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AI- Paperless Recorder

(AI-2070S / AI-2010S)

User Manual

Password :111

Chapter 1	Preface	P.2
Chapter 2	Installation Note	P.3
Chapter 3	AI- Paperless Recorder Application	P.5
Chapter 4	Order Code	P.11
Chapter 5	Product Dimension	P.12
Chapter 6	Parts and Functions	P.13
Chapter 7	Accessories	P.14
Chapter 8	Common Fault and Recommendation	P.15

- **All channels in full screen.** AI-Paperless recorder is used with YUDIAN AI-series instrument for monitoring and controlling module. Apart from different kind of temperature, pressure, flow and frequency, YUDIAN instrument also provides flow totalizing, electricity measuring and artificial intelligent PID control. The configuration and combination of the functions can be achieved by user. With GUI and touch screen, the system is easy to learn and operate. The screen can be tailor-made with a flow chart with customized colorful graphics. For small scaled DCS control system, its function is already above common paperless recorders, combining the advantage of HMI and paperless recorder.
- **Display/Record Function.** Each channel refreshes in 50ms. Internal 90MB data storage; Real-time data saving to external USB thumbdrive; Data in first-in first-out principle, data are backup into CSV. (Most common format for spreadsheet software e.g. MS EXCEL)
- **Extendible.** The AI touch screen paperless recorder connects with AI-instruments, with the RS485 wire included, to form as a control and monitoring system, right after purchase. The touch screen and instrument can be purchased separately and the numbers of device are extendible. This supports control and measuring by means of temperature, pressure, flow and frequency, AI-PID regulation, flow accumulating, electrical power measuring. Many input /output options are available. There are single channel, multichannel, AI controller, manual adjust device, flow totalizer and on/off module. The pre-set channel number can be 2, 4, 6, 8, 12, 18, 24, 30 or 36 upon order for paperless recorder. The title of AI-instruments in the setup can be customized such as <TIC-101>, as well as the measurement unit °C and etc.
- This touch screen panel are widely applied into industries such as chemistry, gold mining, oil refinery, medicine, food, electric furnace, controlled temperature and humidity chamber, mechanical machinery, laboratory mobile touch screen panel, DCS control system as terminal display.

Remark : AI-2070S/C/2010C are compatible to AI – instrument of V7.0/8.0 versions

2.1 General note:

Thank you for choosing our products. This manual contains information about AI-2070S/C/2010C paperless recorder. Please read this manual carefully before using the product. Please take good care of this manual and store it safely and in a place that is easy to reach. Please agree and follow the notes in this chapter before you put the product into use.

- The 24VDC convertor provides electric power to the paperless recorder only.
- The installation environment must be free of water vapour, corrosive gases and flammable gases.
- Please strictly following the wire diagram during wire connection.
- Earth must be done.
- Please do not remove the plug of serial COM port or change the wire connection during the panel is powered on.
- Please do not touch the power source terminal during the panel is powered on, in case of any electric shock.

2.2 Security Note:

Installation:

- Please strictly follow the method in this manual to install the product. Otherwise the product may be damaged.
- Do not use this product or dispose this product to water vapour, corrosive gases and flammable gases. Otherwise there may be electric shock or fire.

Wire Connection: **Wires must be earthed to avoid any interference.**

- This product is powered by 24VDC. Or other power source that meet this requirement.
- Please connect the earth terminal to class-3 (below 100 Ω) earth. Failed to earth may cause electric shock or fire.

User Operation:

- This product must be used with compatible software which is designed by engineer. Unauthorized change may cause the product mal-function.
- Do not change wire connection while it is powered on. Otherwise there may cause electric shock or harm to users.
- Do not use sharp tools to touch the screen. This will cause damage to the screen.

Maintenance:

- Do not touch the inside of the product in case of any electric shock.
- Do not open the case of the product while it is powered on in case of any electric shock.
- Do not touch the wire terminal in 10 minutes after it is shut down because residual voltage may cause electric shock.
- Do not block the ventilation holes during the usage of this product. Otherwise error may be caused.

Wire Connection:

- Quickly plug and unplug the COM port plug from the product.
- Only one wire is inserted into each electric wire connector hole.
- The included 24VDC power convertor must be earthed.

Communication Wire Connection:

- Please use qualified communication wires.

- The length of communication wire must not longer than it is stated.
- Properly connect the earth loop to avoid any bad communication.

2.3 Installation Environment:

This product must be kept in the original package before use. If the product has not been used, please note the following storing suggestion to ensure the product is valid for factory repair within warranty period.

- Must store in a no dust, dry place.
- Storage temperature must be -20°C to +60°C (-4°F to 140°F)
- Storage humidity must be 10% to 90% and no frost.
- Avoid storage in corrosive gases or moisture environment.
- Recommended to properly stored in the original package, on a shelf or flat surface.

2.4 Basic Checking:

- Check the screws between the COM port and device at regular basis.
- The ventilation holes should avoid from oil, water or metal powders.
- Take measure to avoid intrusion of harmful gases or powders in case the product is used in an environment with harmful gases or dust.

Double check: (Before the electric power is supplied)

- Insulation to wire connection.
- Ensure the communication wire connection us correct. Otherwise abnormal action may be carried out.
- Check if any screws, metal parts that is conductive or flammable materials is inside the product.
- Please adjust the instrument if the instrument itself is interference by electromagnetic field.
- Check the power supply voltage

(Operation of indicating/Control instrument refer to its own manual)

3.1 Installation of AI-paperless recorder

AI-paperless recorder communicates with AI-instrument with communication line, according to the address. The channel option of AI-paperless recorder software is 2, 4, 6, 8, 12, 18, 24 and 36.

The installation method can be panel mount or rail mount. The communication wire included is CAT-5e shielded twisted wire. It is plugged into COM1 port. There is 5 pins used among the 9 pin plug. The color allocation is :

A-green and B-green and white for RS485 communication against AI-instrument

RXD-2 Yellow, TXD-3 Yellow and white, GND-5 blue these three for RS232 communication.

Soldering RS232 socket pin 2, 3 and 5 make the connecting to specified micro-printer (please contact sales representative for details)

(Only available for 2010C) With RS485 convertor the paperless recorder supports one more RS485 device such as PLC, apart from AI-instrument lines.

The power of panel itself is 24VDC. The AC to 24VDC convertor is included. The electric power wires include +ve, -ve and earth.

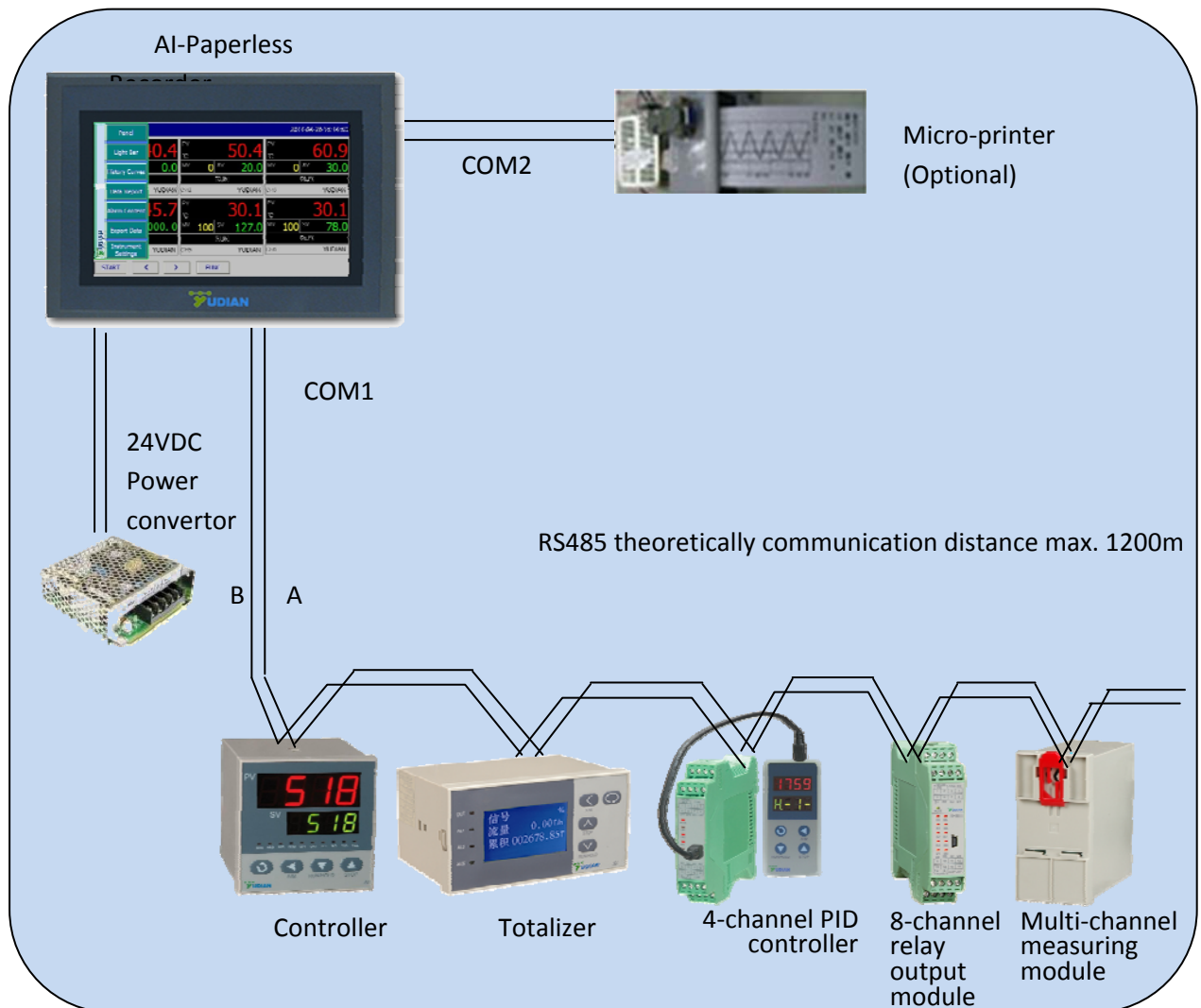
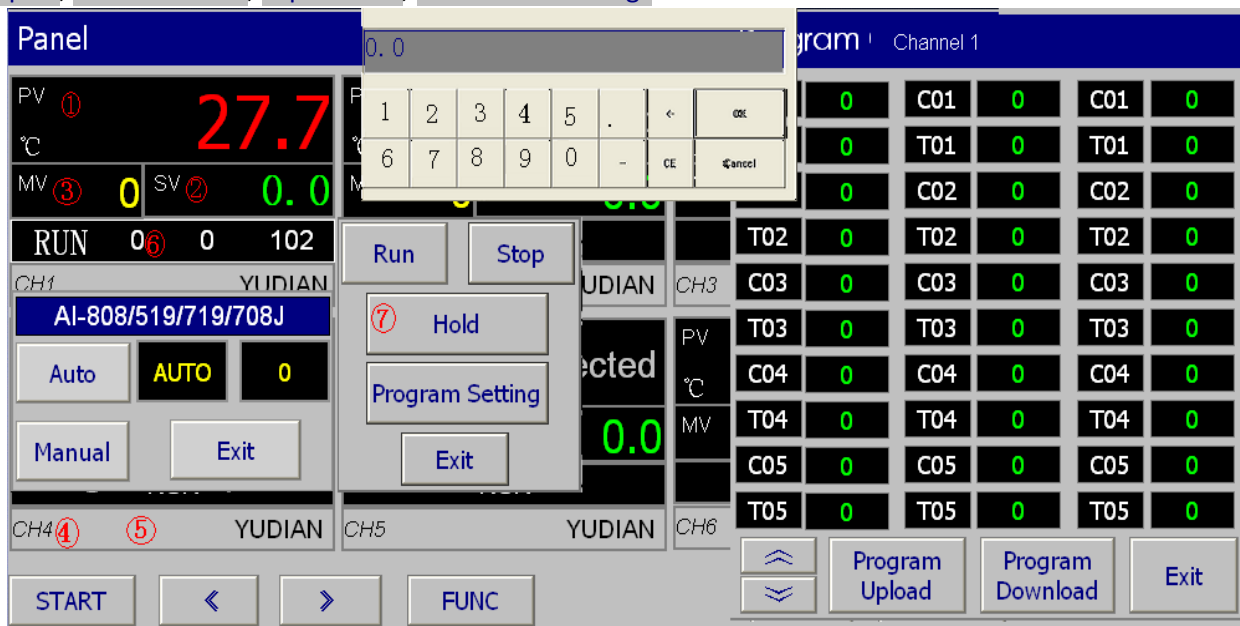


Illustration of combination of AI-paperless recorder and AI-instrument

3.2 Power on

After the panel is powered on, press Panel tag. Press “START” to select **Light bar**, **History Curves**, **Data Report**, **Alarm Content**, **Export Data**, **Instrument Settings**.



Picture 1

- ① Upper display: Showing measured value PV. The unit is shown on left
- ② Setpoint SV (This can be ignored for indicator such as AI — 501/701/702M).
If the instrument is chosen as a programmable controller. Press this area to pop up the sub-window ⑦.
Press **RUN** to start the controller program, **STOP** to stop the program, **HOLD** to make the controller pause during running. Press **Program Setting** to pop up program setting window on the right. The program step number are from C01~C50.*
If the instrument is chosen as a controller without program function such as AI-518/708/808. Press this area to pop up the number input window to enter SV value.
- ③ Showing the output power percentage MV (This can be ignored for indicator such as AI — 501/701/702M). If an instrument with manual control such as AI-808/808P/519/719/708J is chosen, a window will pop up for user to select auto/manual. In manual mode, user can input the output percentage directly.
- ④ Showing indicator channel number/title. This value can be configured in **Instrument settings**.
- ⑤ Alarm Message. If there is a alarm , there will be a text such as “Value1 High Alarm” rolling.
- ⑥ If the instrument is chosen as a programmable controller, the remaining time of current program step will be showing. Press this area to edit step number (Range from C01~50). Otherwise only RUN status will be shown.

*** Step number will be limited to C01~C30 if the instrument version is V8.0 earlier.***

3.3 Initialization

Press **START** -> **Instrument settings** -> **User Logon** -> **Password (111)**

Please arrange AI-instruments according to their address, e.g. Instrument Type = AI — 808P, Channel Title= TIC-101. Press **Parameters Upload** to check parameters. During data transfer, it will show “Parameters Uploading...” or “Parameters Upload finished” . Review and edit parameters if it is necessary. There is also status showing when **Parameters Download** is pressed.

In **Auto Export Config** section, the default value of “Start time” is the time when the panel is powered on while the “End Time” is 480 minutes after. Default sample time interval “Data Record Interval” is 60,000ms (1 minute). Each channel can store data for 560 days (4 channels) , 346 days (8 channels) or 196

days (16 channels). If “Data Record Interval” is long as 2 minutes, then it will store up to 1120 days (4 channels). The data is stored under the principle of first-in first-out. The minimum “Data Record Interval” is 1,000ms (1 second).

Instrument Settings Parameters downLoad finished

Channel Title: Instrument Type: ▼

Parameters

High Alarm: Low Alarm: Alarm Hystereis:

Deivation High Alarm: Deivation Low Alarm: Alarm Output:

Input Spec: Decimal Place(DIP): Prg. No.(PNO): Unit: ▼

Auto Export Config.

Start Time: Data Record Interval: 输入框

End Time: Data Report Interval: 输入框

Progress & No. of Curve Exported: Range 1s~3600s

START < > Parameters Upload Parameters Download User Logon User Logoff

Instrument Settings Parameters downLoad finished

Ch: Instrument Type: ① ▼

Pa: Alarm: Alarm Hystereis:

Deiv: Alarm: Alarm Output:

It:

Unit: ② ▼

Range 1s~3600s

START < > Parameters Upload

① Press ▼ button to select the right instrument model in the pop up window. Default setting is “Undefined”.

② Press ▼ button to select the measurement unit. Default unit is °C.

Press ⏪ or ⏩ to go to previous channel and next channel respectively.

Remark: After wire connection with instrument, in order to have correct display of PV and parameters, “Parameters Upload” must be performed manually to upload the parameters value into the panel.

3.4 AI-Controller Basic Parameter

Please set the basic parameter in the controller/modules itself, instead of the paperless recorder.

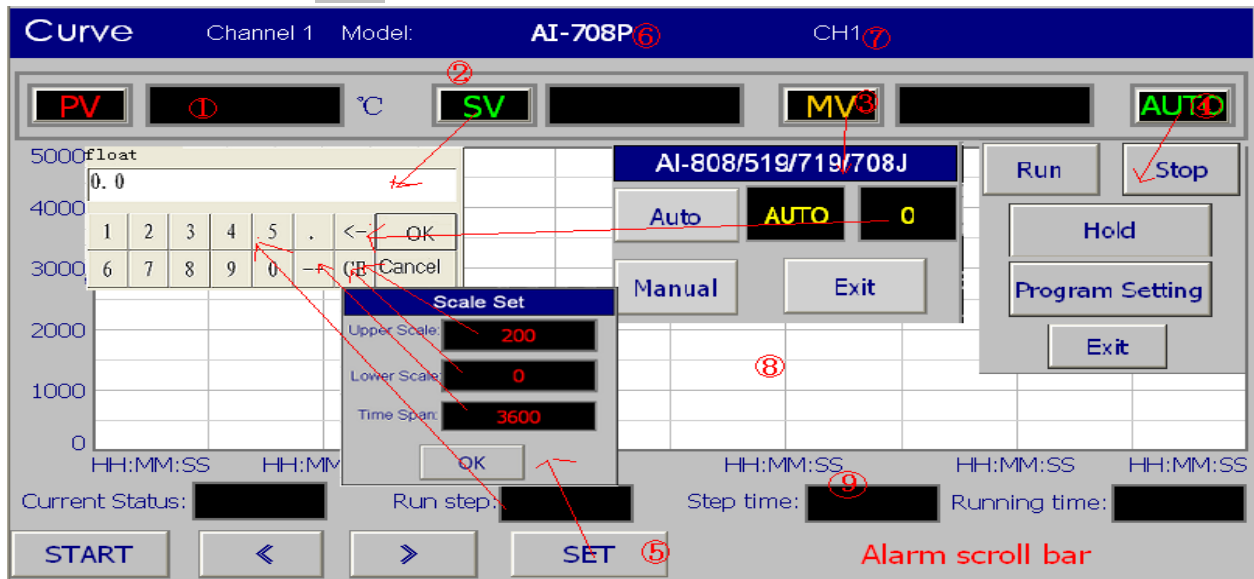
1. Instrument address: Addr from 1 ~ 36. Any address out of this ranges is not read by paperless recorder.
2. Input specification: SN or INP
3. **ATTENTION!** All input scale “dIH/SCH” and “dIL/SCL” must be set according to input specification to ensure the curve showing on the panel is in the middle of the screen.
E5/D5 sized instrument required external keypad E8 to set the address (Addr 1~36) and BAUD rate.

3.5 Panel Operation

Press **Panel** to show full screen overview.



Press **PV** textbox to show **Curve** page. (Only available for 6 or less channels software)



- ① Measurement value PV. The unit is shown on its right.
- ② Setpoint SV. (This can be ignored for indicator such as AI – 501/701/702M). If the instrument is chosen as a controller without program function such as AI-518/708/808. Press this area to pop up the number input window to enter SV value.

③ Output power percentage MV (This can be ignored for indicator such as AI—501/701/702M). If an instrument with manual control such as AI-808/808P/519/719/708J is chosen, a window will pop up for user to select auto/manual. In manual mode, user can input the output percentage directly.

④ Control status of control (AUTO or Manual). If the instrument is chosen as a programmable controller. Press here to pop up a sub-window. Press **RUN** to start the controller program, **STOP** to stop the program, **HOLD** to make the controller pause during running. Press **Program Setting** to pop up program setting window on the right. The program step number are from C01~C50.*

⑤ Press **SET** to “Scale Set” window. The maximum and minimum scale and time span of the curve can be edited.

⑥ Instrument model.

⑦ Channel title. It can be changed in **Instrument settings** page.

⑧ Curve of measurement value PV and setpoint SV.

⑨ If the instrument is chosen as a programmable controller, the remaining time of current program step will be showing. Press this area to edit step number (Range from C01~50). No digit is shown here if it is not a programmable controller.

Alarm scroll bar: Alarm Message. If there is a alarm, there will be a text such as “Value1 High Alarm” rolling.

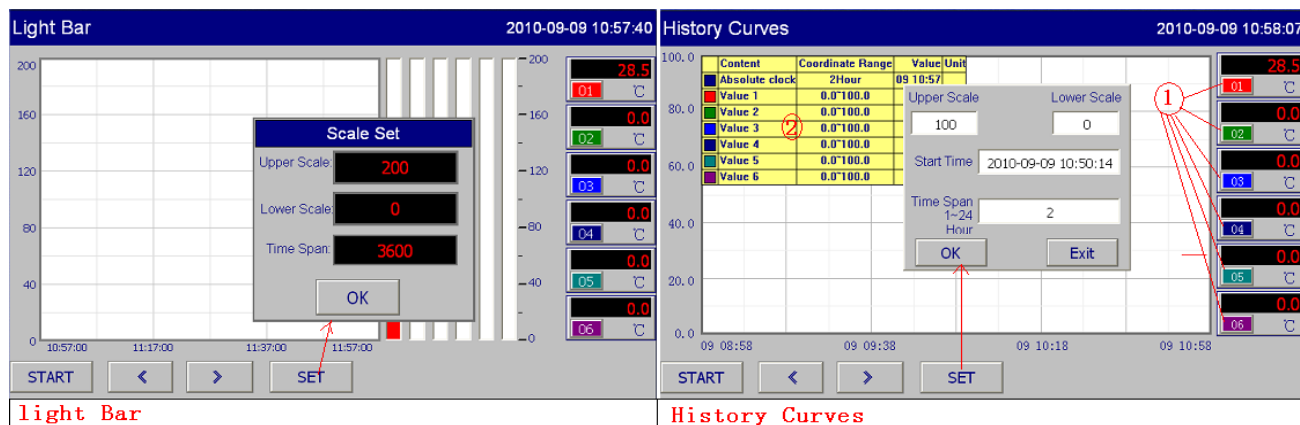
Press **⟨** or **⟩** to go to previous channel and next channel respectively.

*** Step number will be limited to C01~C30 if the instrument version is V8.0 earlier.**

3.6 Light Bar / History Curve

In the page of **Light Bar** and **History Curves**, channel 1 ~ 6 are fixed as a group and data are shown in graph to show the changes. Press **SET** to edit the curve scale, i.e. upper limit and lower limit of the scale.

The time duration can be set in **Light Bar**, as the same as **Curve**. In the **History Curves** page, the beginning time of query can also be set.



① In **History Curves** page, press the channel tag to hide the corresponding line. For example, press **1** to turn background from red to grey. Then line one will be hidden. Press it again to resume normal. The same function applies to line 2 ~6

② Curve Legend. It tells the data on a specific time on each curve.

3.7 Data Report / Alarm Content / Query Print **

Data Report: Browser historical data. Press **SET** to enter the query time period

Alarm Content: Alarm message and time when it occurs. Press **>>** to enter the historical alarm query.

The query method is the same as **Data Report**.

Report								Alarm Content						
2010-09-09 10:58:48								2010-09-09 10:59:07						
S/N	Time	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Date	Time	Object	Alarm Type	Value	Limit	Description
1	2010-09-09 10:51:14	28.5	0.0	0.0	0.0	0.0	0.0							
2	2010-09-09 10:52:14	28.5	0.0	0.0	0.0	0.0	0.0							
3	2010-09-09 10:53:14	28.5	0.0	0.0	0.0	0.0	0.0							
4	2010-09-09 10:54:14	28.5	0.0	0.0	0.0	0.0	0.0							
5	2010-09-09 10:55:14	28.5	0.0	0.0	0.0	0.0	0.0							
6	2010-09-09 10:56:14	28.5	0.0	0.0	0.0	0.0	0.0							
7	2010-09-09 10:57:14	28.5	0.0	0.0	0.0	0.0	0.0							
8	2010-09-09 10:58:14	28.5	0.0	0.0	0.0	0.0	0.0							

Scale Set

Start Time: 2010-09-09 10:50:14

End Time: 2010-09-09 10:58:30

OK

START

<

>

SET

START

<

>

SET

Data Report

Alarm Content

**** Optional micro-printer required.**

3.8 Data Processing

AI-Paperless recorder has internal 90MB memory to store process data from all the channels. A 2GB USB thumbdrive is bundled for data storage. Compulsory manual export is enabled. The thumbdrive supports **hot-plugged**.

The data is in CSV format and opened by EXCEL in a PC. The data reports are saved according to year/month/day/hour. In **Export Data** page the query start and end time can be set. Press **Manual Export** to export the data report instantly to the USB thumbdrive.

Export Data

2010-09-09 11:00:09

Manual Export

Start Time: 2010-09-09 10:50:14

Data Record Interval: 60000ms

Free Memory Space

User Defined Filename: 0

97963.8MB

End Time: 2010-09-09 10:59:58

0

Manual Export

Progress Error Code:1.File cannot be written to the USB drive

Check USB Connection

4.File Operation Error

START

<

>

FUNC

Chapter 4 Order Code

Code Position	AI-2070S/C/2010C						Description
1	AI-2070S/C						7" true-color TFT touch screen
	AI-2010C						10.4" true-color TFT touch screen
2	Communication	1					1 x RS232 / 1 x RS485 serial COM Port
3	Number of channels		?				Select 02, 04, 06, 08, 12, 16, 18, 20, 22, 30, 32 or 36 channel Type-C includes flow chart, 4 x totalizers AI-708H/808H and 1 x power meter AI-601
4	2070S/C with USB thumbdrive			002G			Including 2GB USB thumbdrive, default
	2010C with USB thumbdrive			002G			Including 2GB USB thumbdrive, default
5	Power convertor				1		Power convertor, default
	Remark						Optional: micro-printer

E.g. AI-2070S Paperless Recorder ① ② ③ ④ ⑤ ⑥

This code refers to a ① AI-2070S paperless recorder with ② 2 x RS232/RS485 serial COM port. Its software is ③ 12 channel. The external memory is ④ 2GB USB thumbdrive. The ⑤ power convertor is included. The optional micro-printer is also included.

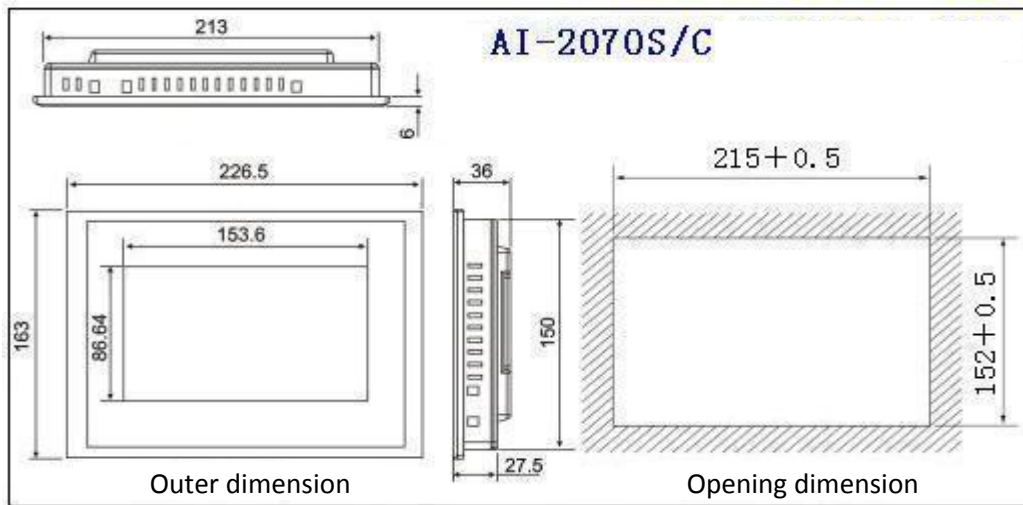
Warranty of AI-Paperless Recorder: 12 months

Chapter 5 Product Dimension

5.1 AI-2070S/C Paperless Recorder

Outer dimension: 226.5W × 163H × 36.4D mm

Opening dimension: 215+0.5W × 152+0.5H mm

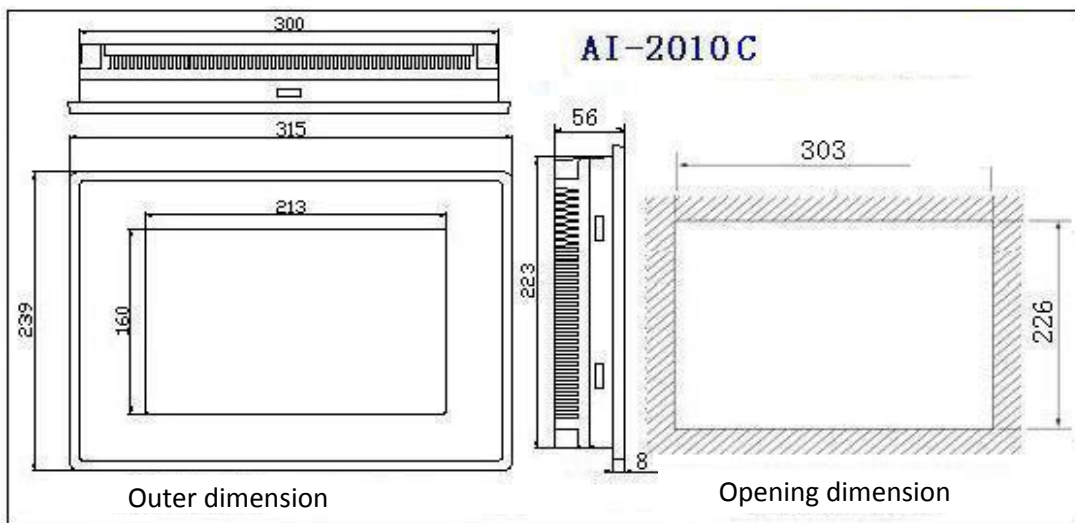


7" Screen installation diagram

5.2 AI-2010C Paperless Recorder

Outer dimension: 315W × 239H × 56D mm

Opening dimension: 303W × 226H mm



10.4" Screen installation diagram

5.3 Installation Note

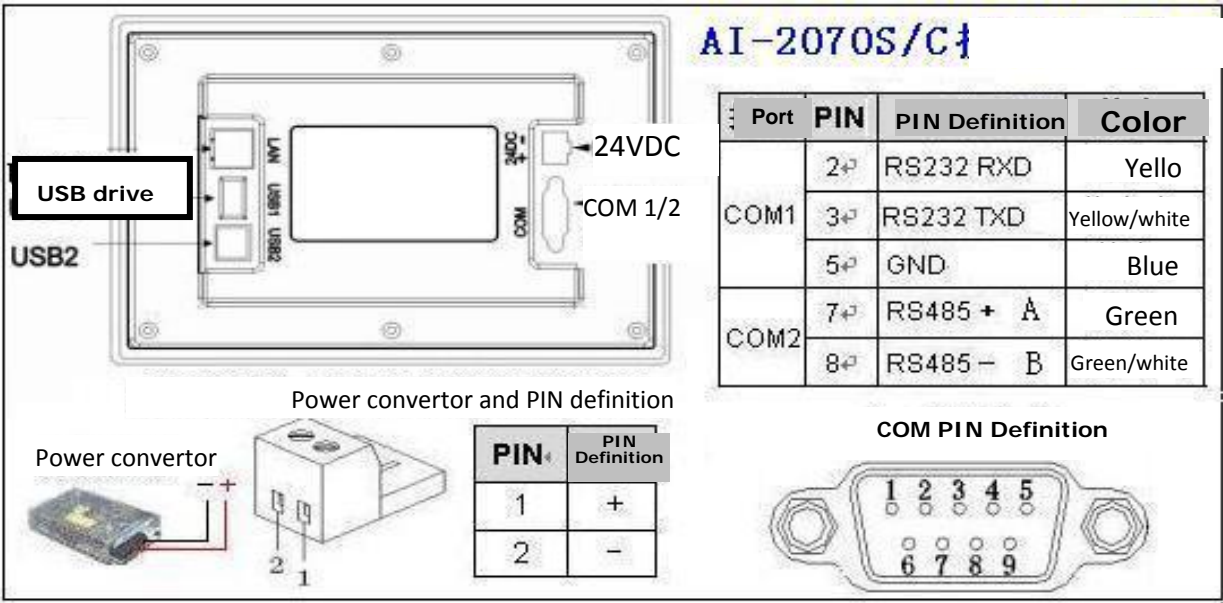
- Installation direction must be followed otherwise it will cause damage.
- Ensure there is adequate space surround the product for ventilation.
- Used on Type 4X indoor casing surface.

5.4 Installation Step

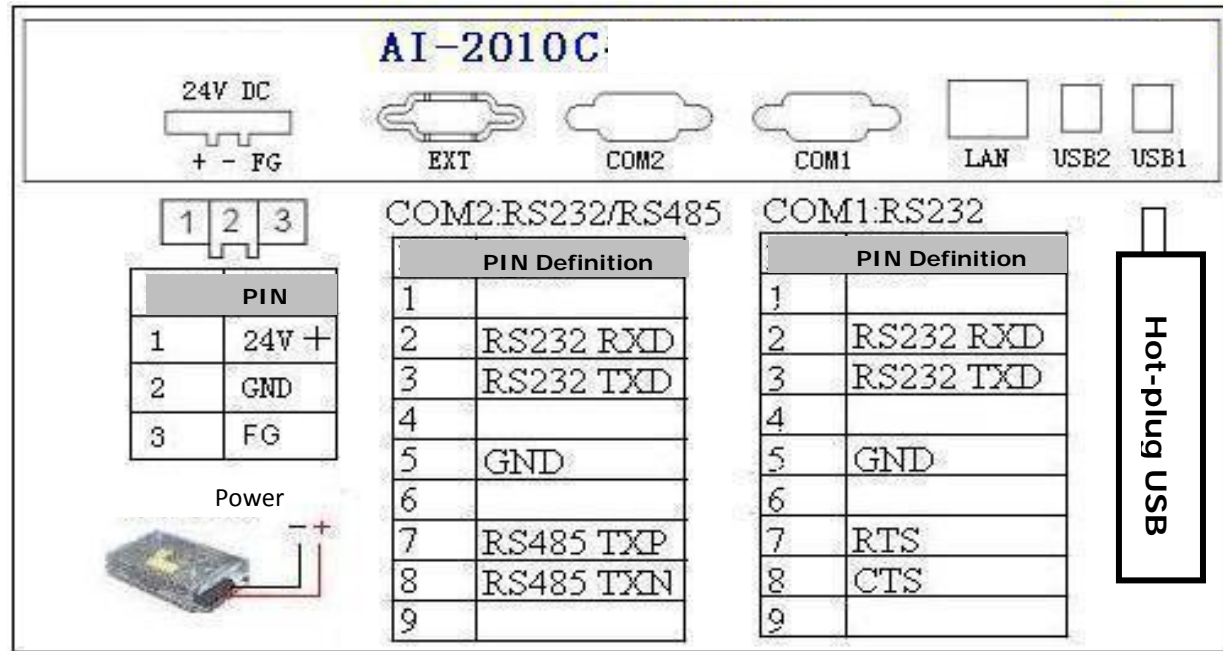
- Ensure the water-proof rubber ring is embedded during installation.
- Ensure there are fixture metal pieces, with proper orientation.
- Screw tight with suitable torque force (6.17lb-inch / 0.7N-M) otherwise it will cause damage to plastic case.

Chapter 6 Parts and Functions

6.1 AI-2070S/C



6.2 AI-2010C



Chapter 7 Accessories

Number	Accessory	Quantity
1	7" or 10.4" touch screen	1 unit
2	2GB USB thumbdrive	1 piece
3	Power convertor 24VDC	1 piece
4	COM1 RS485 communication wire to instrument	1 piece
5	Fixation metal pieces	4 pieces
6	Micro-printer (Optional)	unit

Chapter 8 Common Fault and Recommendation

Common faults usually are non-proper operation or incorrect parameter setting. In case of any error which cannot be handled, please record the error phenomenon and notify local agent or the factory.

<i>Fault Phenomenon</i>	<i>Possible Reason</i>	<i>Recommendation</i>
The product is not working after it is powered on.	1 · Bad contact of power wire 2 · Fused burnt 3 · Light tube burnt	1 · Check power source 2 · Change fuse 3 · Send back factory to repair
Communication interrupt	1 · Poor quality of wire 2 · Incorrect address or BAUD rate 3 · Broken wire or loose contact of COM1 4 · Incorrect connection of A/B wire 5 · COM port burnt	1 · Use CAT-5e shielded twisted pair. 2 · Address cannot be collided. Check BAUD rate. 3 · Check wire and contact 4 · Use another wire directly from instrument to panel to check 5 · Send back factory to repair
Data / Graph jumps abnormally	1 · Repeat addresses were set 2 · External interference 3 · Strong voltage high frequency interference	1 · Check address to avoid any collision and correctly set the instrument parameter 2 · Make sure the paperless recorder and power convertor is earthed and communication wire is shielded. 3 · Avoid putting communication wire close to strong voltage Make sure the interference source is earthed. Lowered the transformer load frequency. Do not shared the neutral and earth. In case of severe high power high frequency interference, install power isolator or add power filter.
No data record	1 · USB drive is not plug properly 2 · Instrument Setting is not well configured.	1 · Remove and plug again. 2 · Check Instrument Setting
Abnormal printing	1 · Not proper connection of printer 2 · Too frequent printing action	1 · Check the printer connection 2 · Shut down and power on the printer. Start to use after 5 minutes.