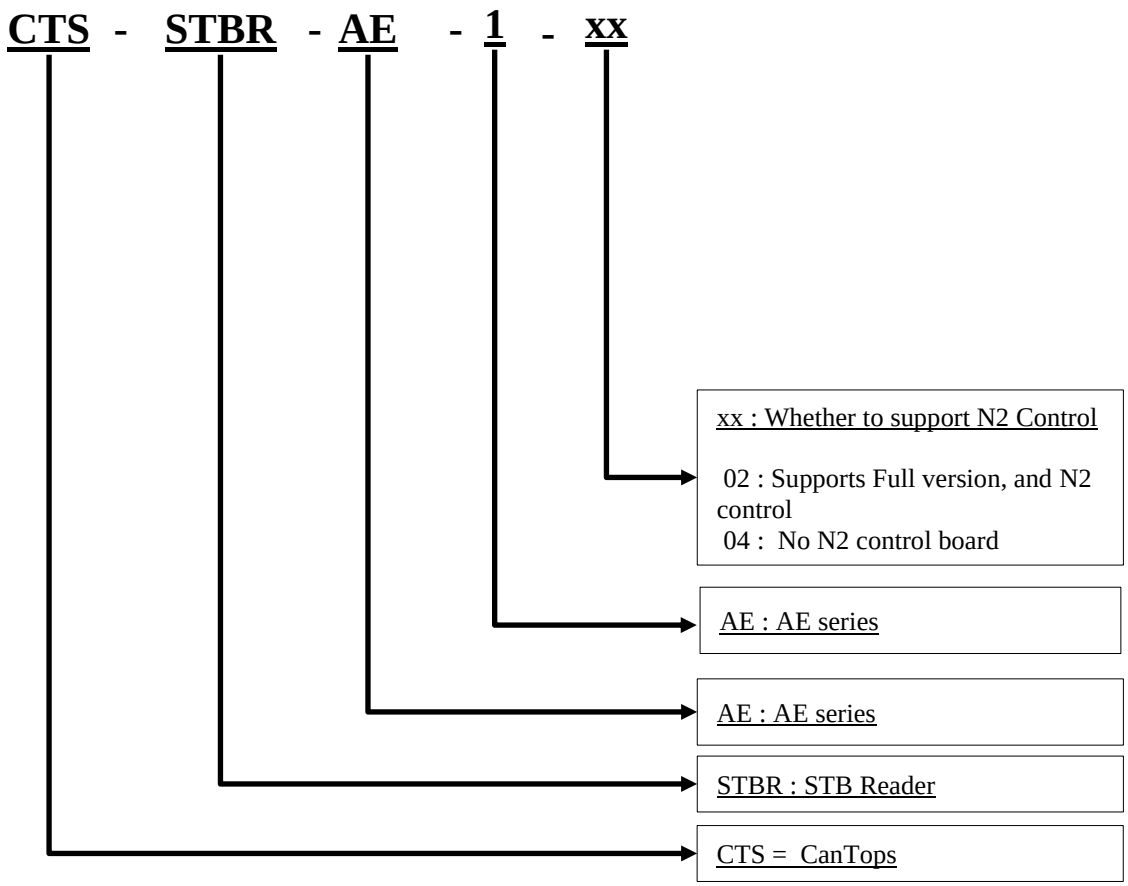
In addition, this product uses Ethernet-based industrial Fieldbus EtherCAT to collect and manage ID and sensor information required for overall factory logistics in real-time and strengthened the network function, and consists of a reader, antenna, and sensor.

For details of the antenna and sensor, please refer to the separate specification sheet.

2. PRODUCT FEATURES

- EtherCAT communication, RFID Reader, and N2 I/O functions are integrated into one
- Can be easily installed in the facility structure due to its compact design, thereby can reduce the cost and shorten the installation time.
- Can be used in various environments by supporting 3 types of reading antennas.

3. PRODUCT CODE CONFIGURATION



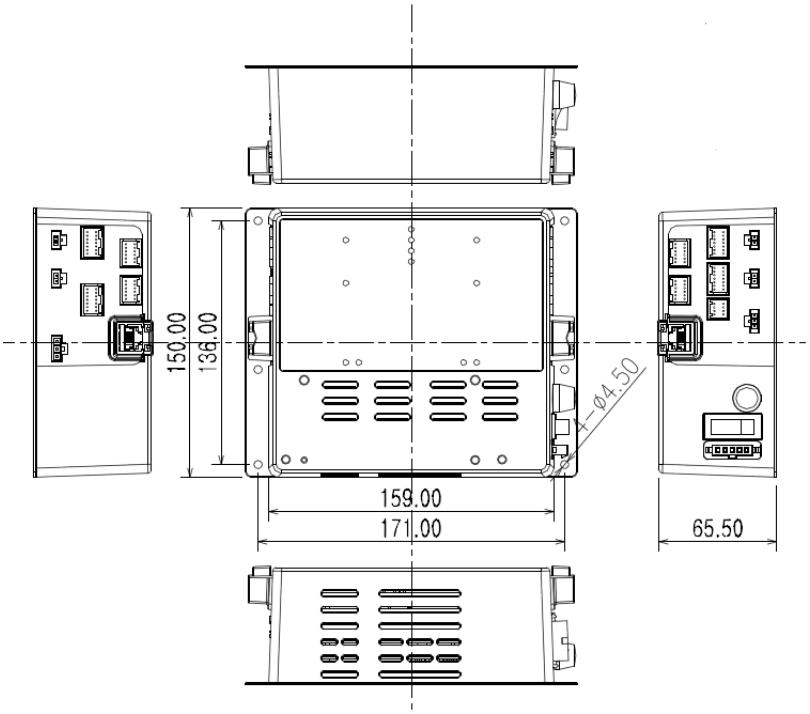
4. MAIN SPECIFICATIONS OF THE PRODUCT

Main specifications and installation environment of this product are shown in the following <Table 1>

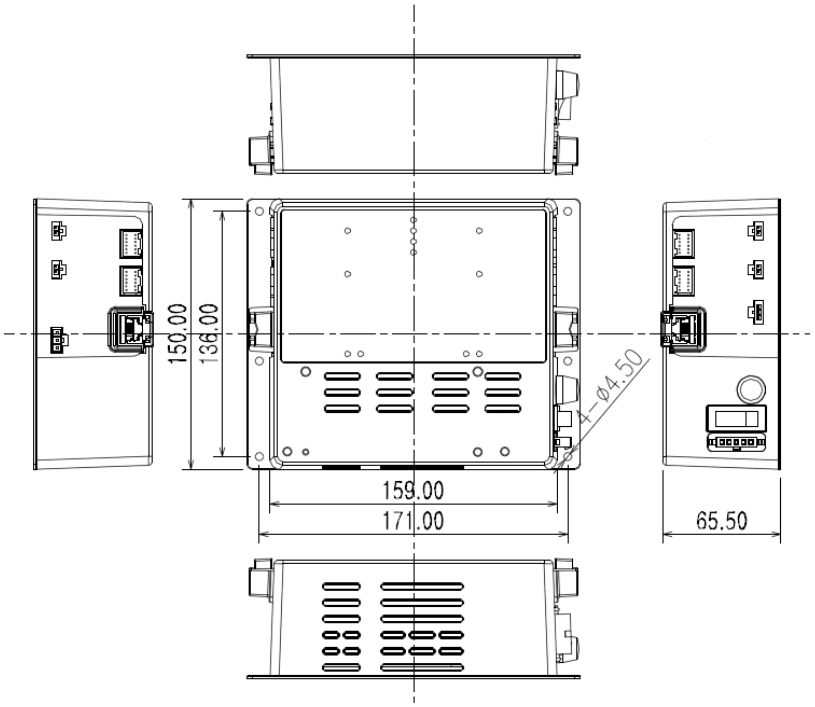
Classification	Item	Description
RFID Reader	Frequency	134.2kHz, Maximum H-Field Strength: below 53.55dBuA/m@3m
	Reading time*	150ms / Page
	Writing time*	390ms / Page
	Max. Reading distance	80mm *Depends on the antenna type and installation environment
	Max. Writing distance	35mm *Depends on the antenna type and installation environment
	Number of antenna connections	Up to 4 connections
	Number of sensor inputs	Up to 8 sensors (2 sensors/Antenna channel), filtering function
	Antenna length	2M ~ 10M (Optional, by 2M)
RFID Antenna	Retangular	CTS-STBA-EC0/1-xxx CTS-STBA-MC0/1-xxx * Refer to the antenna specifications (HF RFID Specification)
	Stick	CTS-RFID-ACzz/AOzz/ABzz-xxyy * Refer to the antenna specifications (HF RFID Specification)
	Material	PC
	Connector	43650-0200, Molex * Refer to the antenna specifications (HF RFID Specification)
Tags	3 types of MPT, SPT and RO	Ex) RI-TRP-DR2B : 17Page´64bit, Read/Write
Communication standards	RS-232C	1ea, 1:1, Full Duplex, for debugging
	Field BUS	EtherCAT, 100MHz
	Communication Protocol	CoE, FoE, etc.
LED	Status Indication	12 LEDs, indicate the operating status
Environment	Storage environment	Temperature: -25 ~ 70℃, Humidity:5~95 %RH (However, there shall be no dew condensation)
	Operating enviornment	Temperature: 0 ~ 45°C, Humidity : 35~85 %RH (However, there shall be no dew condensation)
	Withstand voltage	500V or higher
Power	Input Rating	AC 100V-240 V, 50/60 Hz, 120 W
	Output Rating (per connector unit)	FOUP Detection Sensor Connector : DC24V, 0.1A N2 UBOX Control Connector : DC 24V, 0.7A N2 Control Connector : DC 24V, 0.7A
	Fuse	2 A / 250 V, 5x20 mm, Glass tube fuse
	SMPS (built-in)	200W SMPS
Size (W´H´D)		185´150´65.5mm (except connector protrusion)
Weight		Approx. 1.1kg
Casing material		Securing Plate: SCP1(Steel) Body: ABS

<Table 1> Main specifications

5. PRODUCT SIZE

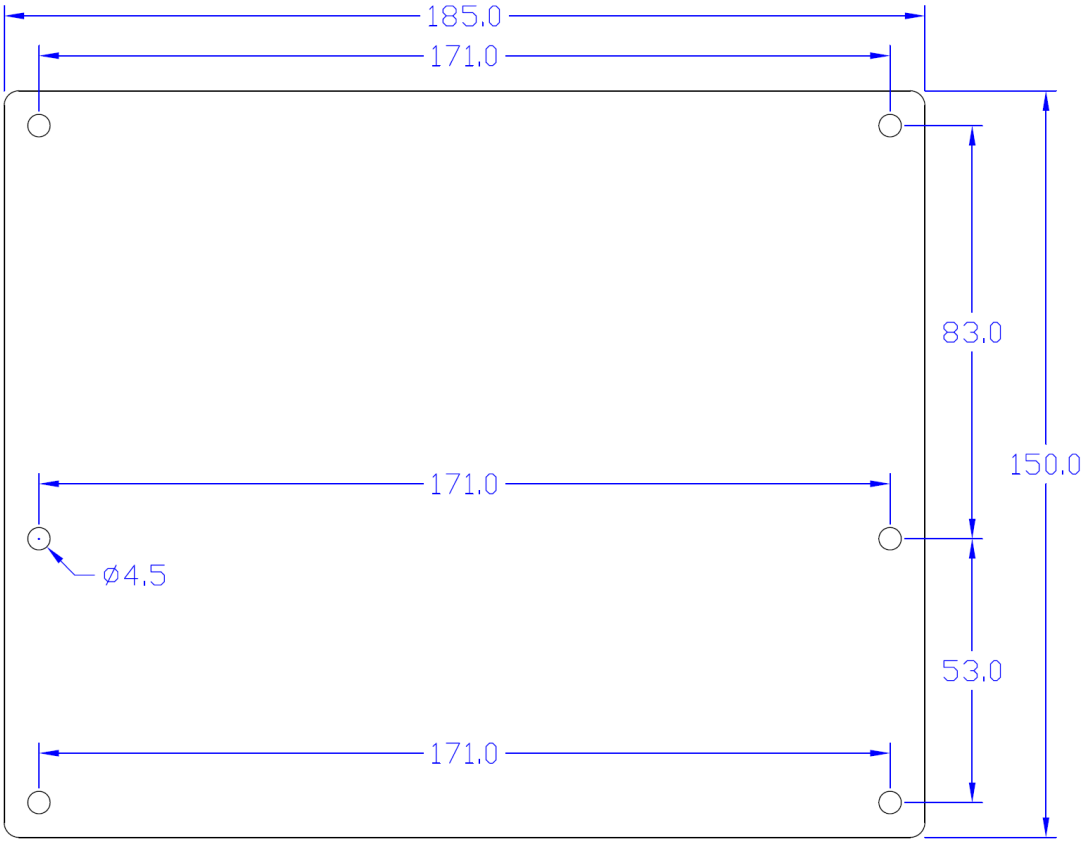


<Fig. 5.a> Size of CTS-STBR-AE-1-02

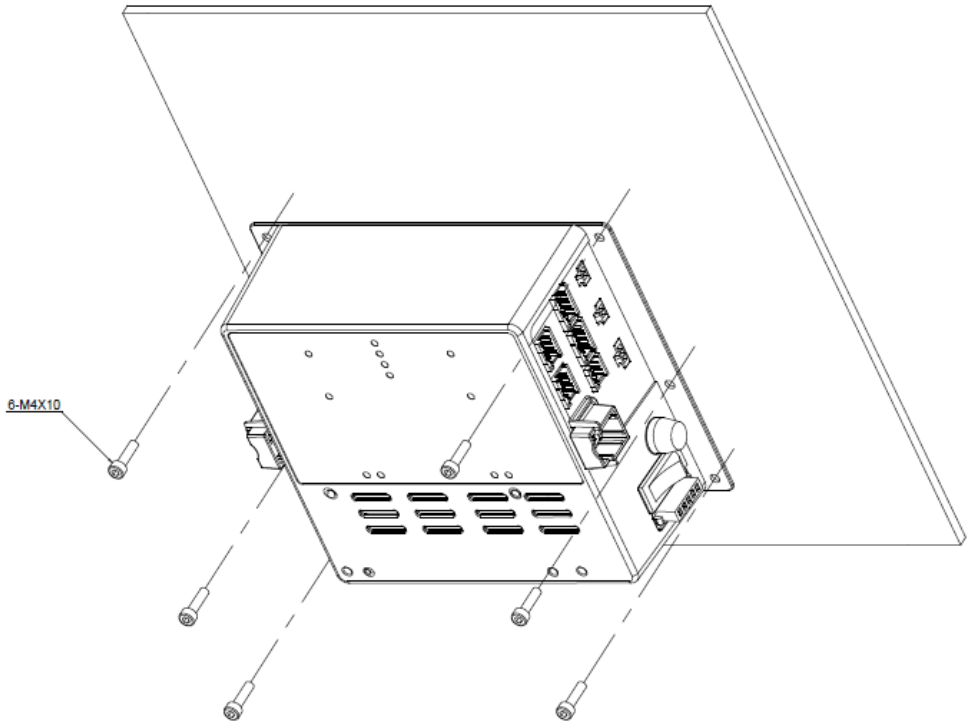


<Fig. 5.b> Size of CTS-STBR-AE-1-04

*Unit:mm



<Fig. 5.c> Fixing hole dimension of CTS-STBR-AE-1-xx

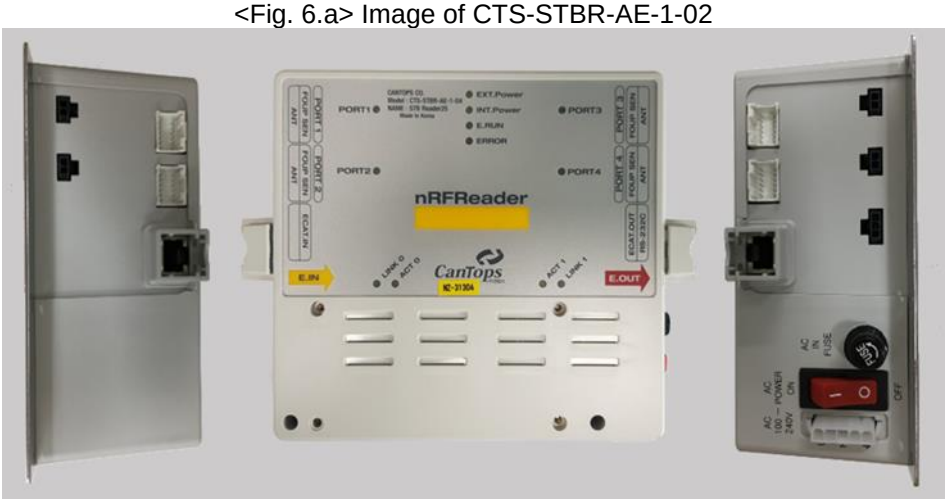


<Fig. 5.d> example of install

*Unit:mm

6. PRODUCT IMAGE

<Fig. 6.a> Image of CTS-STBR-AE-1-02



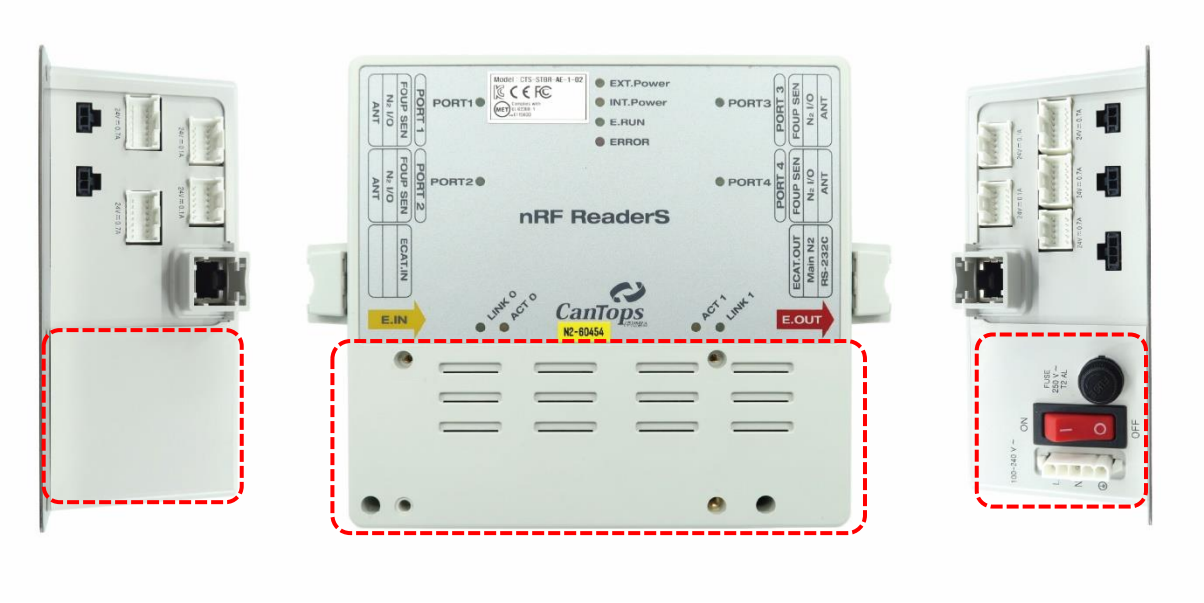
<Fig. 6.b> Image of CTS-STBR-AE-1-04

		
<Fig.6.c> Antenna	<Fig. 6.d> FOUP Sensor	<Fig. 6.e> Mini FOUP Sensor

7. KEY FUNCTIONS

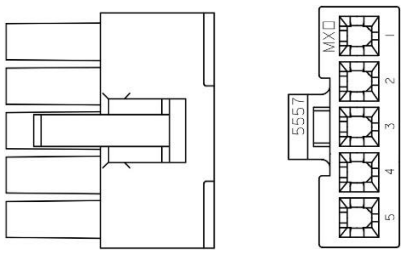
7.1. AC Power Supply

- Consists of power switch, fuse and power connector



<Fig. 7.1a> Power Supply (SMPS)

- Input power connector : AC100-240V



[Fig. 7.2b] Power connector

Pin No.	1	2	3	4	5
Function	AC input	-	AC input	-	Earth
Connector name	39-01-4052, Molex				
Cable connector	39-01-4050, Molex				

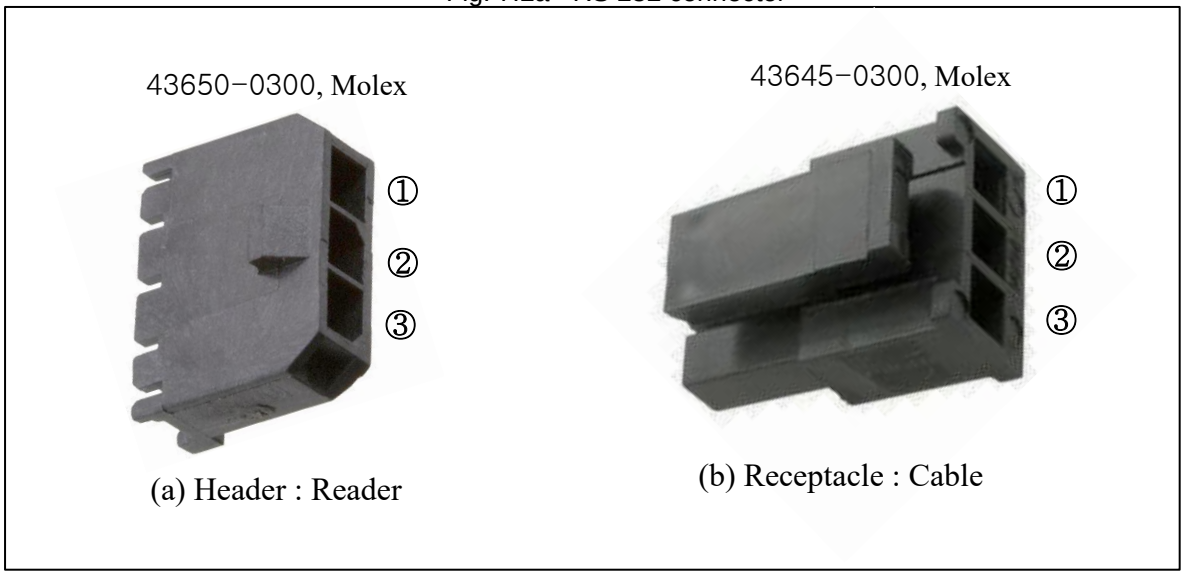
- Glass Tube Fuse : 2A/250V, 5x20mm

- Power Switch : Power on/off switch

7.2. RS-232C communication connector

A serial communication connector to set and check the status of the reader by connecting with PC, and the type used is 43650-0300(Molex).

<Fig. 7.2a> RS 232 connector



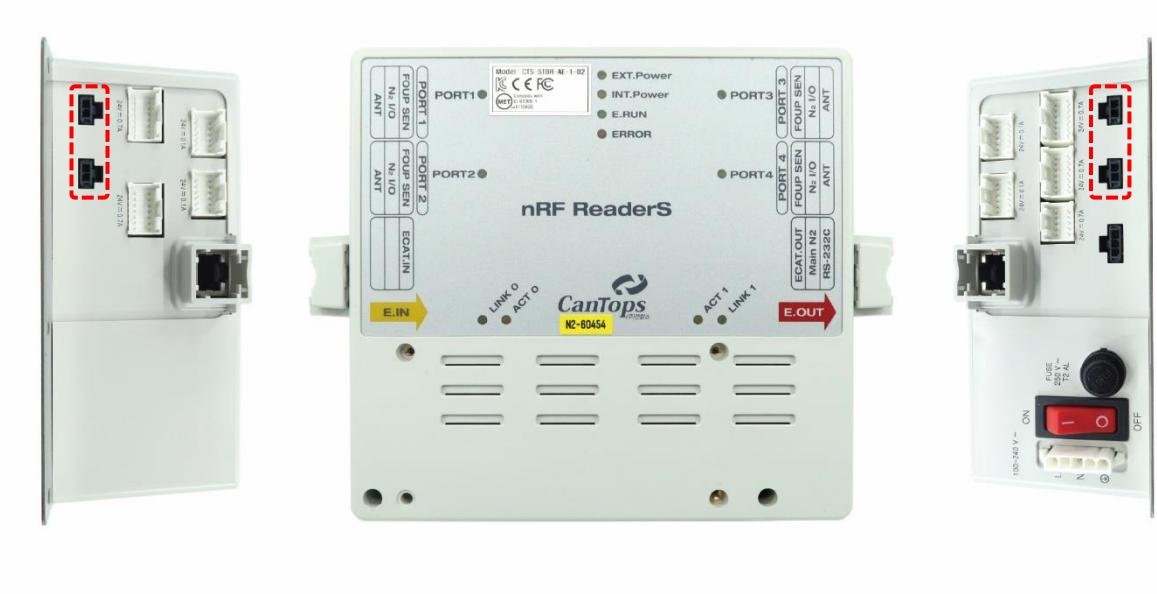
<Table 7.2> RS 232 connector pinout

Reader	Function		TxD	RxD		GND				
	No.		2	1		3				
Computer/Upper	No.	1	2	3	4	5	6	7	8	9
	Function	x	RxD	TxD	x	GND	x	x	x	x

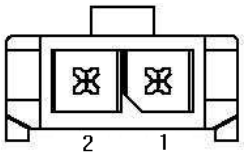
7.3. RFID antenna connector

An antenna connector that reads the tags attached to the plates such as STB or UTB which stores FOUP.

For more details of the antenna, please refer to the antenna specifications of CanTops.

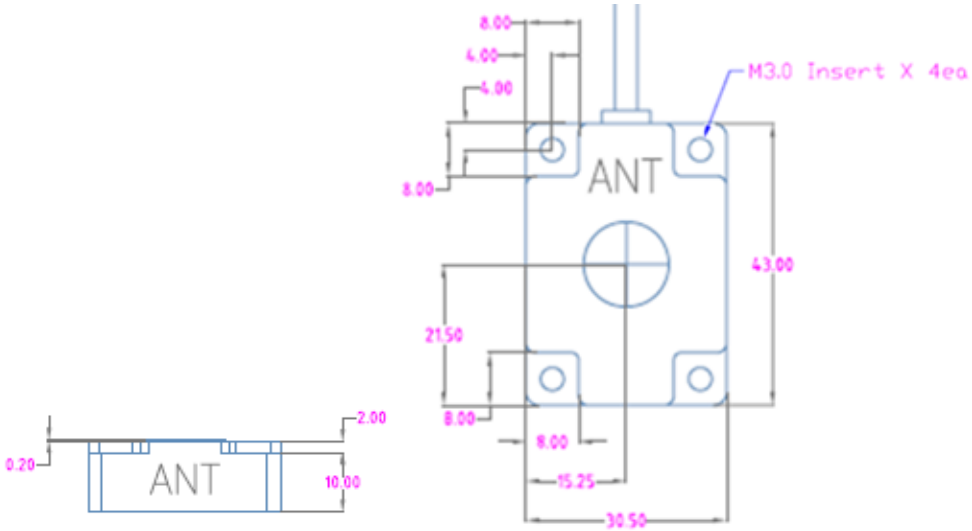


<Fig. 7.3a> RFID antenna connector



Pin No.	1	2
Function	ANT+	ANT-
Connector name	43650-0200, Molex	
Cable connector	43645-0200, Molex	

- Antenna Head size (Retangular type)



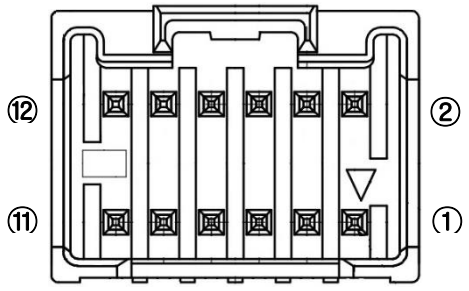
7.4. FOUP Detection Sensor Connector

The connection specification and configuration diagram of the sensor that detects the presence or absence of FOUP is shown in Fig. below. The pin number is determined based on the connector mounted on the board. Basically, two sensors can be linked to one antenna, but one FOUP sensor is used for basic operation. You can add a general sensor other than the FOUP detection sensor. Check IN1 and 2 are signals output from the reader to check the sensor sensitivity and lifespan change in advance. Using this function makes it possible to systematically manage abnormalities related to the sensitivity of the sensors installed in the entire line.

<Fig. 7.4a> FOUP Detection Sensor Connector

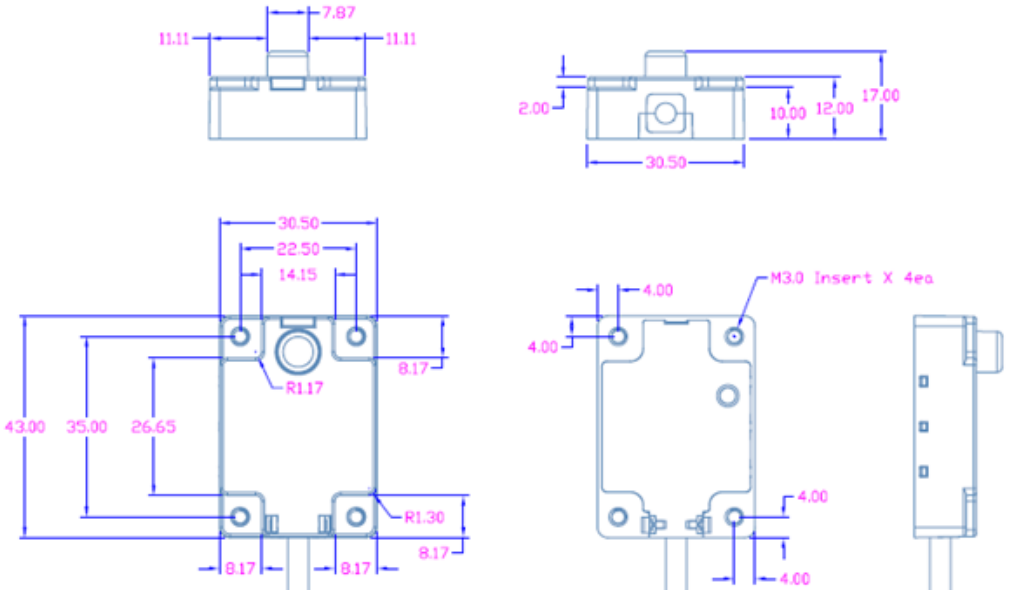
Pin No.	⑫	⑩	⑧	⑥	④	②
Functions	x	Sensor IN 3 (Home Sensor)	Check OUT 2	Sensor IN 2 (FOUP Sensor)	Check OUT 1	Sensor IN 1 (FOUP Sensor)
	GND	+24V	GND	+24V	GND	+24V
Pin No.	⑪	⑨	⑦	⑤	③	①
Connector name	55959-1230, Molex					
Cable connector	Housing: 51353-1200, Molex Terminal: 56134-9000, Molex					

<Table 7.4> Sensor connector pinout

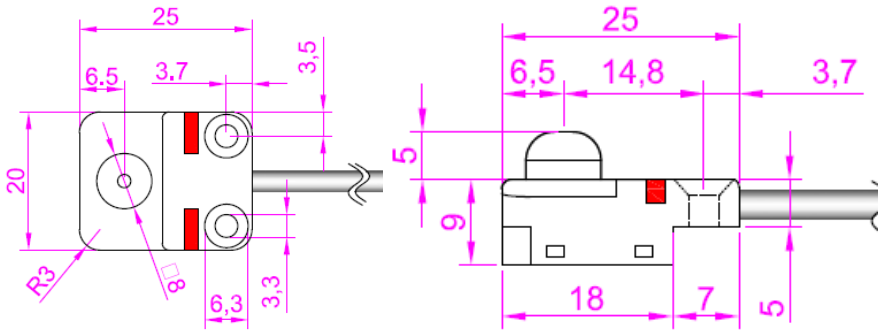


- Protection circuit : Port1 + Port2 = Use 300mA Poly Fuse
  Port3 + Port4 = Use 300mA Poly Fuse

- FOUP Sensor Head size



<Fig. 7.4b> FOUP sensor Head



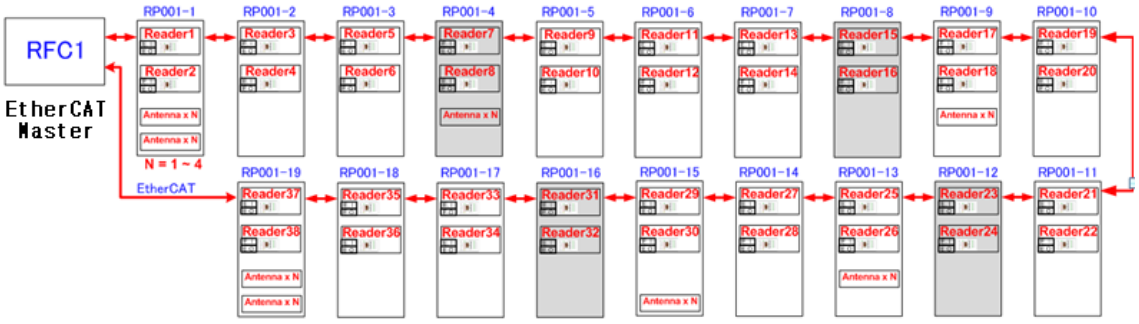
<Fig. 7.4c> mini FOUP sensor Head

When the FOUP sensor operates in the actual use environment, there is an unstable period where the signal turns On/Off in the transient state. The unstable time of these signals can be set as the filter time constant. For details, please refer to the set parameters.

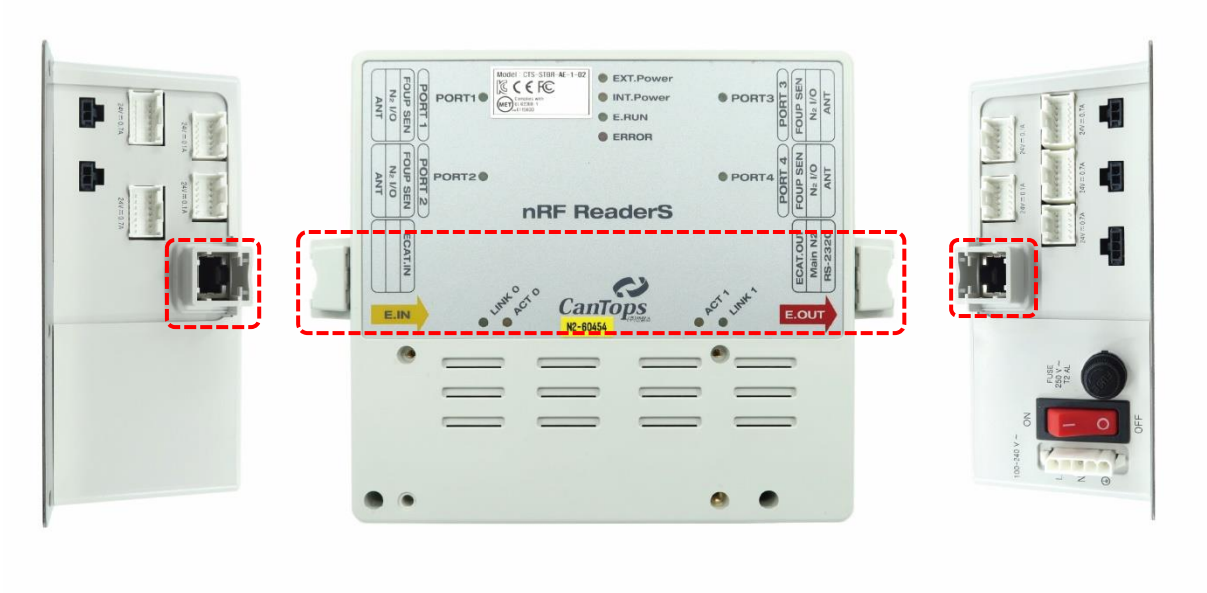
! Caution	☞ An optical sensor is used inside the FOUP detection sensor. Therefore, when particles are introduced from the outside, the sensor sensitivity is lowered, that an abnormality may occur in FOUP detection. It is necessary to check the sensor status periodically.

7.5. EtherCAT connector

The EtherCAT communication configuration is shown in <Fig. 7.5a>. The Ethernet communication lines are connected in a daisy chain form, and the industrial Ethernet communication standard for real-time communication at 100MHz is used. To connect in Daisy Chain type, there are two communication ports in one reader. E.IN is connected to E.OUT of the previous reader, and E.OUT is connected to E.IN of the next reader.



<Fig. 7.5a> Basic configuration chart of EtherCAT System



<Fig. 7.5a> EtherCAT Connector

- EtherCAT LED (Link, ACT)

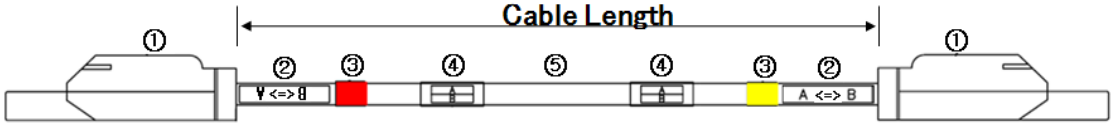
LINK0 and LINK1 LED indicate the status for the following ports.

LNK0, or LNK1	Status
Off	When the communication line is not connected
Flash	When the communication line is connected to perform Ethernet communication
Continuous ON	When the communication line is only connected without communication

ACT0 and ACT1 LED indicate the status for the following ports.

ACT0, or ACT1	Status
Off	When the communication line is not connected
Flash	When the communication line is connected to perform Ethernet communication
Continuous On	When the communication line is only connected without communication

- Configuration and specification of EtherCat Cable



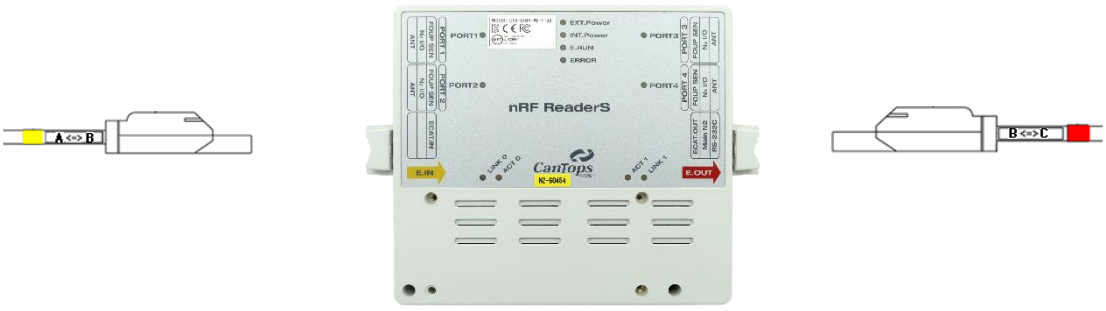
Description	Specification	Maker	Q`ty	Remark
① Plug	6GK1 901-1BB10-2AA0	Siemens	2 PCS	CN1 CN2
② Label 1	Mark the start point (A) and end point (B), and attach it at a distance of 10mm from the transparent heat-shrink tube and the end of the connector.			
③ Classification of Input/Output ports	Attach color tape to the end of the cable (Tape width is 10mm)			
	Input: Yellow		1PC	
	Output: Red or Orange		1PC	
④ Label 2	Start point (A), end point (B) marked, transparent heat-shrink tube, attached to the side of ②			
⑤ Cable	AWG#22, 2Pair, SFTP, Profinet Type B	Siemens	1PC	

- EtherCAT Cable Wiring

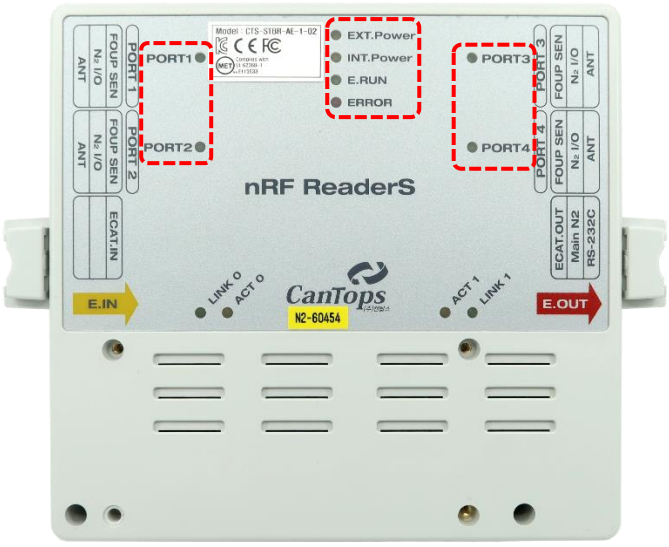
CN1	Color	Function	CN2
1	Yellow	Tx+	1
2	Orange	Tx-	2
3	White	Rx+	3
4	N.C	-	4
5	N.C	-	5
6	Blue	Rx-	6
7	N.C	-	7
8	N.C	-	8
Shell	Shield braiding wire	Shield	Shell

- EtherCAT Cable Wiring Diagram

When connecting the cable, the starting point (A) and ending point (B) marked on the cable and the unit number attached to the reader must match. Also, make sure that the cable color (red, yellow) and the reader case color (E.OUT (red), E.IN (yellow)) shall be the same (as shown in Fig. 5).

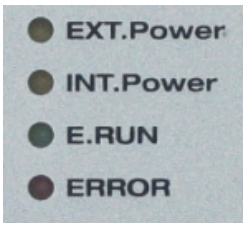


7.6. LED Operation



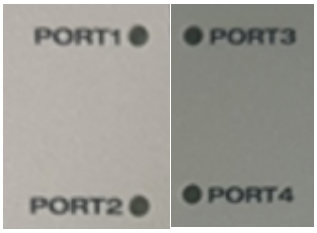
<Fig. 7.6a> Status indication and Antenna LED

- Status indicating LED



LED name	Function	Remarks
EXT.Power	When DC24V, the main power supply, operates normally, the LED turns on.	Yellow
INT.Power	LED turns on when DC3.3V used for logic operation inside operates normally	Yellow
Error	LED that turns on when an error occurs in reading and writing to the tag	Red
E.RUN	OFF: When LED is in INT, an initial status of EtherCAT communication Slow flash: When the current status is in Pre-Operation mode On once: When the current state is in Safe-Operation board Continuous ON: When initialization is in complete and normal operation mode Fast flash: when in Bootstrap mode	Green

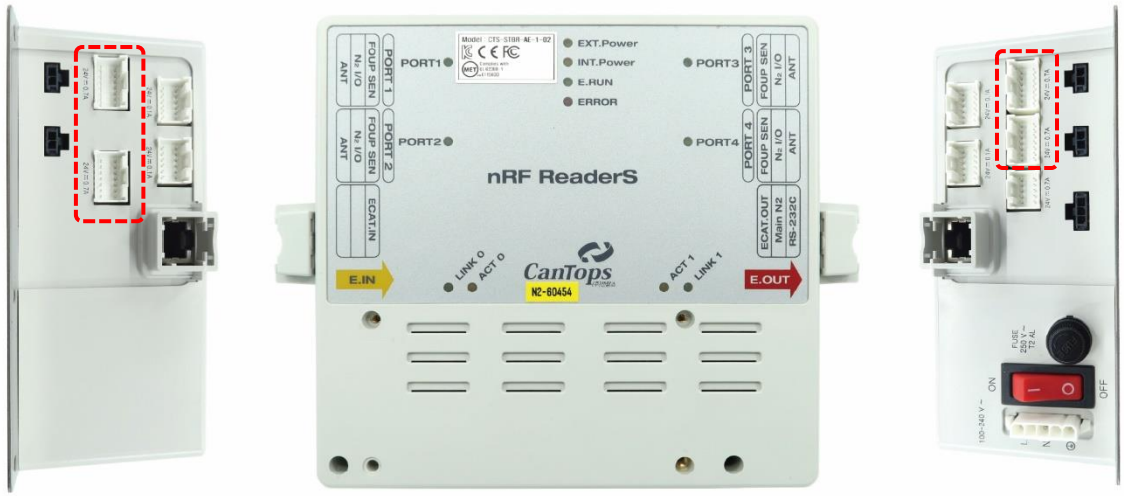
- Antenna channel indicating LED
-



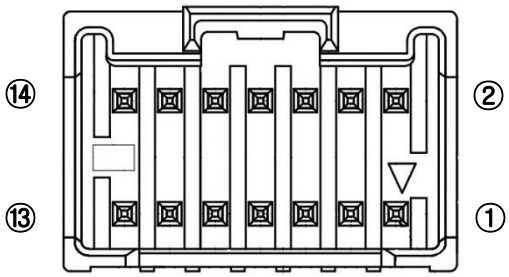
PORT1 , PORT2 , PORT3, PORT4 LE will be lit when reads tag to the corresponding port.

7.7. N2 Control Connector

CTS-STBR-AE-1-04 does not support N2 control connector



<Fig. 7.7a> N2 control connector, 4 ports



Pin No.	⑭	⑫	⑩	⑧	⑥	④	②
Function	Analog Input 2	GND	+24V	Adj 2	Error Output	Solenoid Valve 2	Solenoid Valve +
	Analog Input 1	GND	+24V	Adj 1	+24V	+24V	Solenoid Valve -
Pin No.	⑬	⑪	⑨	⑦	⑤	③	①
Connector name	55959-1430, Molex						
Cable connector	Housing: 51353-1400, Molex Terminal: 56134-9000, Molex						

① OUT-
② OUT+
Driving current: MAX 180mA

③ 24V
④ GND OUT
Driving current: MAX 500mA

⑤ 24V
⑥ GND OUT
Driving current : MAX 500mA

⑦ Zero ADJ 1
⑨ 24V
⑪ GND
⑬ Analog Input 1

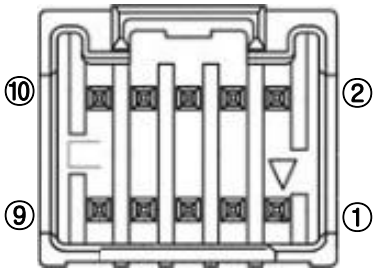
⑧ Zero ADJ 2
⑩ 24V
⑫ GND
⑭ Analog Input 2

- The output signals of Zero ADJ 1 and Zero ADJ 2 operate at the same time, so they can not be controlled separately.
- The output signals of Zero ADJ 1 and Zero ADJ 2 of Port 1, Port 2, Port 3, Port 4 and Main Port can be controlled separately.
  (Only 1 port out of 5 ports can operate Zero ADJ function)

7.8. N2 UBOX Control Connector

CTS-STBR-AE-1-04 does not support N2 UBOX control connector

<Fig. 7.7a> N2 UBOX Control Connector (Port 1)



- Protection circuit : Use 1.1A Poly Fuse

Pin No.	⑩	⑧	⑥	④	②
Function	Adj 2	Analog Input 2	GND	+24V	Solenoid Valve
	Adj 1	Analog Input 1	GND	+24V	+24V
Pin No.	⑨	⑦	⑤	③	①
Connector name	55959-1030, Molex				
Cable connector	Housing: 51353-1000, Molex Terminal: 56134-9000, Molex				

When connect UBOX, select supply or exhaust. 2 readers are necessary per UBOX.

- UBOX Inlet connection

① 24V
② GND OUT
Driving current : MAX 500mA

③ 24V
⑤ GND
⑦ Analog Input 2
⑨ Zero ADJ 2

④ 24V
⑥ GND
⑧ Analog Input 2
⑩ Zero ADJ 2

- The output signals of Zero ADJ 1 and Zero ADJ 2 operate at the same time, so they can not be controlled separately.
- The output signals of Zero ADJ 1 and Zero ADJ 2 of Port 1, Port 2, Port 3, Port 4 and Main Port can be controlled separately.
  (Only 1 port out of 5 ports can operate Zero ADJ function)
-

- UBOX Exhaust Connection

④ 24V
⑥ GND
⑧ Analog Input 2
⑩ Zero ADJ 2

③ 24V
⑤ GND
※RS232 connection(2.2)

***) The specifications of this product are subject to change without notice for improvement of the performance**