USB Communication Converter

COM-KG Instruction Manual

In order to achieve maximum performance and ensure proper operation of the instrument, carefully read all the instructions in this manual. Please place the manual in a convenient location for easy reference.

The manual can be downloaded from the official RKC website:
https://www.rkcinst.co.jp/english/download-center/

⚠ WARNING

RKC is not responsible if this instrument is repaired, modified or disassembled by other than factory-approved personnel. Malfunction may occur and warranty is void under these conditions.

⚠ CAUTION

● This product is intended for use with industrial machines, test and measuring equipment. (It is not designed for use with medical equipment and nuclear energy plant.)
● This is a Class A instrument. In a domestic environment, this instrument may cause radio interference, in which case the user may be required to take additional measures.
● All precautions described in this manual should be taken to avoid damage to the instrument or equipment. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
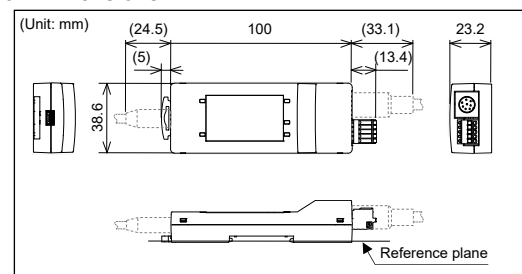
NOTICE

● This manual assumes that the reader has a fundamental knowledge of the principles of electricity, process control, computer technology and communications.
● The figures, diagrams and numeric values used in this manual are only for explanation purpose.
● RKC is not responsible for any damage or injury that is caused as a result of using this instrument, instrument failure or indirect damage.
● RKC is not responsible for any damage and/or injury resulting from the use of instruments made by imitating this instrument.
● Periodic maintenance is required for safe and proper operation of this instrument. Some components have a limited service life, or characteristics that change over time.

1. OUTLINE

The COM-KG is a USB communication converter for connection to USB communication and the following communication functions. Select a proper type of COM-KG according to your application.

· Loader communication: Communication between our controllers with a loader communication connector and the COM-KG.
· Serial communication (RS-485/RS-422A): Communication between our controllers with a serial communication function and the COM-KG.
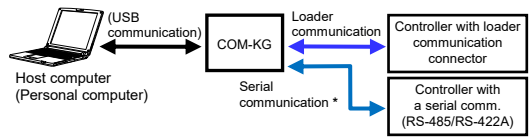
* When the COM-KG is used in the serial communication, the protect mode can be set to eliminate a response interruption of the COM-KG. Refer to **5. SETTING THE PROTECT MODE** for details.

📖 ● To establish the USB communication in Windows 7, you need to install our dedicated USB driver on your PC.
The USB driver can be downloaded from our website.
https://www.rkcinst.co.jp/english/download-center/
※ When installing the driver, a warning message may appear.
Continue the installation by ignoring the warning message.
● Communication in Windows 10 does not need a driver installation for the USB communication.

1.1 Product Check

Before using this product, check each of the following:
● Model code
● Check that all of the accessories delivered are complete.
● Check that there are no scratch or breakage in external appearance (case, terminal, etc).

Accessories
USB cable (1 m) 1
Instruction Manual (IMR01Z03-E1) 1

📖 If any of the products are missing, damaged, or if your manual is incomplete, please contact RKC sales office or the agent.

1.2 Model Code

COM−KG−□N
　　　　 (1)(2)

(1) Loader communication cable (Optional)
N: None
1: W-BV-01 (1.5 m) for Loader communication [1]
3: W-BV-03 (1.5 m) for Loader communication [2]
4: W-BV-05 (1.5 m) for Loader communication [3]

(2) N (fixed)

[1] For RZ100/400, FB100/400/900, RB100/400/500/700/900, SRZ, AG500/PG500
[2] For PF900/901
[3] For FZ110/400/900

The connector on the instrument side of the W-BV-05 cable is not USB-compatible. Do not connect this cable to any USB devices.

2. PARTS DESCRIPTION

Indication lamps
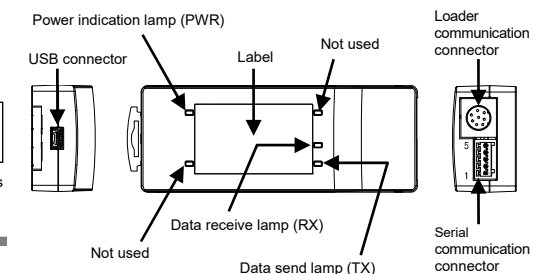
Indication lamp	Description
Power indication lamp (PWR) [Green]	● During serial/loader communication: When powered from USB cable: Constantly on ● In Maintenance mode: Flashing
Data send lamp (TX) [Green]	● During transmission over the serial communication (RS-485/RS-422A): Flashing ● During transmission over the loader communication: Flashing
Data receive lamp (RX) [Orange]	● During reception over the serial communication (RS-485/RS-422A): Flashing ● During reception over the loader communication: Flashing

3. MOUNTING

3.1 Mounting Cautions

(1) Use this instrument within the following environment conditions:
● Allowable ambient temperature: −10 to +55 °C
● Allowable ambient humidity: 5 to 95 %RH
(Absolute humidity: MAX. W. C 29.3 g/m³ dry air at 101.3 kPa)
● Installation environment conditions:
Indoor use
Altitude up to 2000 m
(2) Avoid the following conditions when selecting the mounting location:
● Rapid changes in ambient temperature which may cause condensation.
● Corrosive or inflammable gases.
● Direct vibration or shock to the mainframe.
● Water, oil, chemicals, vapor or steam splashes.
● Excessive dust, salt or iron particles.
● Excessive induction noise, static electricity, magnetic fields or noise.
● Direct air flow from an air conditioner.
● Exposure to direct sunlight.
● Excessive heat accumulation.
(3) Mounting consideration
● Install the module 200 mm away from the main power line.
● Ensure at least 50 mm space on top and bottom of the instrument for maintenance and operating environment.
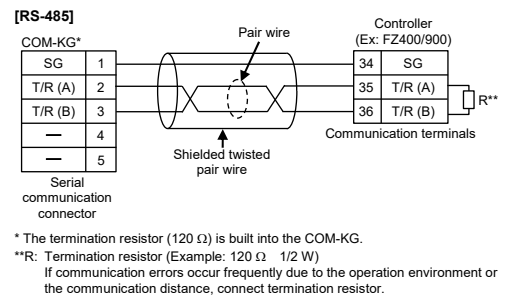
3.2 Dimensions

(Unit: mm)

3.3 DIN Rail Mounting and Removing

■ Mounting procedures

(A) Pull down　(B) Push　(C) Locked

■ Removal procedures

(A) Pull down　(B) Lift and take off

📖 Suitable for DIN-rail mounting and desktop use.

4. WIRING

⚠ WARNING

To prevent electric shock or instrument failure, turn off the power before connecting or disconnecting the instrument and peripheral equipment.

4.1 Wiring Cautions

● To avoid noise induction, keep communication signal wire away from instrument power line, load lines and power lines of other electric equipment.
● If the personal computer is easily affected by noise, use the ferrite core in the USB cable. For an installation position of a ferrite core, please refer to the following figure.

Ferrite core * (sold separately)

* Recommended ferrite core: ZCAT2032-0930 (TDK Corporation)
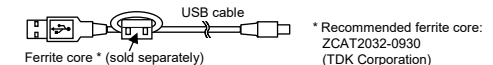
4.2 Wiring Connection to Establish a Loader Communication

Use USB cable and loader communication cable among the PC, the COM-KG and our controller with a loader communication. Make sure the connectors are oriented correctly when connecting.

■ Wiring example

📖 Consult with the communication instruction manual of our products for the communication setting on the PC and the device address for the loader communication.

📖 ● W-BV-01 or W-BV-05 loader communication cable
COM-KG can supply USB bus power to the controller whether or not it is powered on or off. (When connecting an RZ series controller, the controller must be powered on.)
W-BV-01: COM-KG starts supplying USB bus power to the controller two seconds after the cable is connected.
W-BV-05: COM-KG starts supplying USB bus power to the controller as soon as the cable is connected.
● W-BV-03 loader communication cable
Controller should be always ON to use with COM-KG.

📖 Display of controller (RKC product) being powered by COM-KG:

FB series, RB series etc.	Displays "----" at the PV/SV monitor display.
PF900/901	Lights all State monitor lamps: RESET, RUN, FIX, MAN, HOLD, STEP.SET and PTN.END. Other displays and lamps are OFF.
FZ series	Displays "LoAd" at the PV monitor display. Displays "-----" at the SV monitor display.

📖 The power supply function through the loader communication is not available on the USB hub (low power port).

4.3 Wiring Connection to Establish a Serial Communication

The shielded twisted pair wire must be provided by the customer.

■ Wiring example

Connector pin configuration and Signal details

Serial communication connector

[RS-485]

Pin No.	Signal name	Symbol
5 *	Unused	—
4 *	Unused	—
3	Send data/ Receive data	T/R (B)
2	Send data/ Receive data	T/R (A)
1	Signal ground	SG

[RS-422A]

Pin No.	Signal name	Symbol
5	Receive data	R (B)
4	Receive data	R (A)
3	Send data	T (B)
2	Send data	T (A)
1	Signal ground	SG

* Do not connect wires to 4 and 5 pins. Malfunction may result.

[RS-485]

* The termination resistor (120 Ω) is built into the COM-KG.
**R: Termination resistor (Example: 120 Ω 1/2 W)
If communication errors occur frequently due to the operation environment or the communication distance, connect termination resistor.

[RS-422A]

* The termination resistor (120 Ω) is built into the COM-KG.
**R: Termination resistor (Example: 120 Ω 1/2 W)
If communication errors occur frequently due to the operation environment or the communication distance, connect termination resistor.

■ Attention in connector wiring

● The lead wires use the stranded wire.
● Use the stranded wire from size 0.25 to 0.5 mm² (AWG 26-20).
● Stripping length is as follows.

8 mm (Stripping length)

Conductor cross section: 0.25 to 0.5 mm² (AWG 26-20)

Connector type: FK-MC 0,5/5-ST-2,5 (Products by Phoenix contact Ltd.)

5. SETTING THE PROTECT MODE

When the COM-KG is used in the serial communication, the protect mode can be set to eliminate a response interruption of the COM-KG. To attempt protect mode setting, you need to switch the mode to the maintenance mode in the RKC communication protocol. Set the Protect mode referring to the following procedure as well as **6. RKC COMMUNICATION PROTOCOL.**

📖 You can also use our dedicated software PROTEM2 which can be downloaded from the official RKC website.

■ Setting procedures

Change the mode to the Maintenance mode.

Set the Maintenance mode setting (Identifier [ZZ]) to "1: Maintenance mode" from "0: Normal mode".
📖 The Maintenance mode setting is accessible when Protect setting (Identifier [PZ]) is "0 (OFF)". When the setting is "1" (Protect mode), reapply power to the instrument to release the Protect mode. The mode is then accessible.

Select the "Protect mode" at Protect setting (Identifier [PZ]).

Protect setting (Identifier [PZ])
0: OFF (Factory set value)
1: Protect mode
📖 When the mode is switched to the Protect mode, the instrument will forcibly terminate the Maintenance mode. In the Protect mode, communication is maintained between the COM-KG and the instrument, but the communication between the host computer and the COM-KG through the RKC communication protocol will become unavailable. To release the Protect mode, turn off the power once and turn it on again.

Forcibly terminate the Maintenance mode and return to the Normal mode.
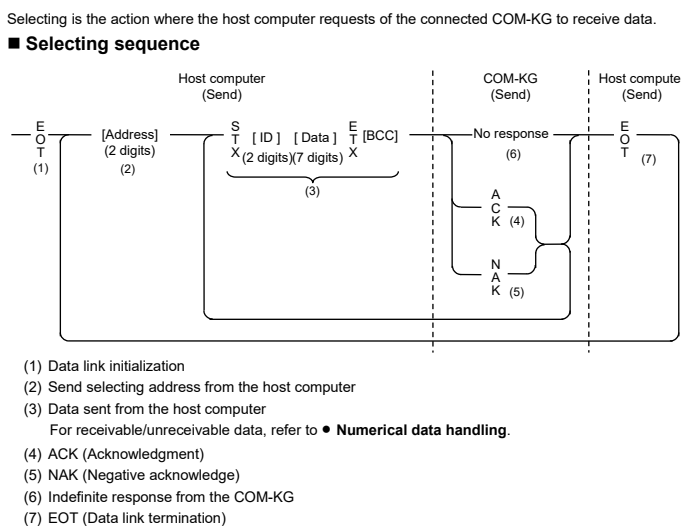
Setting completed

6. RKC COMMUNICATION PROTOCOL

The setting of Maintenance mode needs to be done through the RKC communication (Establishing method of data link: Polling/Selecting method).
The basic procedure follows ANSI X3.28-1976 subcategories 2.5 and A4 basic mode data transmission control procedure (Fast selecting is the selecting method used in this COM-KG).

6.1 Polling

Polling is the action where the host computer requests of the connected COM-KG to transmit data.

■ Polling sequence

(1) Data link initialization
(2) Send polling sequence from the host computer
(3) Data send from the COM-KG
(4) EOT send (Data send from COM-KG completed)
(5) No response from the COM-KG
(6) ACK (Acknowledgment)
(7) NAK (Negative acknowledge)
(8) No response from the host computer
(9) Indefinite response from the host computer
(10) EOT (Data link termination)

ID: Identifier

6.2 Selecting

Selecting is the action where the host computer requests of the connected COM-KG to receive data.

■ Selecting sequence

(1) Data link initialization
(2) Send selecting address from the host computer
(3) Data sent from the host computer
For receivable/unreceivable data, refer to ● **Numerical data handling.**
(4) ACK (Acknowledgment)
(5) NAK (Negative acknowledge)
(6) Indefinite response from the COM-KG
(7) EOT (Data link termination)

● Numerical data handling

Receivable data
· The COM-KG can receive zero-suppressed data and whole number data (data without decimal fraction). The number of digits varies depending on the type of identifier. (Within 7digits)
Example: For example, even if the data −1.5 is sent by the host as −001.5, −01.5, −1.5, −1.50, −1.500, the COM-KG receives the data as −1.5.

· When the host computer sends data containing a decimal point to the item without a decimal point, the COM-KG receives a message with the value that is cut off below the decimal point.
Example: When setting range is 0 to 200, the COM-KG will receive as follows:

Send data	0.5	100.5
Receive data	0	100

· The COM-KG receives a value truncated to a specified number of decimal places. The digits smaller than that will be cut off.
Example: When setting range is −10.00 to +10.00, the COM-KG will receives as follows:

Send data	−.5	−.058	.05	−0
Receive data	−0.50	−0.05	0.05	0.00

Unreceivable data
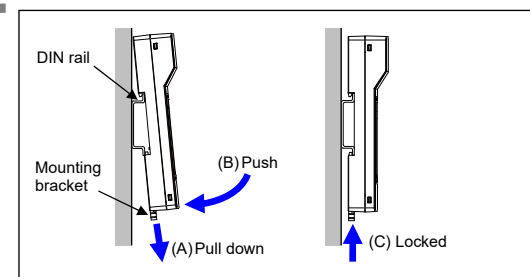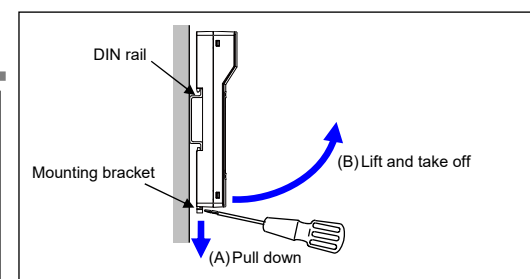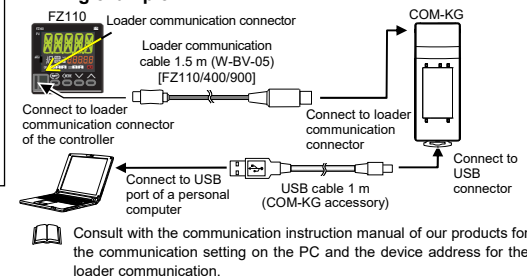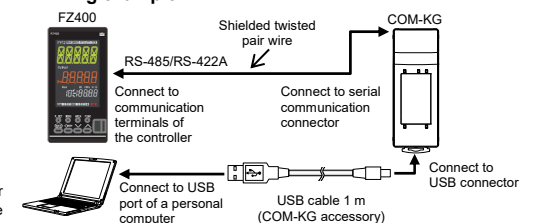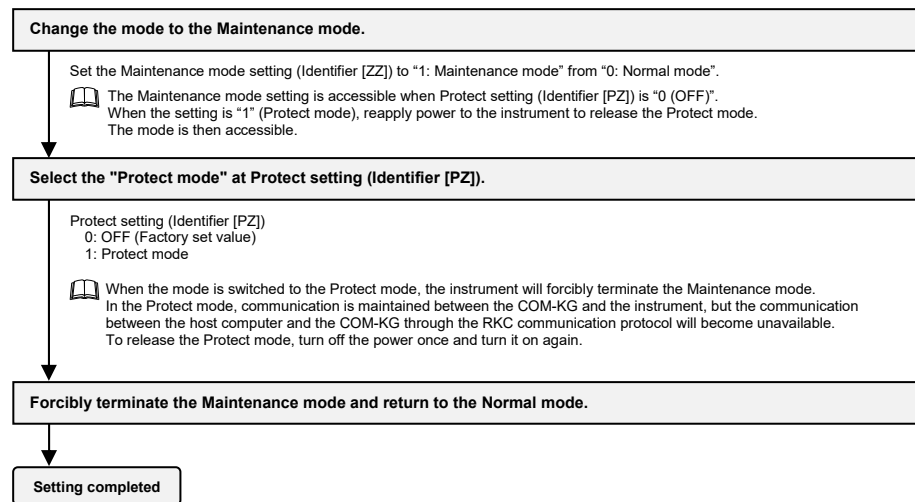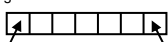· The COM-KG sends NAK when received a following data.

+	Plus sign and data with a plus sign
−	Only minus sign (without a number)
.	Only decimal point (period)
−.	Only minus sign and a decimal point

6.3 Communication Data List

📖 Explanation of data map items

- Identifier: Identifier for RKC communication
- Attribute (A method of how communication data items are read or
  written when viewed from the host computer is described)

  RO: Read only data (Host computer ← COM-KG)
  RW: Read and Write data (Host computer ←→ COM-KG)

- Data range (Read or Write range of the communication data)

  (ASCII code data of 7 digits)

  Most significant digit ··········· Least significant digit

- Factory set value: Factory set value of communication data

Name	Identifier	Attribute	Data range	Factory set value
Parameters dedicated for COM-KG				
Maintenance mode setting [a, b]	ZZ	RW	0: Normal mode 1: Maintenance mode	0
Communication parameters dedicated for the maintenance mode (accessible only in the maintenance mode)				
Protect setting [a]	PZ	RW	0: OFF 1: Protect mode (Set the Protect so that the COM-KG will not respond to the communication in the RKC protocol communication. After setting the Protect, the COM-KG will forcibly terminate the maintenance mode and switch the mode to that set in the Communication mode switch.)	0
Switching communication mode	CS	RW	0: Serial/Loader communication mode	0
Communication address of COM-KG [a, c]	SA	RW	0 to 99	99
ROM version of COM-KG [a]	KG	RO	0x0000 to 0xFFFF	—

[a] Data is not backed up.
[b] Accessible only when Protect setting is set to "OFF".
 When the COM-KG is in the Protect mode, "Maintenance mode setting" is not accessible. You need to reapply power to the instrument to release the Protect mode.
[c] To prevent malfunction, make sure the device address on the instrument side and the communication address of COM-KG (Identifier [SA]) are not overlapped with each other. When the communication address of the COM-KG is changed, the new setting will be valid immediately.

7. SPECIFICATIONS

USB communication function

Interface: Based on USB Ver. 2.0
Communication speed: Full speed (12 Mbps)
Connection: Connected by universal USB cable (Mini-B connector)
Power source method: Bus power (The power is supplied from the USB port on the personal computer side)
Compatible OS: Windows 7 */Windows 10 *
 *32-bit/64-bit

Serial communication function

Interface: Based on RS-485, EIA standard
 Based on RS-422A, EIA standard
Connection method: RS-485: 2-wire system, half-duplex multi-drop connection
 RS-422A: 4-wire system, half-duplex multi-drop connection
Synchronous method: Half-duplex start-stop synchronous type
Communication speed: 2400 bps, 4800 bps, 9600 bps, 19200 bps, 38400 bps, 57600 bps, 115200 bps
Data bit configuration: Start bit: 1
 Data bit: 7 or 8
 Parity bit: Without, Odd or Even
 Stop bit: 1 or 2
Protocol: Protocol depends on application of the personal computer side
Number of connecting controllers:
 Maximum 31 controllers (RS-485/RS-422A)
Termination resistor: Built-in termination resistor (120 Ω)

General specifications

Power supply voltage: 5 VDC±5 % (Supplied by USB bus cable)
 The power supply function through the loader communication is not available on the USB hub (low power port)
Current consumption: 200 mA max. (when powered through loader communication)
 100 mA max. (when in serial communication mode)
Allowable ambient temperature range:
 −10 to +55 °C
Allowable ambient humidity range:
 5 to 95 %RH (Non condensing)
 Absolute humidity:
 MAX.W.C 29.3 g/m^3 dry air at 101.3 kPa
Case material: PC (Flame retardancy: UL94V-2)
Weight: Approx. 50 g (Instrument only)

MEMO