

Remote I/O R3 Series

FL-net INTERFACE MODULE

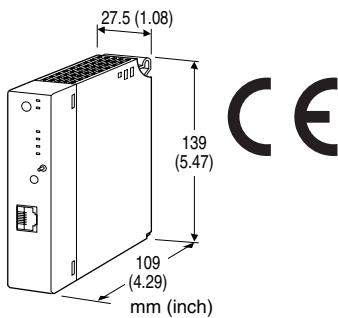
(OPCN-2)

Functions & Features

- Usable as a gateway between different protocols combined with R3 interface modules
- FL-net (OPCN-2), Ethernet based, controller level network, compatible remote I/O
- 10 Mbps/100 Mbps cyclic transmission for the maximum of 4k bits + 256 words (1 word = 16 bits) allows data shared among the devices connected to the bus
- FL-net bus extended to max. 500 meters, up to 2.5 kilometers with a repeater
- No need of ladder programming

Typical Applications

- A gateway between FL-net and Modbus



MODEL: R3-GFL1S[1]

ORDERING INFORMATION

- Code number: R3-GFL1S[1]

Specify a code from below for [1].

(e.g. R3-GFL1S/CE/Q)

- Specify the specification for option code /Q

(e.g. /C01)

COMMUNICATION MODE

S: Single

[1] OPTIONS (multiple selections)

Standards & Approvals

blank: Without CE

/CE: CE marking

Other Options

blank: none

/Q: Option other than the above (specify the specification)

SPECIFICATIONS OF OPTION: Q

COATING (For the detail, refer to M-System's web site.)

/C01: Silicone coating

/C02: Polyurethane coating

/C03: Rubber coating

FUNCTIONS & FEATURES

- 1) R3-GFL1 enables the other interface module to access field signals as virtual I/O data via FL-net. No ladder programming is required to assign these I/O signals.
 - 2) Any PC or PLC compatible with FL-net, up to 254 nodes, can retrieve the updated data by accessing the common memory without interfering with the communication traffic.
 - 3) Analog and discrete input signals cyclically transmitted from other devices can be output as virtual analog signal. The FL-net Configuration Builder software (model: R3-NFLBLD) is used to assign these virtual analog signals on the common memory in the bit or word units.
 - 4) Request/Response type message communication, accessing I/O data only when necessary, is also possible.
- CAUTION !**

- FL-net standard requires a dedicated Ethernet bus for the FL-net compatible devices. Connecting the R3-GFL1 to a general-purpose LAN, or connecting a general-purpose TCP/IP device to FL-net is Not allowed.
- FL-net uses UDP/IP protocol for transmission. ISDN, ADSL or similar types of LAN are Not to be used.

RELATED PRODUCTS

- Interface module (model: R3-NC1, NC3, NDx, NE1, NM1, NM4)

Firmware version V2.00 or later

- Interface Module (model: R3-NML3)

Firmware version V1.00 or higher

GENERAL SPECIFICATIONS

Connection

Network: RJ-45 connector

Internal bus: Via the Installation Base (model: R3-BSx)

Internal power: Via the Installation Base (model: R3-BSx)

RUN contact output: Euro type connector terminal

RUN/CFG selector: Toggle switch; RUN or Configuration

Isolation: Ethernet to internal bus or internal power to RUN contact output

Indicator LEDs

RUN: Green light turns on when the CPU, internal bus and field bus on the other interface module are in normal conditions.

ERR: Red light turns on in an abnormality of the system.

LNK: Red light turns on while the R3-GFL1 is participating FL-net (normal communication)



HER: Red light turns on in an abnormality of the R3-GFL1 module.

PER: Red light blinks on with the parameter setting error.

CFG: Red light blinks in high speed at the startup; blinks in low speed while the builder software is used.

TX: Green light turns on while transmitting.

RX: Amber light turns on while receiving.

Data allocation: Set with the side DIP switch.

RUN contact: Relay turns on when the CPU, the internal bus function and the field bus on the other interface module are in normal conditions.

■ **RUN CONTACT OUTPUT**

Rated load: 250 V AC @0.5A (cos $\theta = 1$)
(≤ 50 V AC, ≤ 75 V DC for CE conformity)
30 V DC @ 0.5 A (resistive load)

Maximum switching voltage: 250 V AC or 220 V DC (≤ 50 V AC, ≤ 75 V DC for CE conformity)

Maximum switching power: 62.5 VA or 60 W

Minimum load: 10 mV DC @ 1 mA

Mechanical life: 5×10^7 cycles (rate 300/min.)

When driving an inductive load, external contact protection and noise quenching are recommended.

FL-net SPECIFICATIONS

Physical layer standard: IEEE 802.3u

Data link layer: 10BASE-T / 100BASE-TX

Baud rate: 10 / 100 Mbps, Auto Negotiation

Protocol: FL-net (OPCN-2) (UDP/IP)

Transmission media: 10BASE-T (STP cable, category 5)
100BASE-TX (STP cable, category 5e)

Max. segment length: 100 meters

Max. number of nodes: 254

IP address: FL-net Configuration Builder is used to set up the IP address and the network address.

Factory setting:
192.168.250.1 (IP address)
255.255.255.0 (network address)

Max. cyclic data size:
8 k bits (area 1) + 8 k words (area 2) / system
4 k bits (area 1) + 256 words (area 2) / node

Max. message data size: 1024 bytes (per transmission cycle)

Performance (2k bits + 2k words / node, 32 nodes in total)

Token cycle time: 50 milliseconds (1.56 milliseconds/ node in average)

Message transmission time: 500 milliseconds (1 : 1 unidirectional message)

INSTALLATION

Current consumption: 150 mA

Operating temperature: -10 to +55°C (14 to 131°F)

Operating humidity: 30 to 90 %RH (non-condensing)

Atmosphere: No corrosive gas or heavy dust

Mounting: Installation Base (model: R3-BSx)

Weight: 200 g (0.44 lb)

PERFORMANCE

Data allocation: 16 × n (Module allocation: 1 to 8)

Insulation resistance: ≥ 100 M Ω with 500 V DC

Dielectric strength: 1500 V AC @ 1 minute
(Ethernet to internal bus or internal power to RUN contact output)
2000 V AC @ 1 minute (power input to FG; isolated on the power supply module)

STANDARDS & APPROVALS

CE conformity:
EMC Directive (2004/108/EC)
EMI EN 61000-6-4: 2007/A1: 2011
EMS EN 61000-6-2: 2005

FL-net DESCRIPTIONS

■ CYCLIC TRANSMISSION

- Transmitting virtual I/O value, this module's information and node error of signal source.
- Supplying common memory word data transmitted from another devices as virtual output.
- If the node that this module is accessing has been removed from the common memory, the operations "Hold output" and "Clear Output" are selectable.

■ MESSAGE TRANSMISSION

The module supports the FL-net defined functions listed in the following table. Only the server function is supported. Server function allows the module to build a response frame to a request message. Client function allows the module to transmit a request message and to receive its response frame.

MESSAGE TYPE	SERVER	CLIENT
Byte block read	No	No
Byte block write	No	No
Word block read	Yes	No
Word block write	Yes	No
Network parameter read	Yes	No
Network parameter write	No	No
Stop command	Yes	No
Start command	Yes	No
Profile read	Yes	No
Transparent mode	No	No
Log data read	Yes	No
Log data clear	Yes	No
Message echo back	Yes	No



APPLICATION SOFTWARE CD

■ FL-net CONFIGURATION BUILDER SOFTWARE (model: R3-NFLBLD)

- The R3-NFLBLD is used to configure the common memory of the R3-GFL1 module for FL-net.
- Configuration setup on the PC is downloaded to the R3-GFL1 via Ethernet.
- Configuration setup on the R3-GFL1 can be uploaded to the PC and saved as a file.
- Instructions:

R3-GFL1 instruction manual

R3-NFLBLD users manual

PC REQUIREMENTS (provided by the user)

The following PC environment is required to run the R3-NFLBLD program.

Operating system: Microsoft Windows XP or Windows 7 (32bit/64bit)

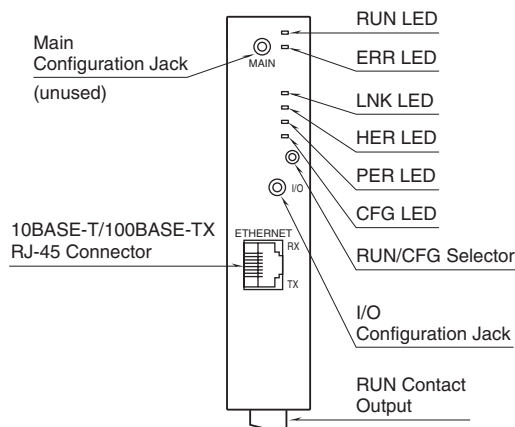
Screen area: 1024 by 768 pixels

CD-ROM drive: Required to install the program

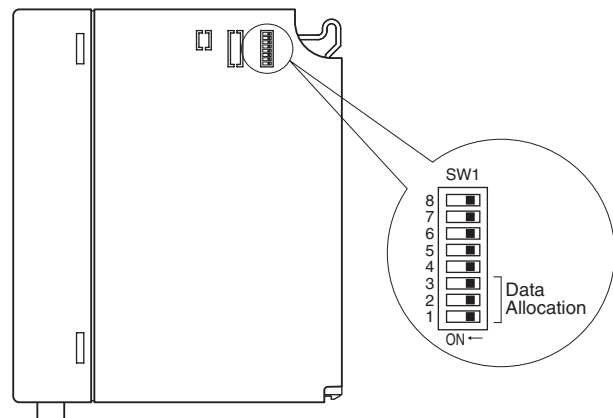
LAN card: Required to connect to Ethernet

EXTERNAL VIEW

■ FRONT VIEW



■ SIDE VIEW



TRANSMISSION DATA DESCRIPTIONS

Use the DIP SW located at the side of the module to specify module allocation.

1 module is equivalent to 1 I/O module with 16 words analog input and 16 words analog output. Max. 8 modules (128 words input, 128 words output) transmission is available. R3-GFL1 seems as if max. 8 I/O modules are mounted to 8 slots via Modbus. The input of the module is processed as follows.

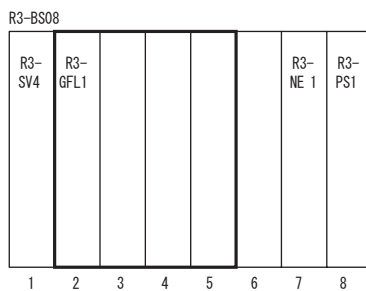
[FL-net Communication] --> [R3-GFL1 Module] --> [R3 Base] --> [R3 Communication Module]

In responding to the input, the output (Holding Register) command becomes valid via Modbus communication, and the input (Input Register) command is valid in the output.

Note: Do not mount any modules in the slots which are occupied by virtual modules. If a real I/O module is mounted in the slot, an internal bus error occurs and the ERR LED turns on. Max. 16 real I/O modules and virtual modules are available. The interface module can not read the data for more than 16 modules.

■ WHEN R3-GFL1 IS MOUNTED TO SLOT 2 (4 modules)

In practice, I/O modules are mounted to slot 1 and slot 2. The R3-NE1 in slot 7 recognizes the R3-SV4 in slot 1 directly. However, the R3-NE1 recognizes the R3-GFL1 in slot 2 as if 4 modules are mounted to from slot 2 to 5.

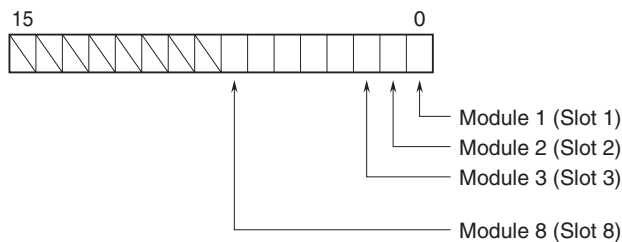


SLOT	REAL MODULE	VERTUAL MODULE	DATA
Slot 1	R3-SV4	R3-SV4	4 Words
Slot 2	R3-GFL1	R3-GFL1 (1/4)	16 Words
Slot 3	No module	R3-GFL1 (2/4)	16 Words
Slot 4	No module	R3-GFL1 (3/4)	16 Words
Slot 5	No module	R3-GFL1 (4/4)	16 Words
Slot 6	No module	No module	-
Slot 7	R3-NE1	R3-NE1	-
Slot 8	R3-PS1	R3-PS1	-

I/O DATA DESCRIPTIONS

■ MODULE STATUS, ERROR STATUS, DATA ERROR STATUS

Shows each module's availability and error status.

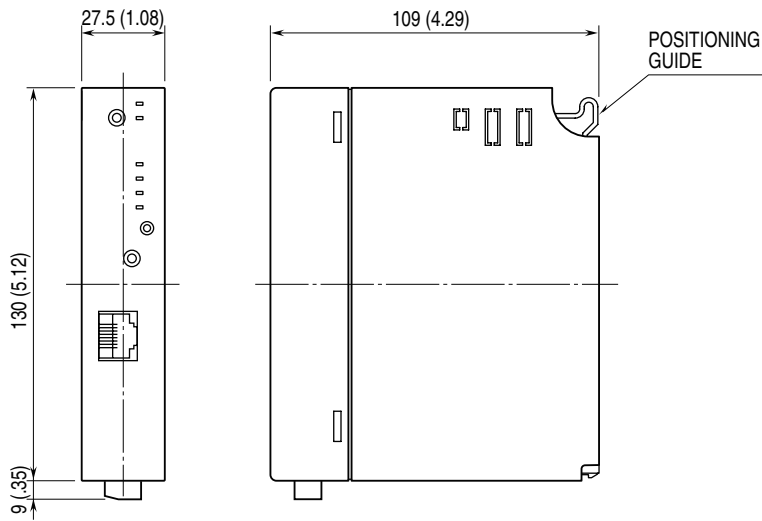


■ ANALOG DATA

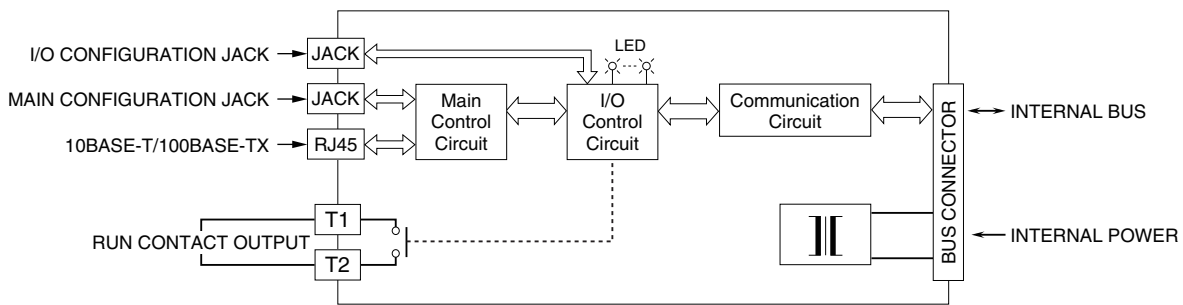
16-bit binary data.



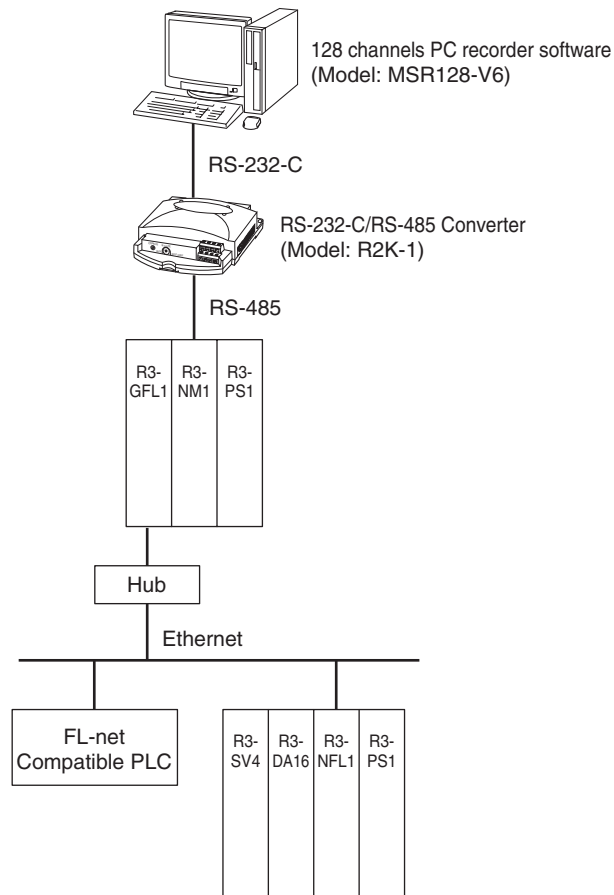
DIMENSIONS unit: mm (inch)



SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM



SYSTEM CONFIGURATION EXAMPLES



Specifications are subject to change without notice.

