TESCOM

Pneumatic Shield Box

Operating Manual

R170825

http://www.tescom.co.kr

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT PRIOR NOTICE

Connects

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Chapter

1

General Information

This chapter has general information about warranty, cautions, specifications and key features of a shield box.

1.1 WARRANTY

TESCOM guarantees that this product will be free from defects in materials and workmanship for a period of six months from the date of shipment. During the warranty period, TESCOM will, at its discretion, either repair or replace defective products.

For the warranty service, customer must notify TESCOM of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to TESCOM or a service center designated by TESCOM. Customer shall pay for shipping charges as well as any other charges incurred outside of Korea. TESCOM shall pay shipping charge to return the product to customer.

This warranty shall not apply to consumable parts and any failure or damage caused by improper use or unauthorized service. In such cases, TESCOM may refuse to furnish service under the warranty.

LIMITATION OF WARRANTY

The foregoing warranty shall nor apply to defects resulting from improper or inadequate malignance by customer, Customer-supplied software or interfacing, unauthorized modification or misuse, accident or abnormal conditions of operations.

TESCOM responsibility to repair or replace deductive products is the sole and exclusive remedy provided to the customer for breach of this warranty. TESCOM will not be liable for any indirect, special, incidental, or consequential damages, despite any advance notice of the possibility of such damages.

1.2 Safety Considerations

Review the following safety precautions to avoid injury and prevent damage to this product or any product connected to it.

Use Proper Power Cord

To avoid fire hazard, use only the power cord specified for this product.

Use Proper Power Source

Do not operate this product from a power source that applies more than the voltage specified.

Use Proper Compressed Air

Do not operate this product from a compressed air that applies more than the pressure specified.

Avoid Electric Overload

To avoid electric shock or fire hazard, do not apply a voltage to a terminal that is specified beyond the range.

Ground the Product

This product is grounded through the grounding conductor of the power cord. In case no ground is available at the power outlet, it is recommended to provide a separate grounding path to the instrument by connecting wire between the instrument ground terminal and an earth ground to avoid electric shock

or instrument damage. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

Do Not Operate Without Plexiglas safety shield

To avoid electric shock or product damage or injury, do not operate this product with Plexiglas safety shield removed.

Do Not Open the Bottom Cover

Do Not Disassemble any part except replaceable parts

Do Not Operate in Wet/Damp Conditions

To avoid injury or fire hazard, do not operate this product in wet or damp conditions.

Do Not Operate in Explosive Atmosphere

To avoid injury or fire hazard, do not operate this product in an explosive atmosphere.

Provided Proper Ventilation

To prevent product overheating, provide proper ventilation.

Do Not Operate With Suspected Failures

If there is damage to this product, have it inspected by qualified service personnel

Environmental Conditions

Refrain from using this equipment in a place subject to much vibration, direct sunlight, and where the surface is not level. Also, use it where the temperature is between 0 °C to 50 °C and relative humidity is less than 85%.

1.3 Safety Symbols and Terms

Terms in this manual:

WARNING: Identifies conditions or practices that could result in injury or loss of life.
CAUTION: Identifies conditions or practices that could result in damage to the product or other property.

Terms on the product:

DANGER: Indicates an injury hazard immediately accessible as you read the marking.
WARNING: Indicates an injury hazard not immediately accessible as you read the marking.
CAUTION: Indicates a hazard to property including the product.

Symbols on the Product: The following symbols may appear on the product.

WARNING	DANGER	ATTENTION	Indicates earth
Proper precaution must be taken while the lid is open and closed.	Risk of electric shock	Refer to Manual	(ground) terminal

1.4 Instructions and Key Features

Pneumatic Shield Box provides RF isolation and signal connections necessary for mobile testing. With the RF coupling accessory and filtered control ports, Pneumatic Shield Box makes an ideal solution for testing mobiles, Bluetooth, DAB/DMB, RFID, Zigbee and small RF devices on the test benches of manufacturing, R&D, service, and QC.

1) High durability and outstanding shielding capacity
2) Automatic opening/closing/ fixture actions through air-compression (pneumatic) method.
3) EMI filters are applied for all data ports and power lines.
4) Manual or remote opening/closing available through RS232C.

1.5 Specifications

Specifications are listed in Appendix A

1.6 Initial Inspection

This section provides the information for verifying proper shipment of the Pneumatic Shield Box.

Product Condition and Accessory Check
1) Upon receipt of the Pneumatic Shield Box, check for damage that could have occurred during shipment.
2) Verify you have received the accessories supplied with the Pneumatic Shield Box and module, which are listed in Appendix B.

⚠️
WARNING   To avoid hazardous electrical shock, do not perform electrical tests when there are signs of shipping damage to the equipment.

1.7 Connectors

This section contains reference information for Pneumatic Shield Box connectors.

[Table 1] Pneumatic Shield Box Connectors

Connector	Specification
RS-232C	Working Voltage: 100 VDC Dielectric Withstanding Voltage: 300 VDC
N Coaxial Connector of the outside SMA Coaxial Connector of the inside	Impedance: 50 ohm Voltage Rating: 250 Vpeak Dielectric Withstanding Voltage: 750 Vrms
DB9 Data Connector	Working Voltage: 100 VDC Dielectric Withstanding Voltage: 300 VDC EMI Filter: 1000 pF Pi
DB25 Data Connector	Working Voltage: 100 VDC Dielectric Withstanding Voltage: 300 VDC EMI Filter: 1000 pF Pi
USB 2.0 Data Connector	Data Rate : 480 Mbps

1.8 Optional I/O Modules and Accessories

Optional I/O Panel and Accessories are listed in Appendix C

1.9 Service and Support

If you have a problem with your Pneumatic Shield Box, contact Tescom Technical Support specialists. Any adjustment or repair of this product must be performed by qualified personnel.

Contact Information

Address : Tescom Company Limited
       #927 Unitechvil 142, Ilsan-ro, Ilsandong-gu, Goyang-si, Gyeonggi-do, Korea
       [410-722]
TEL : 82-31-920-6601
FAX : 82-31-920-6607
Email : support@tescom.org   http://www.tescom.co.kr

1.10 Component Identification

TC-5910DP Component Identification

① Lid
② Lid Handle
③ Power ON/OFF Switch
④ Red and Green LED (Controlled by RS-232C Command "PASS" or "FAIL")
⑤ Fixture Operation Switch
⑥ Open/Close Switch
⑦ DC Input Connector(DC 24 V)
⑧ RS-232C Connector
⑨ Air Inlet
⑩ Interface Panel
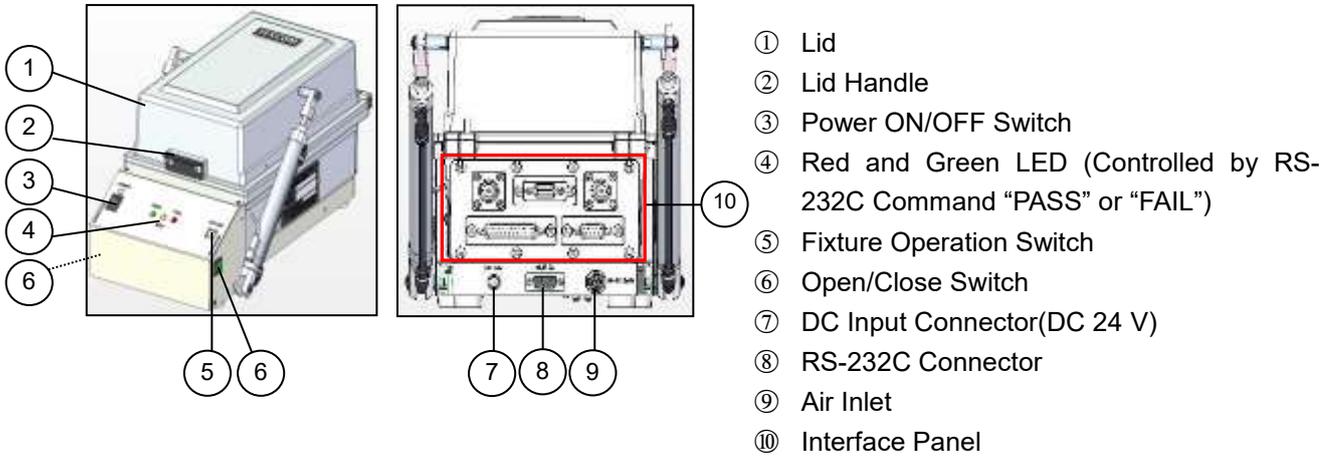
[Figure 1] TC-5910DP Component Identification

TC-5915AP Component Identification

① Lid
② Lid Handle
③ Power ON/OFF Switch
④ Red and Green LED(Controlled by RS-232C Command "PASS" or "FAIL")
⑤ Fixture Operation Switch
⑥ Open/Close Switch
⑦ DC Input Connector(DC 24 V)
⑧ RS-232C Connector
⑨ Air Inlet
⑩ Interface Panel
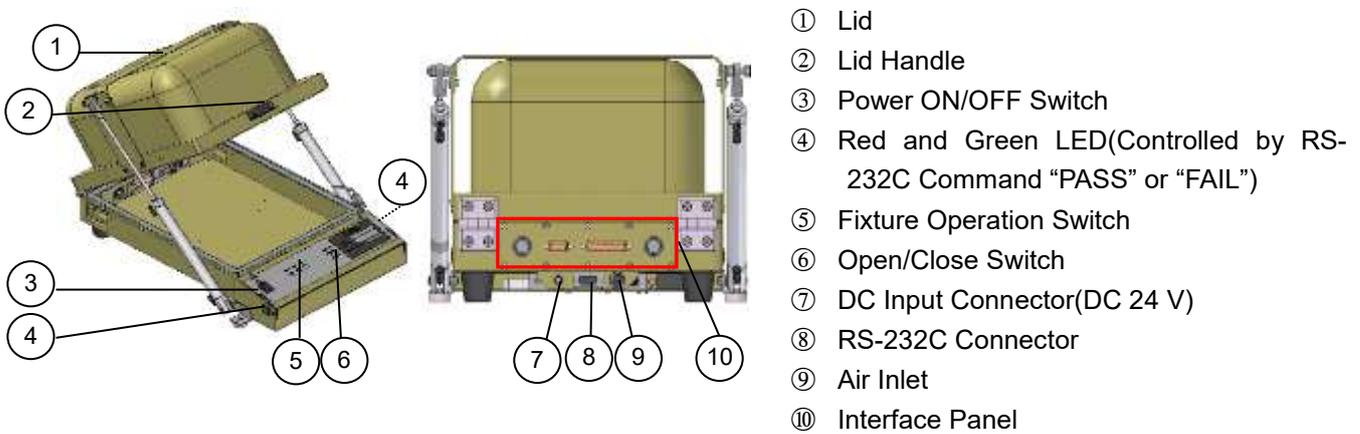
[Figure 2] TC-5915AP Component Identification

TC-5916AP Component Identification

① Lid
② Lid Handle
③ Power ON/OFF Switch
④ Red and Green LED(Controlled by RS-232C Command "PASS" or "FAIL")
⑤ Fixture Operation Switch
⑥ Open/Close Switch
⑦ DC Input Connector(DC 24 V)
⑧ RS-232C Connector
⑨ Air Inlet
⑩ Interface Panel
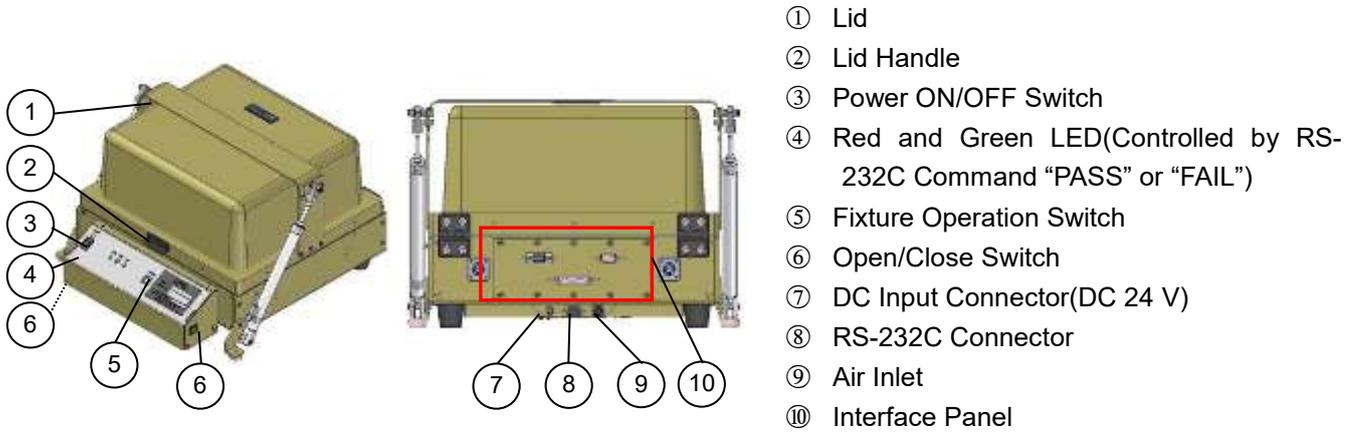
[Figure 3] TC-5916AP Component Identification

TC-5922AP Component Identification

① Lid
② Lid Handle
③ Power ON/OFF Switch
④ Open/Close Switch
⑤ Remote Switch
⑥ Hinge
⑦ N(f) to SMA(f) Connector
⑧ Interface Panel
⑨ Handle for moving
⑩ DC Input Connector(DC 24 V)
⑪ RS-232C Connector
⑫ Air Inlet
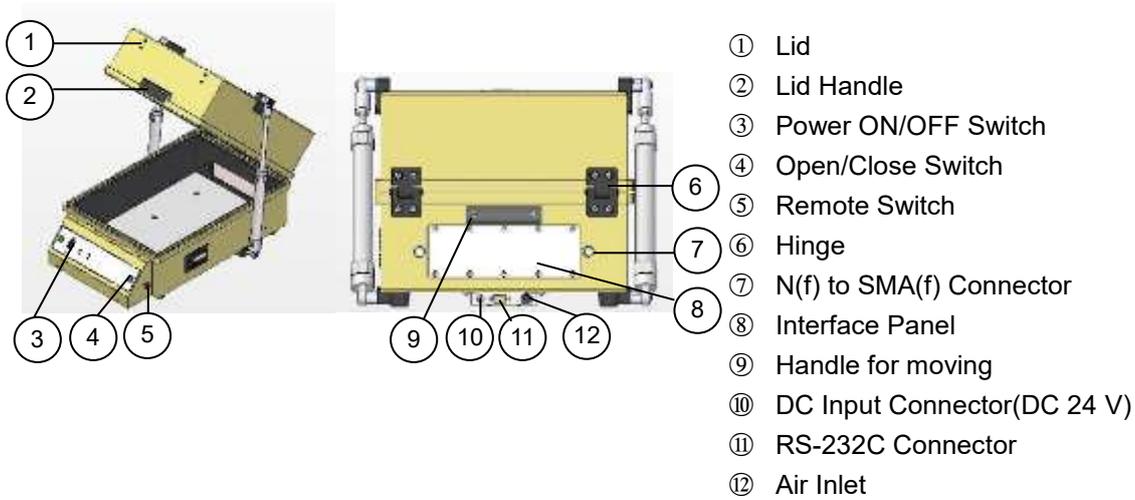
[Figure 4] TC-5922AP Component Identification

TC-5972DP Component Identification
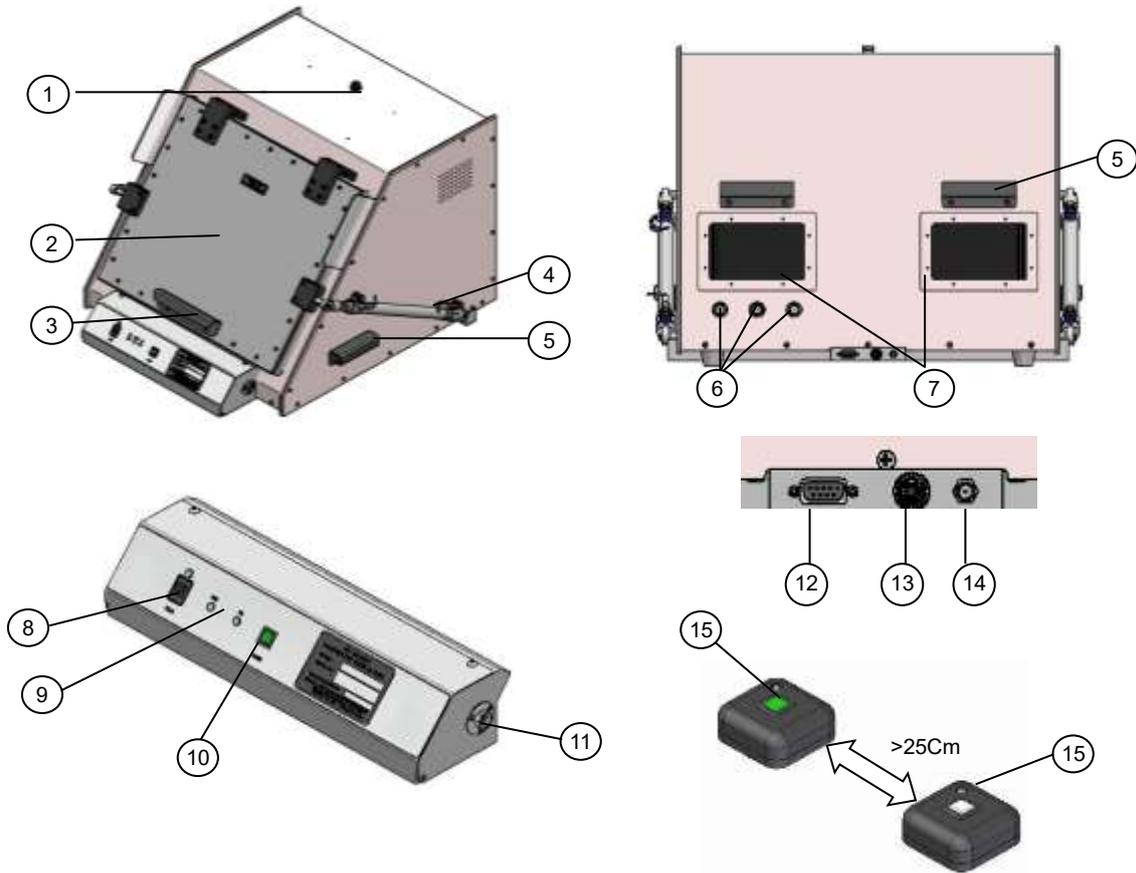
① N(f) to SMA(f) Connector
② Lid
③ Lid handle
④ Cylinder
⑤ Moving handle
⑥ N(f) to SMA(f) Connector
⑦ Interface Panel
⑧ Power on/off switch
⑨ Red and Green LED (Controlled by RS-232C Command "PASS" or "FAIL")
⑩ Fixture optional switch
⑪ Remote connector
⑫ RS-232C connector
⑬ Air Inlet
⑭ DC Input connector (DC 24V)
⑮ Remote Open/Close switch (Please keep at least 25Cm distance between the two switches)

[Figure 5] TC-5972DP Component Identification

TC-5975AP Component Identification

① Door
② USB 2.0 A(s) to A(s)
③ Air In/Out
④ N(f) to SMA(f) Connector
⑤ Lid
⑥ Interface panel
⑦ Power on/off switch
⑧ Remote connector
⑨ RS-232C
⑩ Air Inlet
⑪ Remote Open/Close switch
    (Please keep at least 25Cm distance
    between the two switches)

>25Cm
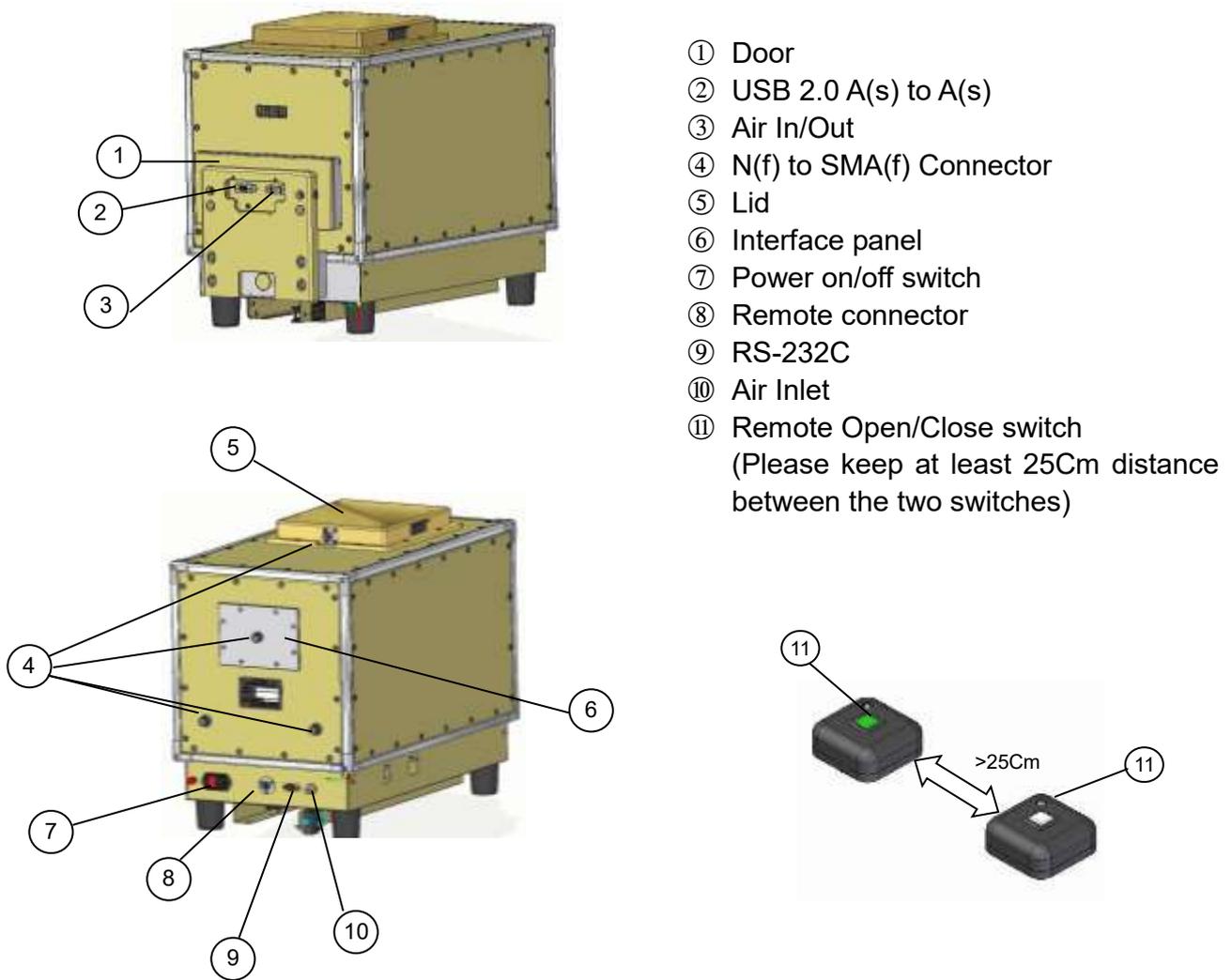
[Figure 6] TC-5975AP Component Identification

TC-5924AP Component Identification

① Door
② Fixture Fasten Hole
③ Top Cover
④ N(f) to SMA(f) Connector
⑤ Power on/off switch
⑥ Remote connector
⑦ Air Inlet
⑧ RS-232C
⑨ Interface panel
⑩ Remote Open/Close switch
    (Please keep at least 25Cm distance
  between the two switches)

>25Cm
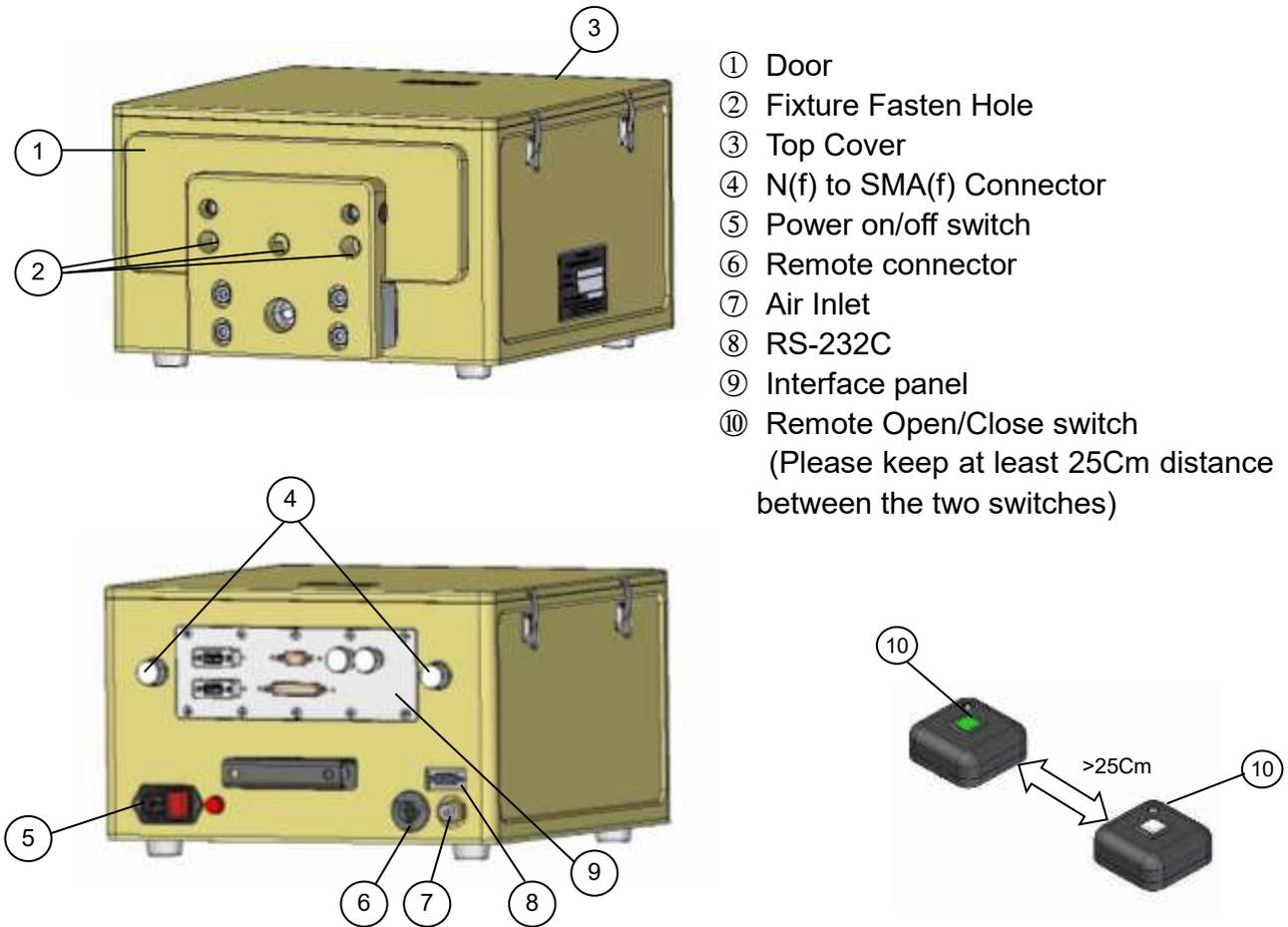
[Figure 7] TC-5924AP Component Identification

Installation

This chapter introduces general information about power requirement compressed air and storage.

2.1 Power Requirement

Input voltage: DC 24V, Max. 2A

2.2 Compressed Air

Input air pressure: 5 bar to 10 bar
Main air connector: 6 mm OD hose, one-touch push-on fitting

NOTE :   It is highly recommended that the compressed air system must be used in conjunction shown in figure 6. Low air quality may cause deterioration of performance.
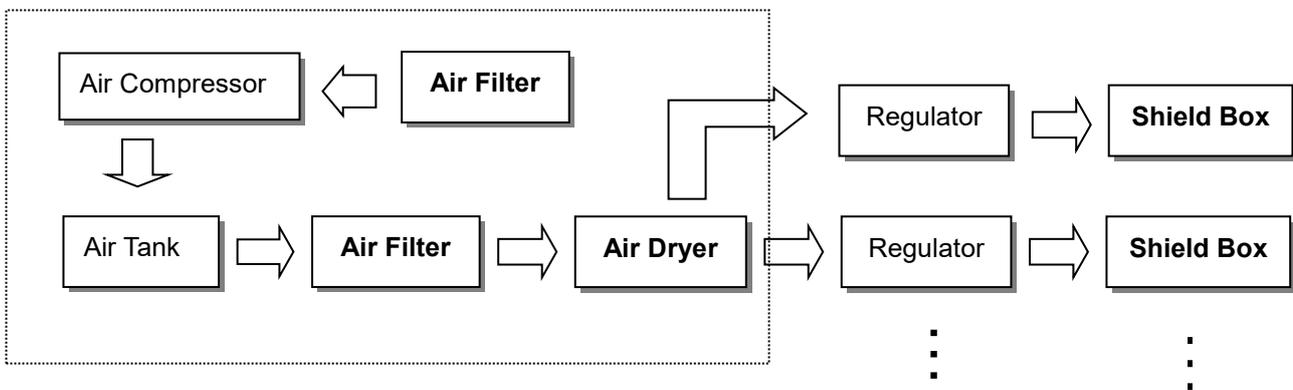
[Figure 8] General Compressed Air Connection System

2.3 Storage

The storage temperature range for this equipment is –20 °C to 70 °C. When this equipment is not used for a long period of time, cover with vinyl or place in a cardboard box and store in a dry place away from direct sunlight.

Operation

This chapter introduces how to do manual operation and remote operation using RS-232C

3.1 Operation

Pneumatic Shield Box Operation Procedure

1) Connect compressed air to "Air Inlet". The lid will open as soon as compressed air is connected to Pneumatic Shield Box.
2) Connect the AC power cord to a 100 to 240 VAC outlet, Turn the power on.
3) Install a DUT in Pneumatic Shield Box. To open the Shield Box, press "Open - Close" switch. (Figure 1, 6)

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⚠️
CAUTION

To avoid product damage, do not connect or disconnect the compressed air while the power is turned on. Operator must be careful because a door could be opened with out preliminary action if the compressed air is connected while the power is turned on.

Pass/Fail LED Indicator

The LED indicator is on the front panel of the Shield Box. Red or Green LED indicators is turned ON or OFF by RS-232C
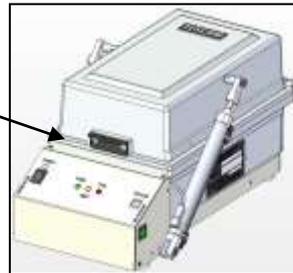
[Figure 9] LED Indicator(ex : TC-5910DP)

Red or Green LED indicators is turned ON or OFF by RS-232C command. "PASS" and "FAIL" command turn on the green or red LED respectively.

Counter Function

The Shield Box counts the lid open/close cycle and save it in the memory. The cumulative open/close frequency number can be viewed on PC by sending a RS-232C command. Send "COUNT?" query command, then the Shield Box return the cumulative frequency data as numeric 7 digits.

3.2 Remote Operation Using RS-232C

Pneumatic Shield Box supports high speed RS232C serial interface for remote operation under PC control. A standard 9-pin RS232C connector is located at the left side. Any communication program (such as WINDOW 2000/XP Hyper Terminal) could be used for simple tasks. Complex tasks can be automated using PC programming.

3.2.1 RS-232C Connection

A 9-pin standard connector is used in the Pneumatic Shield Box for a RS232C connection. To make a connection to the 25-pin RS232C connector, a 9-pin to 25-pin adapter can be used. The cable pin configuration is shown below.
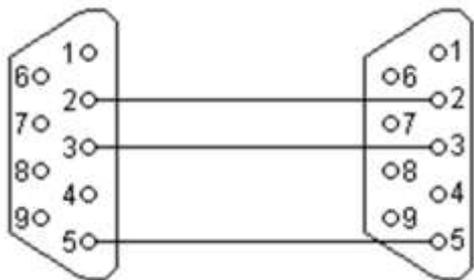
3.2.2 Windows 2000/XP Hyper Terminal

1) Check for the Hyper Terminal installation on your PC. Click Start → Program → Accessories → (Communications). If Hyper Terminal folder is not found in the Accessories list, it must be installed. Insert Windows 2000 or XP CD ROM and install hyper terminal program.

2) Start Hyper Terminal: Click Start → Program → Accessories → (Communications) and then click "Hyper Terminal"
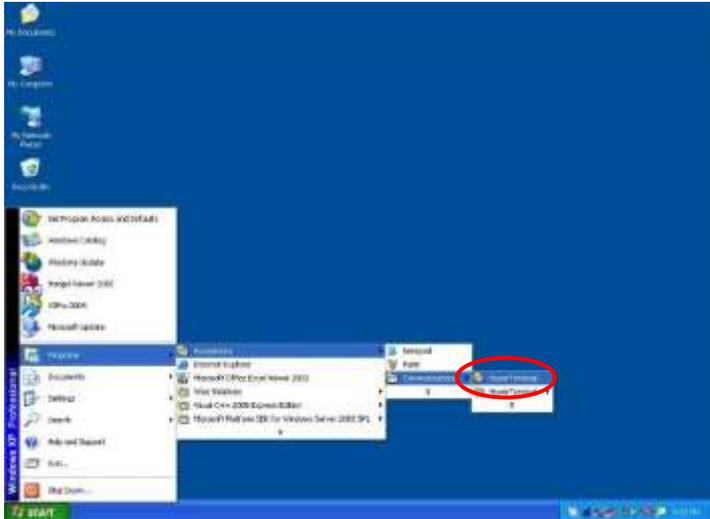
3) In "Name" block, on "New Connections" screen, enter "Shield Box". On "Connect To" screen, click "▼" in "Connect Using:" block, select "Direct to COM1" and then click "OK".
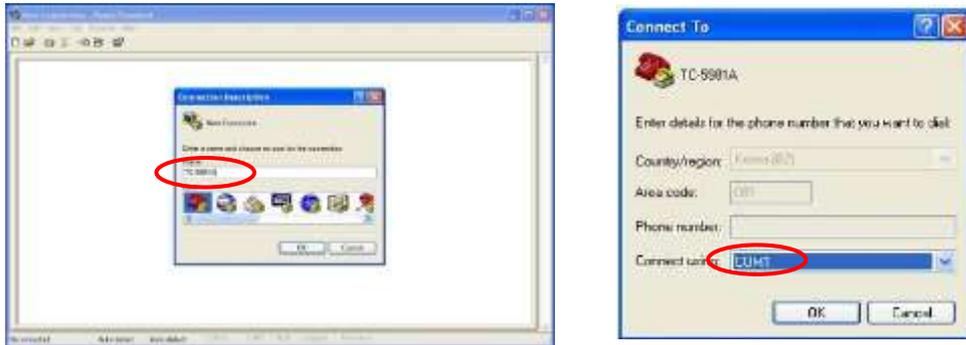
4) On "COM1 Property" screen, select as following. And then click "OK".
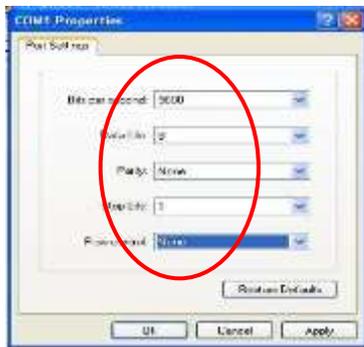
Bits per Second	9600 bps
Data bits	8 bit
Parity	None
Stop bits	1 bit
Flow controls	None

5) Click "FILE" on menu bar and select "Property". You should see the "Shield Box Properties" screen. Select "Setting" tab.
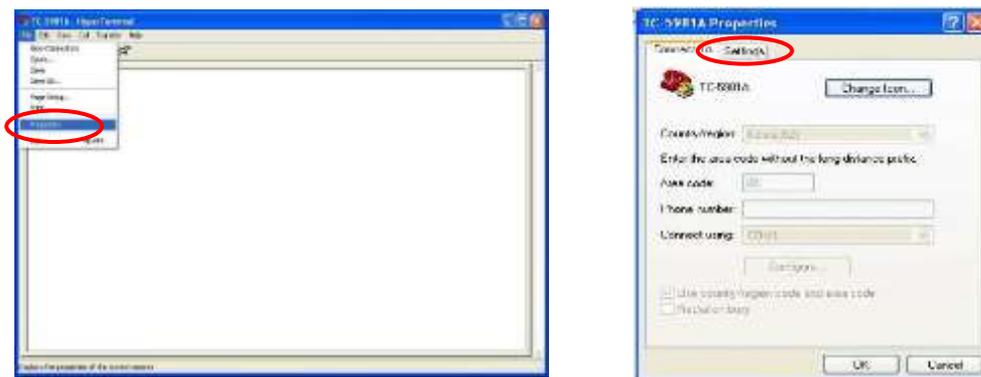
6) Click "ASCII Setup" button

    A.   Check "Echo typed characters locally"

    B.   Check "Append line feeds to incoming line ends"

    C.   Check "Wrap lines that exceed terminal width"

And click "OK", Click "OK" again.
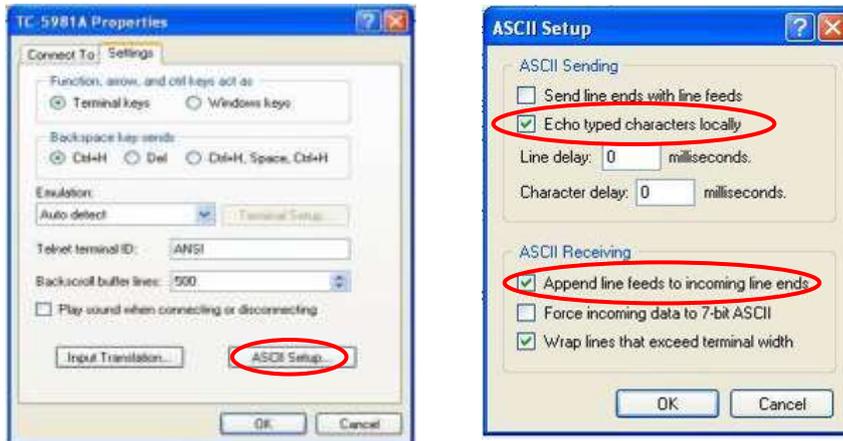
7) Connect 9 pin D type RS232C Cable between PC COM 1 port and Shield Box

8) Type in a RS232C command (Ex: "OPEN") on "Shield Box Hyper Terminal" screen and press Enter on PC keyboard. Shield Box returns OK or Error Data signal.
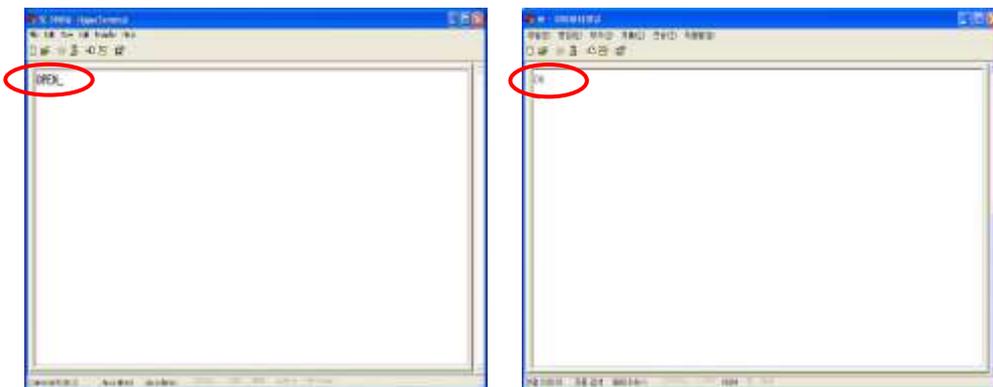
3.2.3 Programming Windows 2000/XP

1. Programming Procedure

    1)   Port select(COM1-COM4)

    2)   Set-up Baud Rate(9600 bps), Parity Bit(None), Data Bit(8 bit), Stop Bit(1 bit)

    3)   Open selected COM Port.

    4)   Send RS232C Command string to the COM Port.

    5)   Wait until the response data is received.

    6)   When confirmed, send the next command

2. Command and Response Message

- Shield Box returns the response message (Response Data + $0A + $0D) after some delay.

- In case of error, Shield Box returns the error message (Error Data + $0A + $0D).

3. Programming Example

The following examples are written in Visual Basic.

Example 1) OPEN the Shield Box

```
Private Sub Form_Load()
            MSComm1.CommPort = 1    ' select COM1'
            MSComm1.Settings = "9600, N, 8, 1"
                    ` Baud Rate(9600 bps), Parity Bit(None), Data Bit(8 bit), Stop Bit(1 bit)
            MSComm1.PortOpen = True    ' Open Com Port.
            MSComm1.Output = "OPEN" + Chr(13)    ` send command.
            MSComm1.PortOpen = False    ` Close Com Port.
        End Sub
```

Example 2) Check "OK" is received in input Buffer

```
Private Sub MSComm1_OnComm()
        ` Triggers when TX or RX event occurs
        If MSComm1.CommEvent = 2 Then    ` event in input Buffer
        Text1.Text = MSComm1.Input        ' read the input string and check later if it is "OK"
        End If
    End Sub
```

3.2.4 RS-232C Command

[Table 2] Error Data

Error Data	Description
ERR10	Syntax error
ERR20	Probe Downward error
ERR30	Handler Inward error
ERR40	Status error
ERR60	Safety error

[Table 3] RS-232C Basic Command

RS-232C Commands	Response Data	Description
OPEN	OK	LID OPEN
CLOSE	READY	LID CLOSE
LID?	OPEN or CLOSE	LID Status query
PASS	OK	Turn on the green LED and open the lid
FAIL	OK	Turn on the red LED
DUAL HAND ON	OK	Switch to the both hands operation
DUAL HAND OFF	OK	Switch to the one hand operation
DUAL HAND?	DUAL HAND ON/ OFF	Operation
MODEL?		Model name query
SYSTEM INITIAL	OK	Reset the count memory
COUNT?	Numeric 7digit(ex: 0000001)	The cumulative frequency of Open/Close query

[Table 4] RS-232C User Option Command

RS-232C Commands	Response Data	Description
UPWARD	OK	PROBE UPWARD
DOWNWARD	OK	PROBE DOWNWARD
PROBE?	UPWARD or DOWNWARD	PROBE Status Query
INWARD	OK	HANDLER INWARD
OUTWARD	OK	HANDLER OUTWARD
HANDLER?	INWARD or OUTWARD	HANDLER Status Query

Maintenance

This chapter introduces maintenance, and performance tests for a shield box.

4.1 Maintenance

Manual Shield Box is designed and built for long life and easy maintenance.

Optimal RF shielding is obtained using a shield form gasket between the case and lid. It must be checked periodically for damage or excessive wear that would compromise the seal. Pressure on the gasket by the lid results in a proper RF seal.

Check List for Maintenance

1) Check for loose screws and tighten with proper tools, if necessary.
2) Check for a loose connection. If a loose connector is found, tighten the connector with proper tools.
3) Check for a damaged cable, especially near the connector-cable neck. Replace any damaged cables found.
4) Visually inspect the RF seal (gasket) between the bottom shield box case and lid for excessive wear.
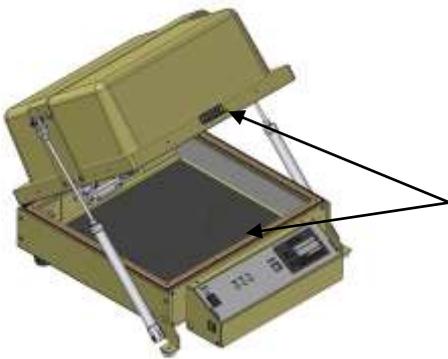
The RF gasket must be checked periodically for damage or wear out. Periodic cleaning of the aluminum contact surface where the gasket touches is important for optimum shielding performance.

[Figure 10] Pneumatic Shield Box(ex : TC-5915AP)

⚠️ **WARNING**   Do not clean this equipment with organic solvents such as benzene, toluene or acetone as they will damage the gasket parts.

4.2 Performance Test

Tescom Shield Boxes are precision RF devices built very sturdy. Their electrical performance can, however, deteriorate with mechanical damages. Worn out shielding gaskets, as well as metal corrosion or oxidation at the lid contact, can significantly reduce the effectiveness of the Shield Box. This section describes the test and calibration procedure for the Pneumatic Shield Box.

Calibration Period: < 6 months

### Test Subject: Shielding Effectiveness

Required Equipment

- Spectrum Analyzer: HP8562B or equivalent
- Signal Generator: HP8648C or equivalent
- Dipole Antenna: Tescom 900 MHz, 1.8 GHz, 2.4 GHz, 5.8 GHz

Test Connection

Signal Generator

Spectrum Analyzer

Source dipole antenna

Monitor dipole antenna
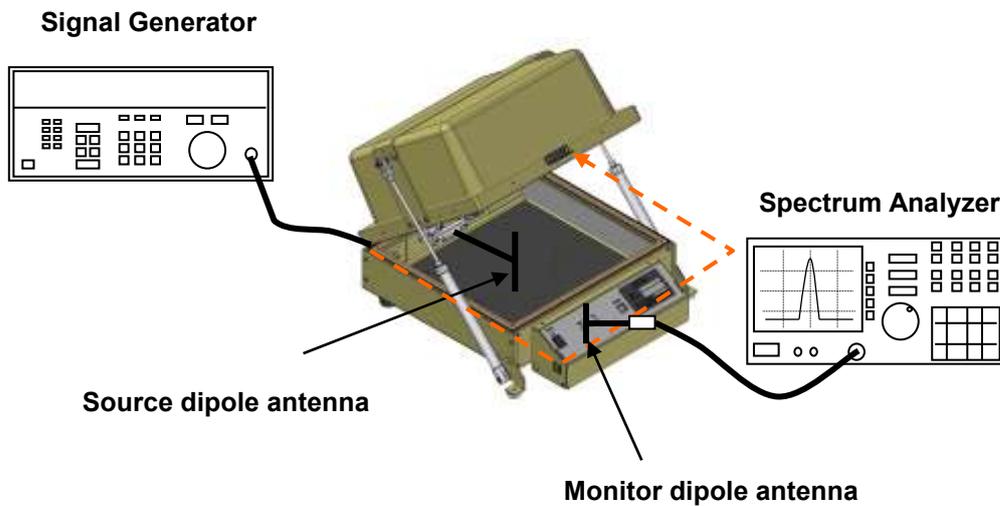
[Figure 11] Shielding Measurement Test Set Up(ex : TC-5915AP)

Specification

The Specification for each shield box varies on I/O interface panel. Therefore, please take a look Appendix A and C before order.

TEST Procedure

1) Connect the HP8648C Signal Generator output to the RF connector of the Shield Box

2) Connect the 900 MHz Rod or Dipole antenna to the SMA connector inside the Shield Box.

3) Set the HP8648C to CW 900 MHz, 10 dBm output.

4) Set the HP8562B Spectrum Analyzer as follows:

   – CF: 900 MHz

   – Span: 1 MHz

   – Resolution BW: 10 kHz

   – 10 dB/div

5) Connect the 900 MHz Dipole antenna to the Spectrum Analyzer with RF cable.

6) Open the door of the Shield Box and move the antenna around the Shield Box to find the location where the maximum field is found. Fix the location of antenna for maximum field.

7) Adjust the spectrum analyzer input range and set the 800 MHz signal to the top display line.

8) Close the lid.

9) The shield effectiveness, which is measured when the lid opens or closed, should be within the specification in the Appendix A or C.

10) Change frequency to 1.8 GHz and repeat the test described above.

11) Change frequency to 2.4 GHz and repeat the test described above.

12) Change frequency to 5.8 GHz and repeat the test described above.

(a) Maximum Field (Lid Opened)   Shielding Effect   (b) Maxium Field (Lid Closed)
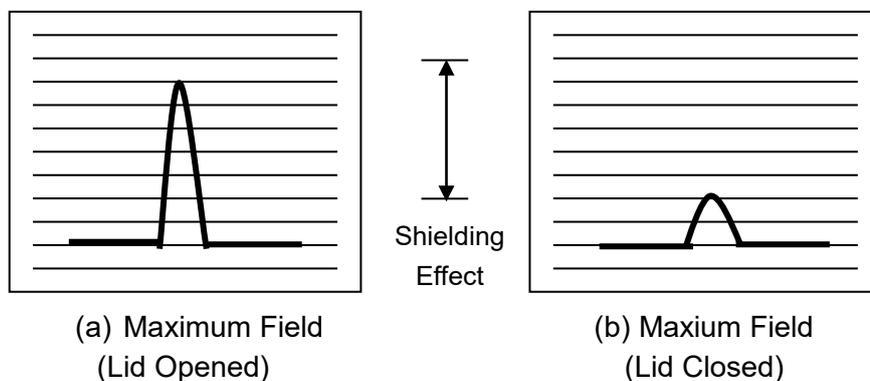
[Figure 12] Spectrum Analyzer Display

4.3 Check List for Common Problems

This section provides a brief checklist of common failures.

NOTE: First verify that the problem is not a result of an external connection before considering the problem is with the shield box. Then isolate the failure to the shield box before troubleshooting or repairing the Pneumatic Shield Box. Verify the shield box performance is to specification while troubleshooting the problem.

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1) **Verify that the power cord is connected to the Pneumatic Shield Box.**
Make sure that the power cord is firmly plugged into the power module. Also make sure that the power source for the Pneumatic Shield Box is energized.

2) **Verify that the Pneumatic Shield Box power switch is depressed.**

3) **Verify the line voltage.**
The line voltage to the power source should be DC 24V.

4) **Verify the compressed air and air cables.**
The compressed air to the Pneumatic Shield Box should be 5 ~ 10 bar.

5) **Verify external cables provide good connections.**

APPENDICES
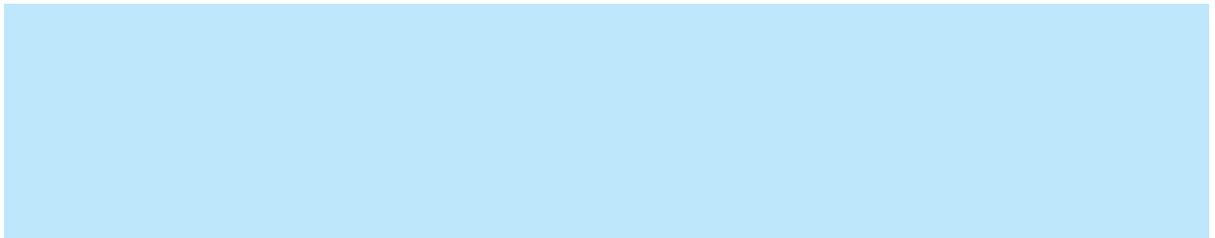
Appendix A

TC-5910DP Specification

Mechanical Specification	
Line voltage	DC 24 V, Max. 2A
Remote control	RS-232C, 3 wire, DB9(s)
Air connection	
Main connector	6 mm OD hose, one-touch push-on fitting
Fixture control connector	4 mm OD hose, one-touch push-on fitting
Input air pressure	5 to 10 bar
Dimension	
Inside	140(W) x 244(D) x 139(H) mm
Outside	218(W) x 375(D) x 195(H) mm, lid closed.
	410(D) x 355(H) mm, lid open
Weight	approx. 7 kg
*Packing	
Size	365(W) x 450(D) x 280(H) mm
Weight	approx. 8 kg

*The size or weight of a package may vary on how to pack a package.

Typical RF Shielding	

The shield effectiveness below is measured when the blank panel is mounted; other I/O interface panel results a different shielding effectiveness of the shield box.

100 to 2000 MHz	> 70 dB
2000 to 3000 MHz	> 70 dB
3000 to 6000 MHz	> 60 dB

TC-5915AP Specification

Mechanical Specification	
Line voltage	DC 24 V, Max. 2A
Remote control	RS-232C, 3 wire, DB9(s)
Air connection	
Main connector	6 mm OD hose, one-touch push-on fitting
Fixture control connector	4 mm OD hose, one-touch push-on fitting
Input air pressure	5 to 10 bar
Dimension	
Inside	220(W) x 280(D) x 170(H) mm
Outside	324(W) x 432(D) x 252(H) mm, lid closed. 373(H) mm, lid open
Weight	approx. 9 kg
*Packing	
Size	460(W) x 528(D) x 335(H) mm
Weight	approx. 10 kg

Typical RF Shielding	

It is measured including the blank panel module, without cable. The shielding effectiveness can be different depend on the data connector in the module.

100 to 2000 MHz	> 70 dB
2000 to 3000 MHz	> 70 dB
3000 to 6000 MHz	> 60 dB

TC-5916AP Specification

Mechanical Specification	
RF Connectors without module	2 N (f) outside and SMA (f) inside
Line voltage	DC 24 V, Max. 2A
Remote control	RS-232C, 3 wire, DB9(s)
Air connection	
Main connector	6 mm OD hose, one-touch push-on fitting
Fixture control connector	4 mm OD hose, one-touch push-on fitting
Input air pressure	5 to 10 bar
Dimension	
Inside	310(W) x 280(D) x 200(H) mm
Outside	425(W) x 430(D) x 260(H) mm, lid closed. 422(H) mm, lid open.
Weight	approx. 13 kg
*Packing	
Size	480(W) x 545(D) x 365(H) mm
Weight	approx. 15 kg

*The size or weight of a package may vary on how to pack a package.

Typical RF Shielding	

The shield effectiveness below is measured when the blank panel is mounted; other I/O interface panel results a different shielding effectiveness of the shield box.

100 to 2000 MHz	> 70 dB
2000 to 3000 MHz	> 70 dB
3000 to 6000 MHz	> 60 dB

TC-5922AP Specification

Mechanical Specification

RF Connectors without module	2 N (f) outside and SMA (f) inside
Line voltage	DC 24 V, Max. 2A.
Remote control	RS-232C, 3 wire, DB9(p)
Air connection	
Main connector	6 mm OD hose, one-touch push-on fitting
Fixture control connector	4 mm OD hose, one-touch push-on fitting
Input air pressure	5 to 10 bar
Dimension	
Inside	296(W) x 435(D) x 230(H) mm
Outside	429(W) x 601(D) x 330(H) mm, lid closed. 623(H) mm, lid open
Weight	approx. 25 kg
*Packing	
Size	620(W) x 800(D) x 530(H) mm
Weight	approx. 29 kg

*The size or weight of a package may vary on how to pack a package.

Typical RF Shielding

The shield effectiveness below is measured when the blank panel is mounted; other I/O interface panel results a different shielding effectiveness of the shield box.

100 to 2000 MHz	> 70 dB
2000 to 3000 MHz	> 70 dB
3000 to 6000 MHz	> 60 dB

TC-5972DP Specification

Mechanical Specification	
RF Connectors without module	4 N (f) outside and SMA (f) inside
Line voltage	DC 24 V, Max. 2A.
Remote control	RS-232C, 3 wire, DB9(s)
Air connection	
Main connector	6 mm OD hose, one-touch push-on fitting
Fixture control connector	4 mm OD hose, one-touch push-on fitting
Input air pressure	5 to 10 bar
Dimension	
Inside	445(W) x 449(D) x 338(H) mm, 208(D)mm top side
Outside	582(W) x 661(D) x 451(H) mm,
Weight	approx. 32 kg
*Packing	
Size	830(W) x 700(D) x 555(H) mm
Weight	approx. 42 kg

*The size or weight of a package may vary on how to pack a package.

Typical RF Shielding	

The shield effectiveness below is measured when the blank panel is mounted; other I/O interface panel results a different shielding effectiveness of the shield box.

100 to 2000 MHz	> 70 dB
2000 to 3000 MHz	> 70 dB
3000 to 6000 MHz	> 60 dB

TC-5975AP Specification

Mechanical Specification	
Line voltage	100 to 240VAC, 50/60 Hz, 15 watt max.
Remote control	RS-232C, 3 wire, DB9(s)
Air connection	
Main connector	6 mm OD hose, one-touch push-on fitting
Fixture control connector	4 mm OD hose, one-touch push-on fitting
Input air pressure	5 to 10 bar
Dimension	
Inside	254(W) x 514(D) x 254(H) mm
Outside	354(W) x 680(D) x 515(H) mm, lid closed. 1100(D) mm, lid open
Weight	approx. 43 kg
*Packing	
Size	485 (W) x 835 (D) x 610 (H) mm
Weight	approx. 47 kg

*The size or weight of a package may vary on how to pack a package.

Typical RF Shielding	

The shield effectiveness below is measured when the blank panel is mounted; other I/O interface panel results a different shielding effectiveness of the shield box.

100 to 2000 MHz	> 80 dB
2000 to 3000 MHz	> 80 dB
3000 to 6000 MHz	> 70 dB

TC-5924AP Specification

Mechanical Specification	
Line voltage	100 to 240VAC, 50/60 Hz, 15 watt max
Remote control	RS-232C, 3 wire, DB9(s)
Air connection	
Main connector	6 mm OD hose, one-touch fitting
Input air pressure	5 to 10 bar
Dimension	
Inside	270(W) x 290(D) x 103(H) mm
Outside	330(W) x 401(D) x 208(H) mm, lid closed. 604(D) mm, lid open
Weight	approx. 19 kg
*Packing	
Size	500 (W) x 460 (D) x 300 (H) mm
Weight	approx. 23 kg

*The size or weight of a package may vary on how to pack a package.

Typical RF Shielding	

The shield effectiveness below is measured when the blank panel is mounted; other I/O interface panel results a different shielding effectiveness of the shield box.

100 to 2000 MHz	> 80 dB
2000 to 3000 MHz	> 80 dB
3000 to 6000 MHz	> 70 dB

Appendix B

TC-5910DP Accessories list

[Table 5] TC-5910DP Accessories list

Order Number	Description
	Pneumatic Shield Box (including accessories bellow)
TC-5910DP	Operating Manual Test Report SS-402, N(m) to N(m) cable, 1 m, 1 pc DB9(p) to DB9(s) cable, 2 m, 1 pc. Air Coupler, 1 pc Switching Power Supply, 1 pc

TC-5915AP Accessories list

[Table 6] TC-5915AP Accessories list

Order Number	Description
	Pneumatic Shield Box (including accessories bellow)
TC-5915AP	Operating Manual Test Report SS-402, N(m) to N(m) cable, 1 m, 1 pc DB9(p) to DB9(s) cable, 2 m, 1 pc. Air Coupler, 1 pc Switching Power Supply, 1 pc

TC-5916AP Accessories list

[Table 7] TC-5916AP Accessories list

Order Number	Description
	Pneumatic Shield Box (including accessories bellow)
TC-5916AP	Operating Manual Test Report SS-402, N(m) to N(m) cable, 1 m, 1 pc DB9(p) to DB9(s) cable, 2 m, 1 pc. Air Coupler, 1 pc Switching Power Supply, 1 pc

TC-5922AP Accessories list

[Table 8] TC-5922AP Accessories list

Order Number	Description
TC-5922AP	**Pneumatic Shield Box (including accessories bellow)**
	Operating Manual
	Test Report
	DB9(p) –DB9(s) 2 m, 1 pc
	SS-402, N(m) to N(m) 1 m, 1 pc
	Air Coupler, 1 pc
	Switching Power Supply, 1 pc
	Box Remote Switch , 1pc

TC-5972DP Accessories list

[Table 9] TC-5972DP Accessories list

Order Number	Description
TC-5972DP	**Pneumatic Shield Box (including accessories bellow)**
	Operating Manual
	Test Report
	SS-402, N(m) to N(m) cable, 1 m, 1 pc
	DB9(p) to DB9(s) cable, 2 m, 1 pc.
	Air Coupler, 1 pc
	Switching Power Supply, 1 pc

TC-5975AP Accessories list

[Table 10] TC-5975AP Accessories list

주문 번호	제품명
TC-5975AP	**Pneumatic Shield Box (including accessories bellow)**
	Operating Manual
	Test Report
	Power cable 220V, 1 pc
	Box Remote Switch, 2 m, 1 pc

TC-5924AP Accessories list

[Table 11] TC-5924AP Accessories list

Order Number	Description
	Pneumatic Shield Box (including accessories bellow)
TC-5924AP	Operating Manual Test Report Power cable 220V, 1 pc Box Remote Switch, 1 m, 1 pc SS-402, N(m) to N(m) cable, 1 m, 1 pc DB9(p) to DB9(s) cable, 2 m, 1 pc Air Hand valve, 1 pc

Appendix C

TC-5910DP I/O Interface Panel

[Table 12] TC-5910DP I/O Interface Panel

	Order Number	Configuration
Data Interface Panel	M591011A	• *Shielding Effectiveness:>70 dB from 0.5 to 2 GHz, >60 dB from 2 to 3 GHz, >55 dB from 3 to 6 GHz • DB9(p) outside and DB9(s) inside, 1000 pF Pi filter • DB25(p) outside and DB25(s) inside, 1000 pF Pi filter • 2 N(f) outside and SMA(f) inside • Data line Capacity : 100 VDC, 5 Amps max
Data Interface Panel	M591011B	• *Shielding Effectiveness:>70 dB from 0.5 to 2 GHz, >60 dB from 2 to 3 GHz, >55 dB from 3 to 6 GHz • DB9(p) outside and DB9(s) inside, 100 pF Pi filter • DB25(p) outside and DB25(s) inside, 100 pF Pi filter • 2 N(f) outside and SMA(f) inside • Data line Capacity : 100 VDC, 5 Amps max
USB2.0 interface Panel	M591012A	• *Shielding Effectiveness: >60 dB from 0.5 to 6 GHz • DB25(p) outside and DB25(s) inside, 100 pF Pi filter • USB A(p), 10 pF Pi filter • Data line Capacity : 100 VDC, 3 Amps max
USB2.0 interface Panel	M591013A	• *Shielding Effectiveness: >60 dB from 0.5 to 6 GHz • DB9(p) outside and DB9(s) inside, 100 pF Pi filter • DB25(p) outside and DB25(s) inside, 1000 pF Pi filter • USB A(p), 10 pF Pi filter • Data line Capacity : 100 VDC, 3 Amps max
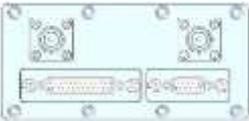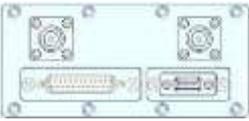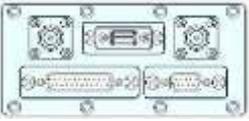
*Each shielding effectiveness is measured when each I/O interface panel, which is shown above, is mounted.

TC-5915AP I/O Interface Panel

[Table 13] TC-5915AP I/O Interface Panel

	Order Number	Configuration
Data Interface Panel	M591502B	• *Shielding Effectiveness:>70 dB from 0.5 to 2 GHz, >60 dB from 2 to 3 GHz, >55 dB from 3 to 6 GHz • DB9(p) outside and DB9(s) inside, 1000 pF Pi filter • DB25(p) outside and DB25(s) inside, 1000 pF Pi filter • 2 N(f) outside and SMA(f) inside • Data line Capacity : 100 VDC, 3 Amps max.
Data Interface Panel	M591505A	• *Shielding Effectiveness:>70 dB from 0.5 to 2 GHz, >60 dB from 2 to 3 GHz, >55 dB from 3 to 6 GHz • DB25(p) outside and DB25(s) inside, 1000 pF Pi filter • 4 N(f) outside and SMA(f) inside • Data line Capacity : 100 VDC, 3 Amps max.
RJ-45 Interface Panel	M591531A	• *Shielding Effectiveness: >60 dB from 0.5 to 3 GHz • RJ-45 outside and inside, 10pF Pi filter, for LAN • Data line Capacity : 1.5 Amps max.
DC Power interface Panel	M591532A	• *Shielding Effectiveness:>70 dB from 0.5 to 2 GHz, >60 dB from 2 to 3 GHz, >55 dB from 3 to 6 GHz • DC Power Jack outside and inside • Data line Capacity : 100 VDC, 3 Amps max.
DB9 Interface Panel	M591533A	• *Shielding Effectiveness:>70 dB from 0.5 to 2 GHz, >60 dB from 2 to 3 GHz, >55 dB from 3 to 6 GHz • DB9(p) outside and DB9(s) inside, 1000 pF Pi filter • Data line Capacity : 100 VDC, 3 Amps max.
USB Interface Panel	M591534B	• *Shielding Effectiveness: >60 dB from 0.5 to 6 GHz • USB A(p) 2.0, 10 pF Pi filter • Data line Capacity : 1 Amps max. (Frequency range : 200 MHz ~ 5.8 GHz) • ※ Only for USB to USB Connection

*Each shielding effectiveness is measured when each I/O interface panel, which is shown above, is mounted.

TC-5916AP I/O Interface Panel

[Table 14] TC-5916AP I/O Interface Panel

|	Order Number	Configuration
Data Interface Panel	M591602A	• *Shielding Effectiveness: >60 dB from 0.5 to 6 GHz • DB9(p) outside and DB9(s) inside, 100 pF Pi filter • DB25(p) outside and DB25(s) inside, 1000 pF Pi filter • USB A (p) 2.0 10 pF Pi filter • Data line Capacity: 100 VDC, 3 Amps max.

*Each shielding effectiveness is measured when each I/O interface panel, which is shown above, is mounted.

TC-5922AP I/O Interface Panel

[Table 15] TC-5922AP I/O Interface Panel

	Order Number	Configuration
Blank Panel	M592001A	
Data Interface Panel	M592002A	• *Shielding Effectiveness:>70 dB from 0.5 to 2 GHz, >60 dB from 2 to 3 GHz, >55 dB from 3 to 6 GHz • DB9(p) outside and DB9(s) inside, 1000 pF Pi filter • DB25(p) outside and DB25(s) inside, 1000 pF Pi filter • 2 N(f) outside and SMA(f) inside
Data Interface Panel	M592003A	• *Shielding Effectiveness:>70 dB from 0.5 to 2 GHz, >60 dB from 2 to 3 GHz, >55 dB from 3 to 6 GHz • DB9(p) outside and DB9(s) inside, 1000 pF Pi filter • DB25(p) outside and DB25(s) inside, 1000 pF Pi filter • 2 DB37(p) outside and DB37(s) inside, 1000 pF Pi filter
Data Interface Panel	M592004A	• *Shielding Effectiveness:>70 dB from 0.5 to 2 GHz, >60 dB from 2 to 3 GHz, >55 dB from 3 to 6 GHz • Air fitting, 6mm OD. • DB9(p) outside and DB9(s) inside, 1000 pF Pi filter • DB25(p) outside and DB25(s) inside, 1000 pF Pi filter • 2 N(f) outside and SMA(f) inside
Data Interface Panel	M592005A	• *Shielding Effectiveness:>70 dB from 0.5 to 2 GHz, >60 dB from 2 to 3 GHz, >55 dB from 3 to 6 GHz • 2 DB9(p) outside and DB9(s) inside, 1000 pF Pi filter • DB25(p) outside and DB25(s) inside, 1000 pF Pi filter • DB37(p) outside and DB37(s) inside, 1000 pF Pi filter • N(f) outside and SMA(f) inside

	M592007A	• *Shielding Effectiveness: >60 dB from 0.1 to 3 GHz
Data Interface Panel		• DB9(p) outside and DB9(s) inside, 1000 pF Pi filter
		• DB25(p) outside and DB25(s) inside, 1000 pF Pi filter
		• 4 SMA(f) outside and SMA(f) inside
		• RJ-45 outside and inside, 10 pF Pi filter, for LAN

*Each shielding effectiveness is measured when each I/O interface panel, which is shown above, is mounted.

TC-5972DP I/O Interface Panel

[Table 16] TC-5972DP I/O Interface Panel

	Order Number	Configuration
Blank Panel	M5970C01A	• *Shielding Effectiveness: >70 dB from 0.5 to 2 GHz >60 dB from 2 to 3 GHz, >55 dB from 3 to 6 GHz
RF and AC Power Panel	M5970C02A	• *Shielding Effectiveness: >70 dB from 0.5 to 3 GHz >60 dB from 3 to 6 GHz • 1 N (f) outside and SMA (f) inside • AC Inlet, 100 VAC~300 VAC, 10 A
RF and RJ45, DB25 Data Interface Panel	M5970C03A	• *Shielding Effectiveness: >60 dB from 0.5 to 3GHz, >55 dB from 3 to 6 GHz • 1 N (f) outside and SMA (f) inside • RJ-45 outside and inside, 10 pF Pi filter • One DB25(p) outside, DB25(s) inside, 1000 pF Pi filter
RF and USB, DB25 Data Interface Panel	M5970C04A	• *Shielding Effectiveness: >60 dB from 0.5 to 3 GHz, >55 dB from 3 to 6 GHz • 1 N (f) outside and SMA (f) inside • USB outside and inside • One DB25(p) outside, DB25(s) inside, 1000 pF Pi filter

*Each shielding effectiveness is measured when each I/O interface panel, which is shown above, is mounted.

TC-5975AP I/O Interface Panel

[Table 17] TC-5975AP   I/O Interface Panel

	Order Number	Configuration
Data Interface Panel	M597064A	• *Shielding Effectiveness: >70 dB from 0.5 to 2 GHz >60 dB from 2 to 3 GHz, >50 dB from 3 to 6 GHz • 1 N(f) outside and SMA(f) inside

*Each shielding effectiveness is measured when each I/O interface panel, which is shown above, is mounted.

TC-5924AP I/O Interface Panel

[Table 18] TC-5924AP I/O Interface Panel

	Order Number	Configuration
Data Interface Panel	M591689A	• *Shielding Effectiveness: >60 dB from 0.5 to 2 GHz >60 dB from 2 to 3 GHz, >50 dB from 3 to 6 GHz • 2 USB A(p), 10 pF Pi filter • DB9(p) outside and DB9(s) inside, 100 pF Pi filter • DB25(p) outside and DB25(s) inside, 100 pF Pi filter • 2 N(f) outside and SMA(f) inside

*Each shielding effectiveness is measured when each I/O interface panel, which is shown above, is mounted.