Kanban Reader

RFID System

Model 4S2VR-V720-KR11 ☐ Series

Operation Manual

Omron Corporation

Extensive Area Sales Department

Information Product Section

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<Record of Manual Revision>

Jan. 9, 2004	Chapter 1	1-2	Rewriting of example of use
	Chapter 2	2-1	Revision of Hoshiden connector type
	Chapter 3	3-1	Addition of description of indicator function
	Chapter 4	4-1	Revision on time chart
Jan. 13, 2004	Chapter 1	1-2	Rewriting of example of use
	Chapter 3	3-1	Revision on system configuration
April 1, 2004	Chapter 2	2-1	Revision on mounting hole
	Chapter 4	4-5	Addition of Note
		4-7	Addition of Note
	Chapter 5	5-2	Correction of description of ADR number in ASCII
April 14, 2004	Chapter 2	2-4	Addition of omitted communication conditions
June 9, 2004	Chapter 2	2-6	Addition of specification of connecting cable
June 28, 2004	Chapter 1	1-2	Rewriting of example of use
	Chapter 2	2-1	Addition of outside layout diagram
		2-5	Addition of dimensional outline drawing
	Chapter 3	3-2	Revision on layout of communication area diagram
	Chapter 6	6-4	Addition of omitted description of mutual interference condition
June 30, 2004	P.13	P.17	Revision of typographical errors
July 2, 2004	Chapter 2	2-5	Revision and addition of dimensional outline drawing
July 7, 2004	Chapter 2	2-1	Revision of parts description
		2-6-2	Revision of note of cable diagram
July 13, 2004	Chapter 2		Change of item name
July 28, 2004	Chapter 2	2-6-4	Addition of description of shield wire processing
Nov. 10, 2004	Chapter 2	2-2	Revision of general specification, specification, ambient temperature

Introduction

Thank you very much for purchasing our Kanban Reader Model 4S2VR-V720-KR11 ☐ Series.
Model 4S2VR-V720-KR11 ☐ Series is a product developed with advanced technology and accumulated experiences of Omron.
This Operation Manual includes important information on functions, performance and operating method required for using Model 4S2VR-V720-KR11 ☐ Series.

In operating Model 4S2VR-V720-KR11 ☐ Series, observe the following instructions.

- Read and understand this Operation Manual before starting operation.
- Save this Manual with care for future reference.

Notes to Users

When this product is used in the following conditions and environment, care should be used to take safety measures such as failsafe provision and use with sufficient allowance in rating and performance, and contact sales personnel of Omron to assure safe and proper operation.

1. Use of the product in conditions and environment not specified in the Operation Manual.
2. Use of the product with equipment for nuclear control, railroad, aviation, vehicle, fuel system, medical equipment, entertainment devices and safety equipment
3. Use of the product for application which may have a major impact on a human life and property, and application requiring special safety.

For Safe Operation

Be sure to observe the following instructions to assure safety.

1. Do not use the product in the presence of inflammable, explosive and corrosive gas.
2. Do not attempt to disassemble, repair or remodel the product.
3. Tighten the base securing screws and terminal screws securely.
4. Use crimping terminals of the specified size for wiring.
5. Make sure that a cable or the like having a lock mechanism is securely locked before operation.
6. Ensure that the DC power supply unit meets the following requirements.
   1) It should be exclusively used for 4S2VR V720-KR11 and not be connected to other machines and equipment.
   2) The power supply meets the rating of supply voltage (within 5V±5% DC).
7. Observe warnings, cautions and notes included in this manual.

Correct Way to Use

1. Avoid the following places in installing Model 4S2VR V720-KR11☐.
   - Place subjected to direct sunlight
   - Place subjected to high humidity and dew condensation
   - Place where the main body of the device is subjected to direct vibration and impacts.
2. Prior checking on operating environment
   This product uses the frequency band of 13.56MHz and make communications with the tag. The frequency band of 13.56MHz is also used for the ISM band (One of frequencies assigned to medical equipment and

industrial heating devices: Generally an application for approval is required before installation). Consequently, if such equipment is present nearby, communication with the tag may be affected and the tag may be damaged. In case that this product is used near such equipment, check the effects of such equipment in advance.
Observe the following instructions so as to minimize the effects of general noises.

- Connect metallic bodies located around this product to Class D grounding (Class 3 grounding).
- Do not install wiring close to high voltage and heavy current.

Contents

Chapter 1 Overview of Equipment

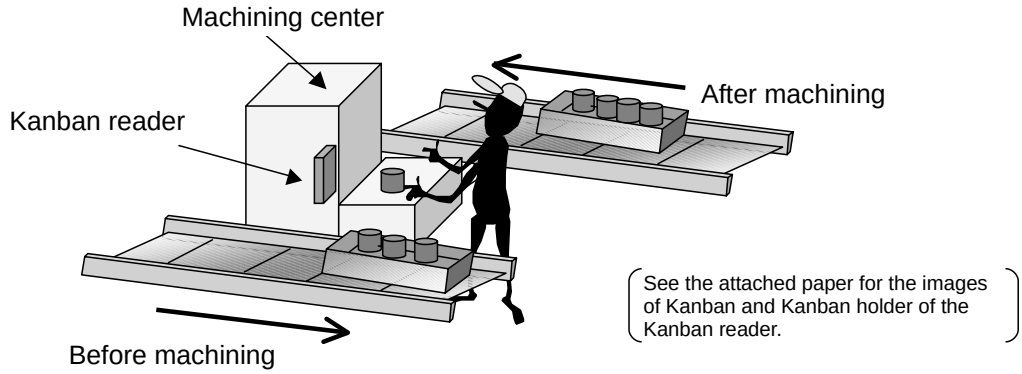
1-1 Features

1. Model 4S2VR-V720-KR11 ☐ allows communication with the tag Model 4S2VR-V720-D13P series (Omron) which uses Philips' Model SL2ICS20 (known as "I-CODE II").
2. For use with a tag in conformity with ISO15693 standard made by other manufacturer, check on communication range and others before use.
3. Since Model 4S2VR-V720-KR11 ☐ clearly displays responses, it allows checking on the operation of interfaces with an operator. As a result, this reader is less prone to errors.
4. When Model 4S2VR-V720-KR11 ☐ is controlled by the host, up to 16 readers (4S2VR-V720-KR11 ☐) can be connected.

1-2 Example of Use of Kanban Reader

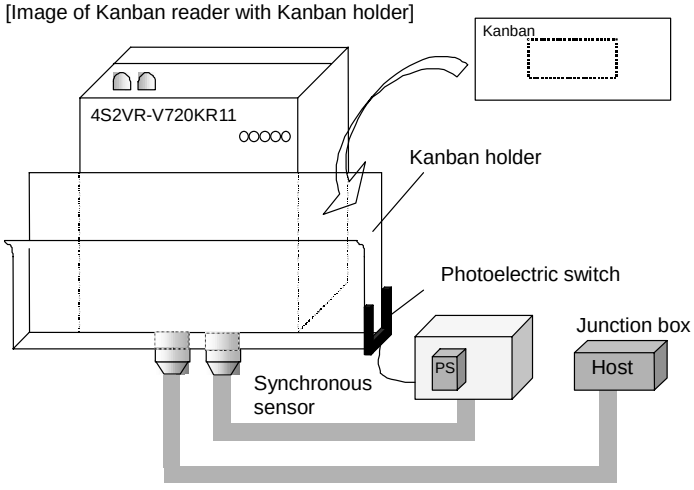
Kanban reader Model 4S2VR-V720-KR11 □ is developed for interfacing between man and equipment for a situation in which reading and writing operation is performed mainly with a device like a Kanban held in a hand. Since a laminate tag significantly varies in communication distance, a close examination should be made when this reader is used in fixed installation.

1. Example of recording information associated with manufacturing (Process equipment number, operator information, time, etc.) in carrying out manufacturing based on Kanban in the manufacturing process.

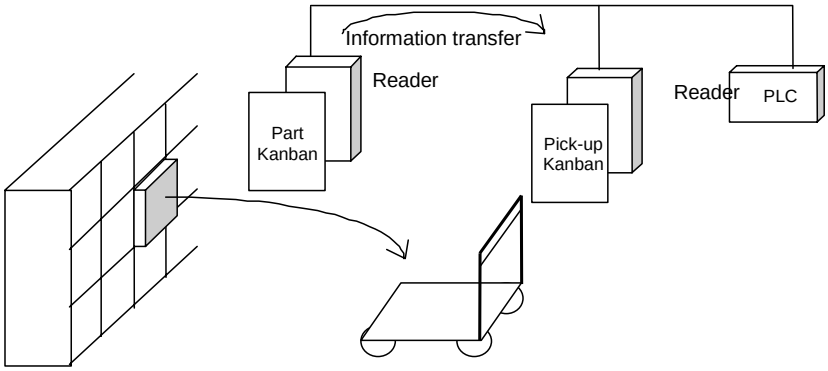


1. When parts to be machined arrive, an operator inserts the work instruction Kanban accompanying the parts into the Kanban holder.
2. The operator does machining of the part and puts the finished part into the machined part box.
3. Write information associated with the machining on the Kanban (Serial No., equipment No., required time, person in charge, etc. Additional information such as completed quantity may be included.)
4. When all the machining is complete, withdraw the Kanban from the Kanban holder, and attach it on the case after machining and send it to the next process.

[Image of Kanban reader with Kanban holder]



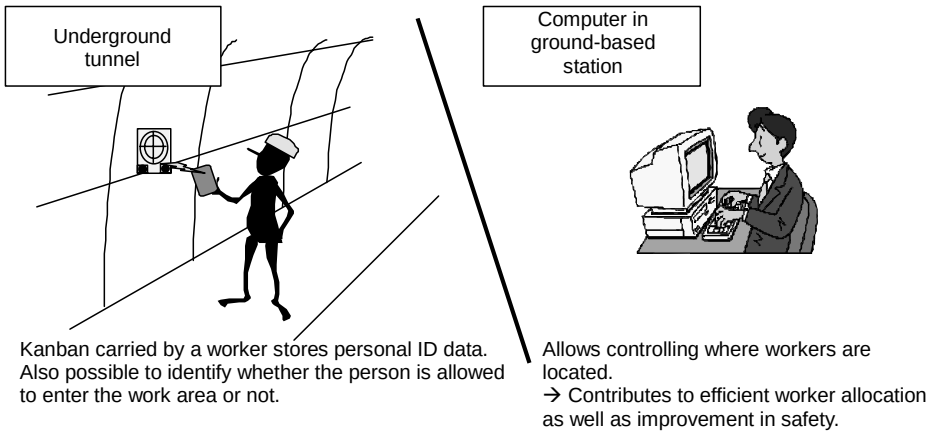
2. When an operator in charge of allocating parts on the assembly line of the plant tries to transfer the prior process information unique to the part to the pick-up Kanban, the operator inserts the pick-up Kanban into the holder. Then the pick-up Kanban shows the operator the presence of the part specified by the pick-up Kanban. When the part Kanban is inserted into other holder, its information is transferred to the pick-up Kanban.



3. Use as a security card or open-close control of gate and door for controlling of entry and exit of people and vehicles to a controlled area

In this case the card is used as an ID card not as a Kanban.

A Kanban reader is installed for each work section. A person has a Kanban storing personal data and has the data read by the Kanban reader. A computer in a ground-based station controls the presence and destination of persons.

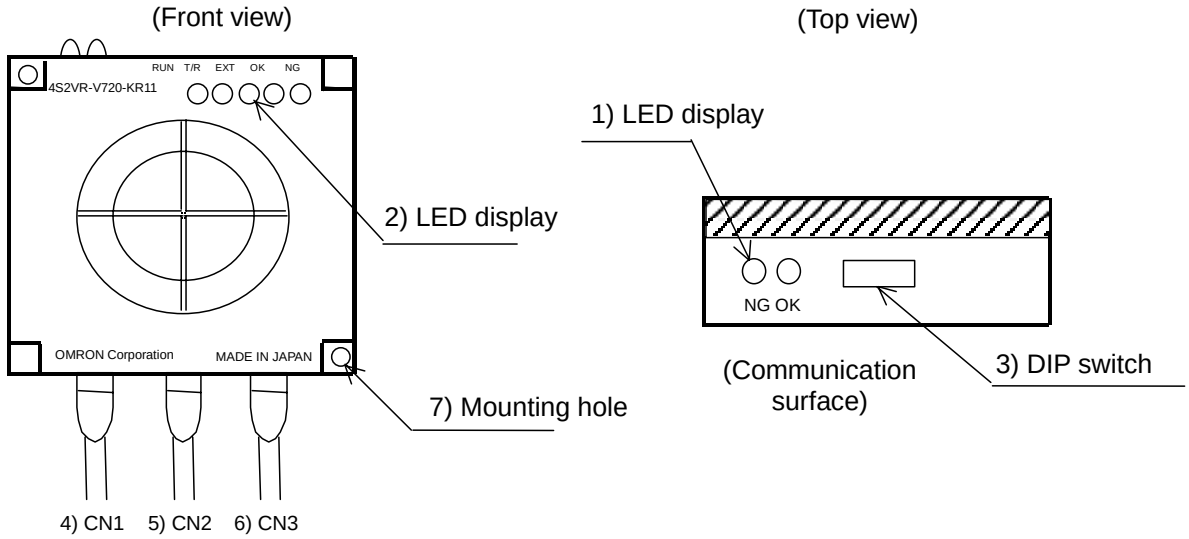


4. Use as a tag for collecting information of work progress
   When an ID tag is incorporated in a Kanban attached to key parts running on the production process, information can be received and transferred for each process as needed.
   At the start of the work, a part Kanban is taken out from the part box and inserted into the Kanban holder of the Kanban reader. Whe the work is complete, the Kanban is pulled out from the Kanban holder and returned to the part box as a part Kanban. Information is written in the Kanban tag on the time when the Kanban was inserted into the Kanban holder and removed from the Kanban holder as well as the number of finished parts in each process. By performing these operations in all processes, the Kanban collects work records and man-hour records in all the processes.

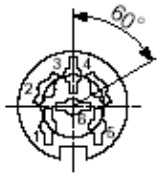
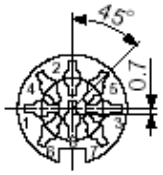
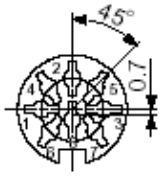
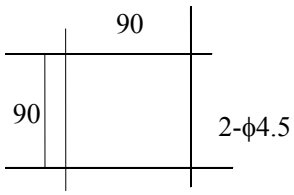
5. Use as a barcode reader
   - The barcode of a Kanban does not provide reliable reading performance due to smudges on a case.
   - In case of a colored kanban, the contrast is low for a barcode reader, thereby resulting in unreliable reading.
   - There are a number of problems in reading a barcode on the Kanban including difficulties in setting a common standard for positioning of a barcode due to various sizes and shapes of a Kanban. A Kanban incorporating a tag is free from these problems.

Chapter 2 Specifications

2-1 Part Names and Functions



	Name	Function	Description
1)	LED display	OK/NG judgment display	NG (Red)/ OK (Green)
2)	LED display	Operation display	NG (Red) judgment: No Good OK (Green) judgment: OK EXT (Yellow) external synchronization input T/R (Orange) antenna in operation RUN (Green) power display
3)	DIP switch	8 7 6 5 4 3 2 1 ON OFF Address (BIN setup 1: LSB 4: MSB) System reserved (Normally OFF) BIT 7/6 = OFF/ON: RS232C = ON/OFF: RS422 Do not turn on both switches concurrently. Setup of RS422 end station Turn on the reader on the extreme end alone.	Note 4

4)	CN1	Connector for indicator 6P Hoshiden type TCP1366-71-5011  	For connection with indicator (option) 1 TXD 2 RXD 3 SG 4 CLK 5 STB 6 KEY (Connector for display) Notes 4 and 5
5)	CN2	Connector for host connection 8P Hoshiden type TCP1386-71-5011  Note 1	RS232C/422 1 TXD 2 RXD RS232C 3 SG 4 SD+ 5 SD- RS422 6 RD+ 7 RD- 8 NC
6)	CN3	I/O connector 8P Hoshiden type TCP1386-71-5011  Note 1	Power /Synchronizing input /Judgment output 1 VIN···5V 2 GND···0V 3 NC 4 EXTIN···Trigger input 5 COM+ 6 OK 7 NG 8 COM- Note 2
7)	Mounting hole	ϕ4.5 × 2	Machining diagram of mounting hole 

Note 1: CN2 and CN3 are same connectors. Use caution not to plug1in mistakenly.

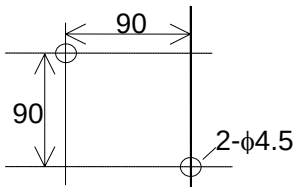
Note 2: See "2-4 External I/O Circuit".

Note 3: Plug connectors of CN1, 2 and 3 are supplied with the product.

Note 4: Seal the DIP switches with the supplied seal after the completion of the initial setup.

Note 5: The indicator is an optional accessory. When the indicator is not used, seal the connector for the indicator with the supplied seal.

2-2 General Specifications

Item	Specifications
Supply voltage	5V±5% (S82K-00705 recommended)*
Consumption current	0.15A
Working ambient temperature	-10 - 55°C
Storage ambient temperature	-25 - +65°C
Working ambient humidity	Working ambient humidity: 25%RH - 85%RH (non-condensing)
Communication frequency	13.56MHz
Weight	Approx. 300g
Radio standards	Extremely low power radio station (Radio Law, Article 4, Clause 1 "Radio station emitting extremely low power radio waves specified by the Posts and Telecommunications Ministry Ordinance"): Electric field intensity of 500μV/m or less (322MHz or less) at distance of 3m stipulated in the Enforcement Regulation of Radio Law Article 6, Clause 1
Outline dimensions	W100 × H100 × D40
Installation	

* Attention should be paid to the voltage drop and noises for the supply power cable. Do not extend the power cable to longer than 3 m.

2-3 Performance Specifications

Item	Specifications
Communication function	Trigger: Communications are made at the time that a command is issued. Auto: When a command is issued anticipating the approach of the tag, communication is executed waiting for the approach of a tag. Continue: When a command is issued, communications with the tag are repeated until a stop command is received. Write-protect function: Write-protect setting on the tag can be made. However, once this setting is made, it cannot be cancelled.
I/O function	Judgment output: Output of communication result Output of judgment of host Remote synchronization input EXT
Display function (In planning stage)	Fluorescent display output, 20 digits, 2 lines Display of command response

Caution!

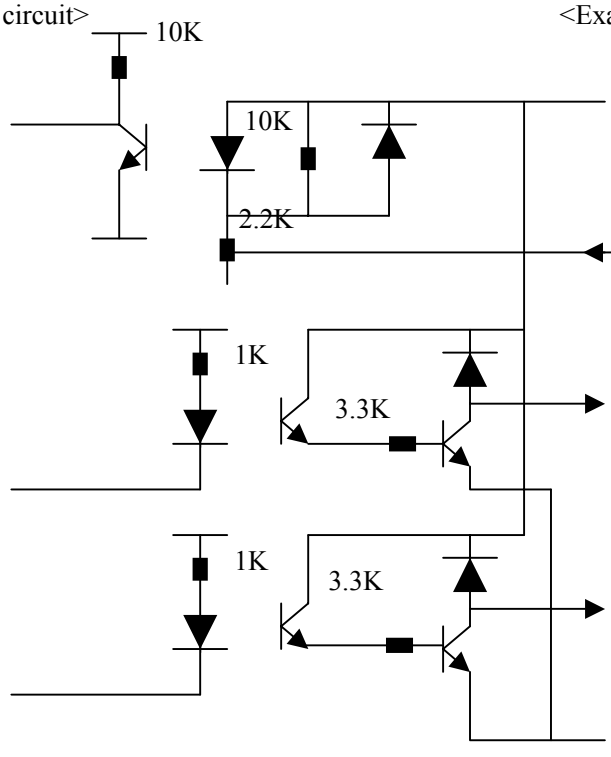
As a general rule, reading and writing operation of Kanban information by the Kanban reader should be performed for each Kanban.
When communication is executed with more than one Kanban present within the communication area, a communication is made with one of the tags or no communication is made at all, causing a tag absence error and resulting in incorrect information collection.

2-4 Interface Specifications (RS232C/RS422: To be switched)

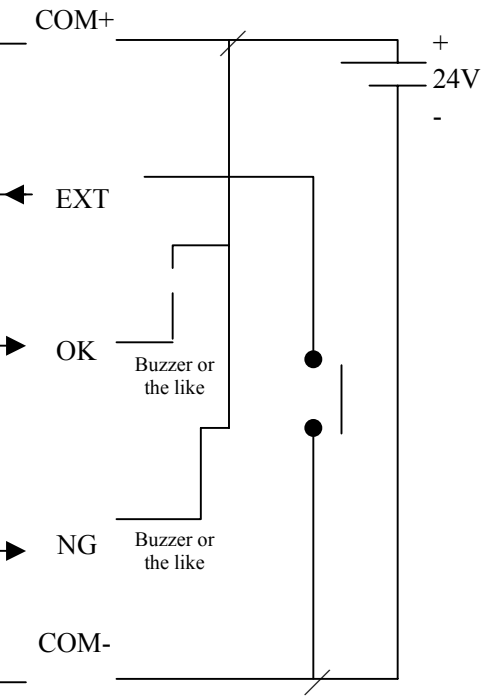
	RS232C	RS422
Transmission rate	9600bps	9600bps
Data length	8 bit	8 bit
Stop bit	1 bit	1 bit
Synchro system	Asynchronous mode	Asynchronous mode
Transmission code	ASCII	ASCII
Maximum number of connectable controllers	1	16
Error control	Parity (Even number)	Parity (Even number)
Line length	Max 15 m	Max 1000 m
Compatible connector	TCP1386-71-5011 (Hoshiden)	TCP1386-71-5011 (Hoshiden)

Host communication	Compatible connector	TCP1386-71-5011 (Hoshiden)	TCP1386-71-5011 (Hoshiden)
	Communication method	Two-wire system, half-duplex serial	Half-duplex serial
	Synchro system	Asynchronous mode	Asynchronous mode
	Communication control method	CR control	CR control
I/O output	Compatible connector	TCP1386-71-5011 (Hoshiden)	
	Power supply		
	EXT		
	OK		
	NG	TCP1366-71-5011 (Hoshiden)	
Out put			

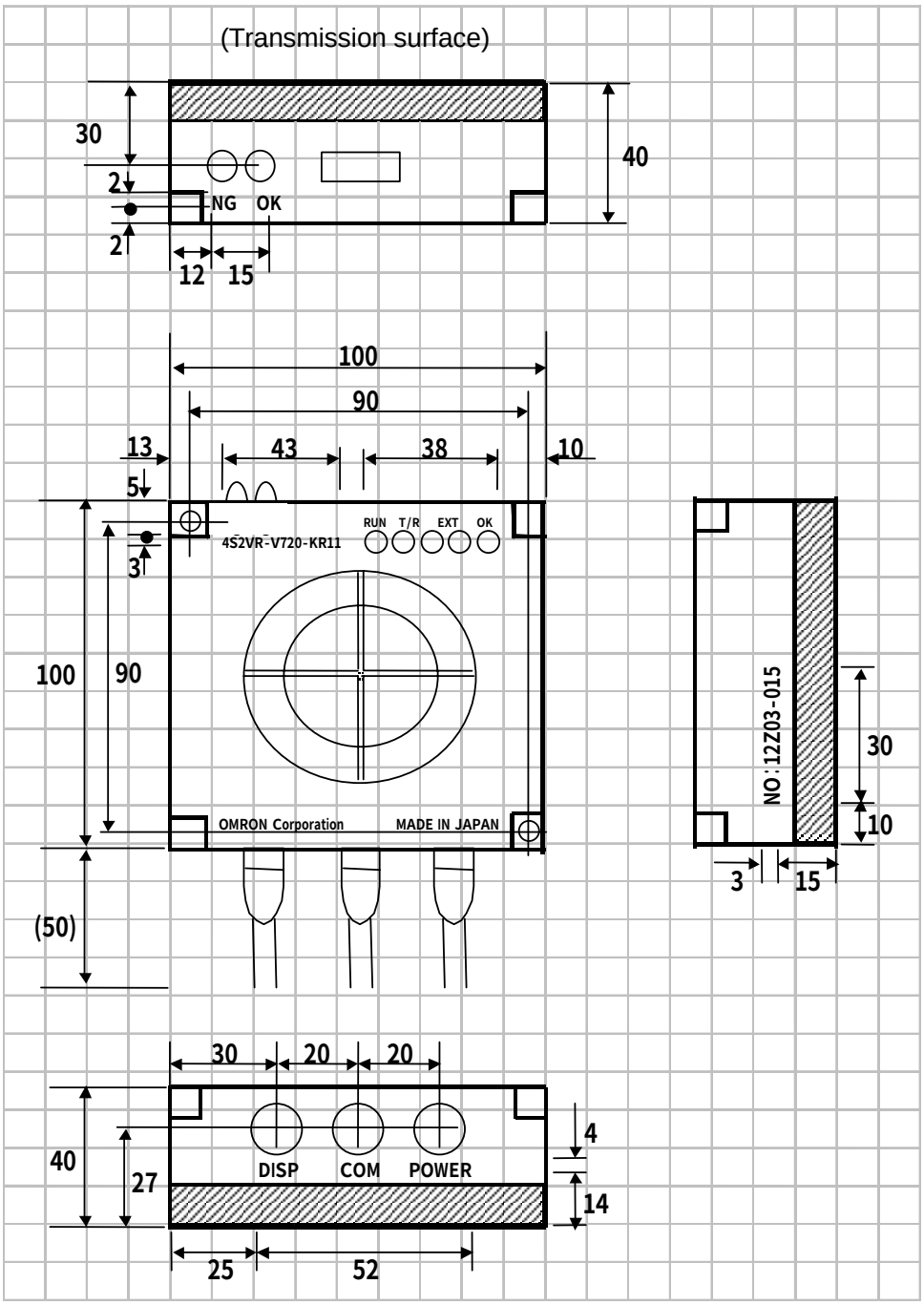
<External I/O circuit>



<Example of external I/O circuit>



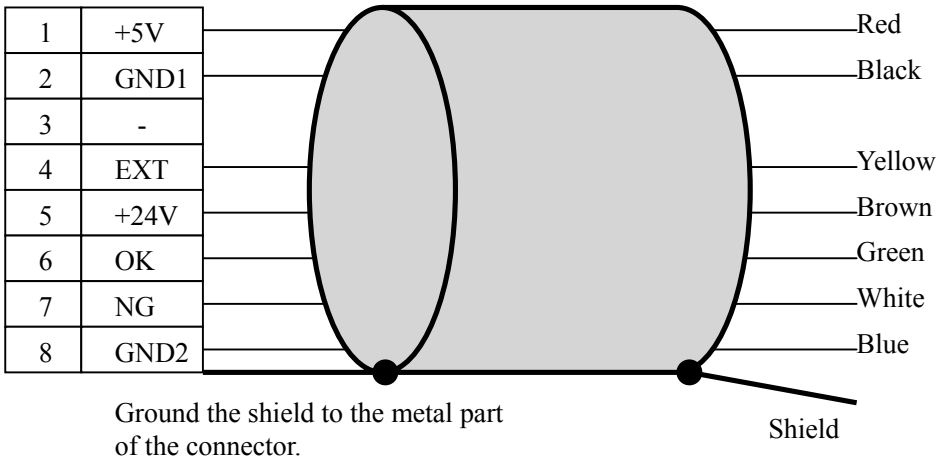
2-5 Dimensional Outline Drawing



2-6 Cable Connection Diagram

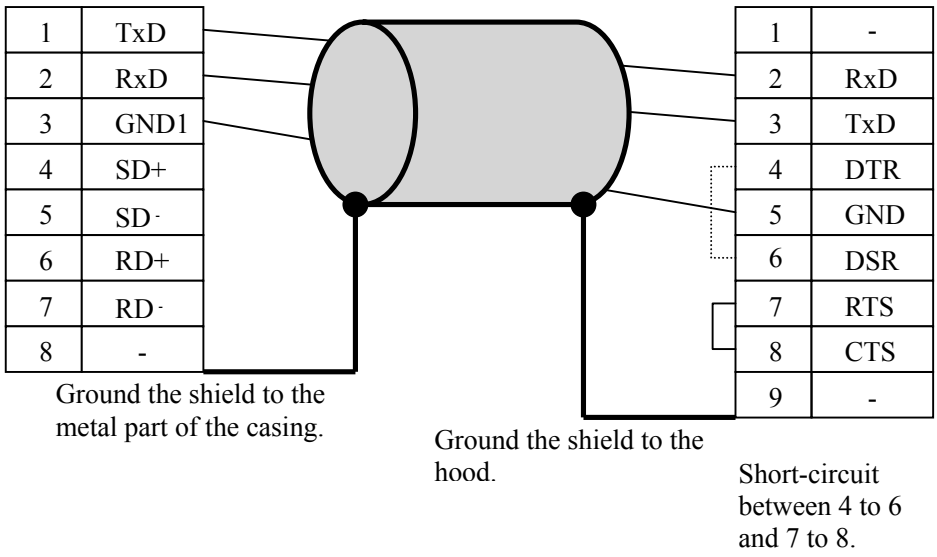
2-6-1 Power cable Model 4S2VR-V720-KRA10

TCP1386-71-5011 (Hoshiden)



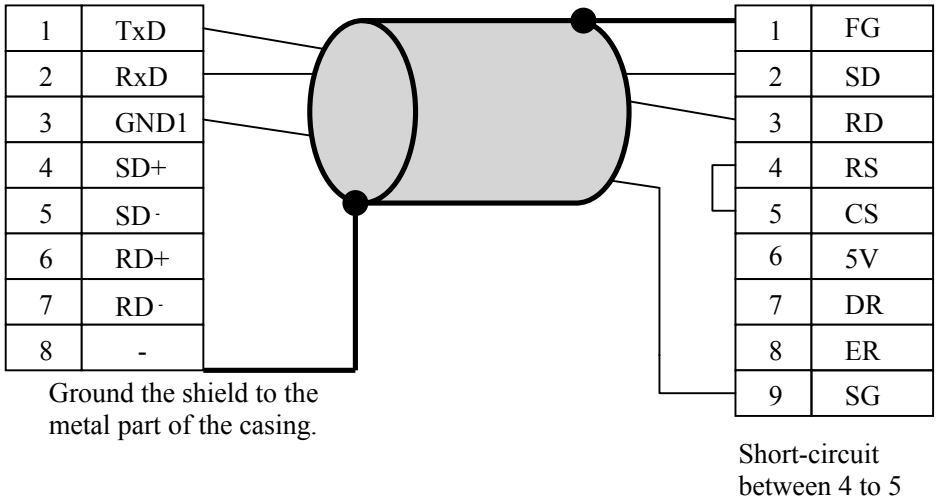
2-6-2 RC-232 cable (For PC), Model 4S2VR-V720-KRA21

TCP1386-71-5011 (Hoshiden)



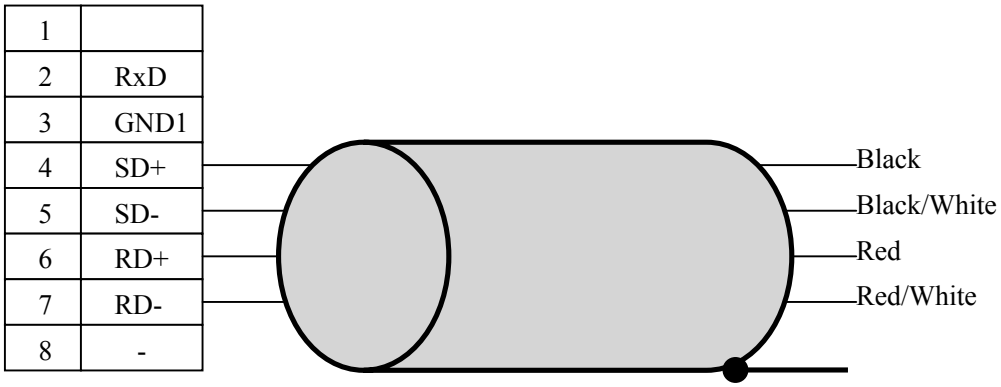
2-6-3 RC-232C cable (For PLC), Model 4S2VR-V720-KRA41

TCP1386-71-5011 (Hoshiden)



2-6-4 RS-422 cable, Model 4S2VR-V720-KRA31

TCP1386-71-5011 (Hoshiden)



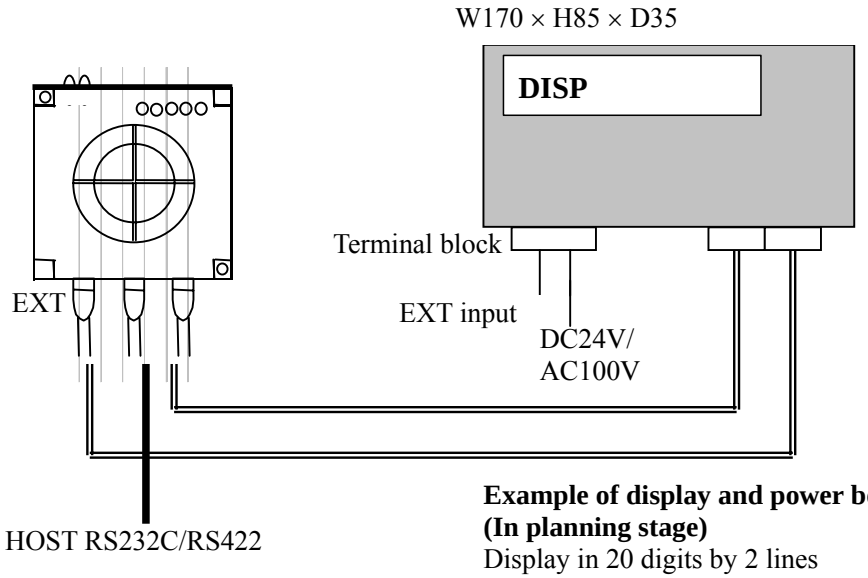
Note 1: Use a pair cable with the (+) and (-) ends of SD and RD paired, respectively.

Note 2: The shield line is not grounded on the Kanban reader side (Model 4S2VR-V720-KR11). Please ground the shield line on your side.

Chapter 3 Performance

3-1 System Configuration

1. Example of configuration (Basic configuration)



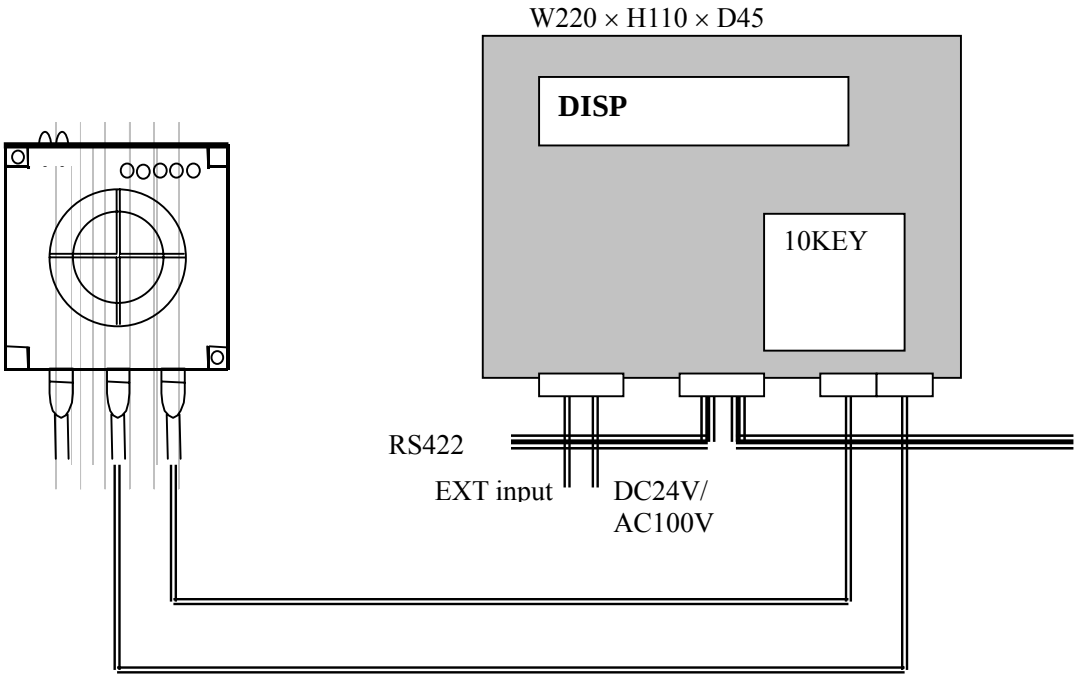
Example of display and power box
(In planning stage)
Display in 20 digits by 2 lines
Built-in reader power and display power
Built-in OK/NG buzzer
Calendar, clock and log functions are not provided

1) A command response is displayed.

C:
R:

2) When information of the Kanban is shown to an operator
3) When the host presents the wok information to an operator based on Kanban data

2. Example of configuration (In case of 1 = n connection)



Example of display and power box (In planning stage)
Built-in CPU board, built-in calendar clock function, built-in data collection memory
Built-in reader power supply and display power supply, built-in OK/NG buzzer

1) The error log of the Kanban reader can be used for maintenance.
2) The same display as shown in the previous section can be presented.
3) Information of numeric keypad can be added to Kanban data to send it up to the host.
4) When the reader reads Kanban information as an independent controller, information can be sent wirelessly to the host in real time
5) The reader can write the process information on the Kanban as an independent controller.

3-2 Maximum Communication Range

Reader	Tag	Communication range (mm)*
Model 4S2VR-V720-KR11 □ Series	Model 4S2VR-V720-D13P01S	5-20 mm, Axial displacement ±20 mm
	Model 4S2VR-V720-D13P01ST	5-20 mm, Axial displacement ±20 mm
	Model 4S2VR-V720-D13P30	5-20 mm, Axial displacement ±20 mm
	Model 4S2VR-V720-D13P02ST	5-15 mm, Axial displacement ±15 mm
	Model 4S2VR-V720-D13P06ST	5-15 mm, Axial displacement ±15 mm

* Place the tag in the communication range for communication and do synchronized reading by a synchronization sensor as much as practical.

* Kanban reader Model 4S2VR is developed for interfacing between man and equipment assuming a situation in which communications are made with a card-like tag held in a hand. Since the communication distance with a tag varies, a close examination should be made on the use of this reader in fixed installation.

<Communication range diagram between Kanban reader and tag>

The communication range diagram shown below is given for reference purpose (actual capacity). Use the Kanban reader within the distance of communication range specified above in actual operation.

Model 4S2VR-V720-KR11□ vs Model 4S2VR-V720-D13P01S/01ST/03