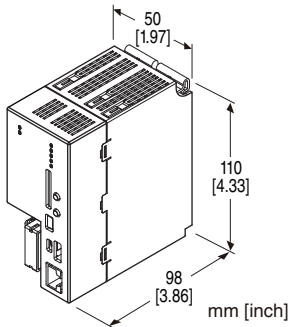# Paperless Recorder TR30 Series

PAPERLESS RECORDER

Functions & Features
- 측정 데이터 및 장치의 실행/정지 상태를 SD 카드에 기록
- 기록된 데이터의 웹 브라우징 허용
- 필요한 신호 유형 및 포인트 수에 따라 R30 시리즈 I/O 모듈과 유연하게 결합

50 [1.97]
110 [4.33]
98 [3.86]
mm [inch]

CE

MODEL: TR30-G-R[1]

ORDERING INFORMATION
- Code number: TR30-G-R[1]
Specify a code from below for [1].
  (e.g. TR30-G-R/Q)
- Specify the specification for option code /Q
  (e.g. /C01)

MODULE TYPE
G: High functionality

POWER INPUT
DC power
R: 24 V DC
(Operational voltage range: ±10 %; ripple 10 %p-p max.)

[1] OPTIONS
blank: none
/Q: With options (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
TR30 is used in combination with base (model: R30BS) and I/O modules (Remote I/O R30 series).

■ TR30
입력 데이터 수집 및 기록, 출력 데이터 전송:
내부 버스를 통해 I/O 모듈에서 데이터를 수집하고 내부 메모리에 데이터를 기록한 다음 SD 카드에 기록합니다. 이더넷을 통해 Modbus/TCP를 사용하여 원격 I/O와 연결하고 원격 I/O의 입력 데이터를 수집 및 기록합니다. SLMP를 사용하여 Mitsubishi PLC MELSEC와 연결하여 MELSEC의 CPU 데이터를 수집하고 기록합니다. 그리고
미리 설정된 알람 레벨에 따라 알람 출력을 Output 모듈로 전송합니다.

- Web server:
웹 서버로 작동하며 수집된 데이터를 태블릿의 브라우저에 표시합니다. 태블릿에서 다양한 설정과 조작을 할 수 있습니다.

- Internal power
TR30 및 I/O 모듈에 필요한 내부 전원은 공급된 전원에서 생성됩니다.

■ I/O Module
내부 버스를 통해 수신된 데이터를 개별 출력으로 출력합니다. 이산 입력 데이터 및 A/D 변환된 아날로그 입력 값을 내부 버스로 출력합니다. (자세한 내용은 각 R30 I/O 모듈의 사양 참조)

■ Installation base
모듈 설치 베이스는 내부 전원용 PWB와 내부 버스를 내장하고 있습니다. (설치 베이스(모델명: R30BS) 사양 참조)

RELATED PRODUCTS
- Remote I/O R30 series
- PC Configurator cable
  USB 2.0 compatible cable
  (TR30 connector: mini-B type, 5.0m max.)
- PC configurator software (model: TRGCFG)
- PC configurator software (model: R30CFG)
- Viewer software (model: TRViewer)
Software downloadable at M-System's web site.
- SD card
An SD card is required to store data in the unit.
Use a memory card of the specified model number.
Consult M-System for purchase.
  - Hagiwara Solutions NSD6-004GH(B21SEI,
  NSD6-016GH(B20SEI
  (NSD6-004GH(A00SDI ... discontinued)

GENERAL SPECIFICATIONS

Connection

RUN contact output, power supply: M3 separable screw terminal (torque 0.5 N·m)

Ethernet: RJ-45 modular jack

Internal bus: Via the Installation Base (model: R30BS)

Internal power: Via the Installation Base (model: R30BS)

Solderless terminal: Refer to the drawing at the end of the section.

Recommended manufacturer: Japan Solderless Terminal MFG. Co., Ltd., Nichifu Co., Ltd.

(Solderless terminals with insulation sleeve do not fit.)

Applicable wire size: 0.25 to 0.75 mm^2

Screw terminal: Nickel-plated steel

Housing material: Flame-resistant resin (gray)

Max. number of R30 I/O modules: 16

(Max. consumption current of I/O modules: 500 mA)

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

Calendar clock: Year (4 digits), month, date, day, hour, minute, second

Read rate: Approx. ≤ 1 msec. (Connected max. modules)

Indicator LEDs: PWR, TR30 RUN, RECORD, SD CARD, ERROR (Refer to the insruction manual)

■ RUN CONTACT OUTPUT

RUN contact output: Turns on (closed) at normal operation

Rated load: 250 V AC @ 0.5 A (cos ø = 1)

30 V DC @ 0.5 A (resistive load)

(Less than 50 V AC to conform with EU Directive)
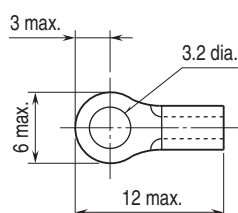
Maximum switching voltage: 250 V AC or 30 V DC

Maximum switching power: 250 VA (AC) or 30 W (DC)

Minimum load: 5 V DC @ 10 mA

Mechanical life: 2×10^7 cycles (rate 300 cycles/min.) When driving an inductive load, external contact protection and noise quenching recommended.

■ Recommended solderless terminal size - M3 (unit: mm)

R30 CONNECTION

■ TR30 INSTALL POSITION

Install to PWR slot (most left slot) and COM slot (right next to PWR slot).

■ COMPATIBLE R30 SERIES MODULES

TYPE	MODEL
Base	R30BS
Discrete input	R30XN16A
Discrete output	R30YN16A, R30YN16C
DC voltage/current input	R30SV2, R30SV4
DC voltage/current input, high speed	R30SVF4
Thermocouple input	R30TS4
RTD input	R30RS4
Potentiometer input	R30MS4
AC current input	R30CT4E
Universal input	R30US2, R30US4
Totalized pulse input	R30PA2
Blank filler	R30DM

ETHERNET COMMUNICATION

Communication Standard: IEEE 802.3u

Transmission: 10BASE-T, 100BASE-TX

Baud rate: 10/100 Mbps (Auto Negotiation function)

Protocol: TCP/IP, Modbus/TCP, HTTP, SLMP, FTP, SMTP, SNTP

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

Max. length of fieldbus segment: 100 meters

Ethernet indicator LED: DPX, LNK

IP address: 192.168.0.1 (factory setting)

INSTALLATION

Power consumption

•**DC**: Approx. 18 W 24 V DC (@ output current max. 500 mA)

Internal power

• **Max. rated output voltage / current**: 21 V DC / 500 mA

Total current consumed at the R30 I/O modules used combination with TR30 must be within above current.

Operating temperature: 0 to 50°C (32 to 122°F)

Storage temperature: -10 to +60°C (14 to 140°F)

Operating humidity: 10 to 90 %RH (non-condensing)

Atmosphere: No corrosive gas or heavy dust

Mounting: Installation Base (model: R30BS)

Weight: 300 g (0.66 lb)

PERFORMANCE

Calendar clock: (with battery backup)
 Accuracy: Monthly deviation 2 minutes at 25°C
 Back up period: Approx. 2 years at 25°C
 Battery: Primary lithium battery (non-removable)
 (In order to prevent battery drain, battery back up is OFF at factory default. Turn it ON prior to start using.)
Insulation resistance: ≥ 100 MΩ with 500 V DC
Dielectric strength: 1500 V AC @ 1 minute
(Ethernet to internal bus or internal power to RUN contact output to power supply to FE)
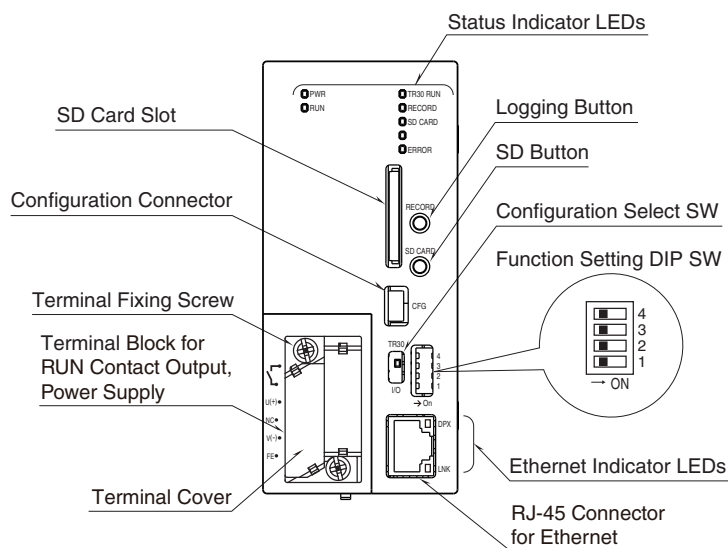
STANDARDS & APPROVALS

EU conformity:
EMC Directive
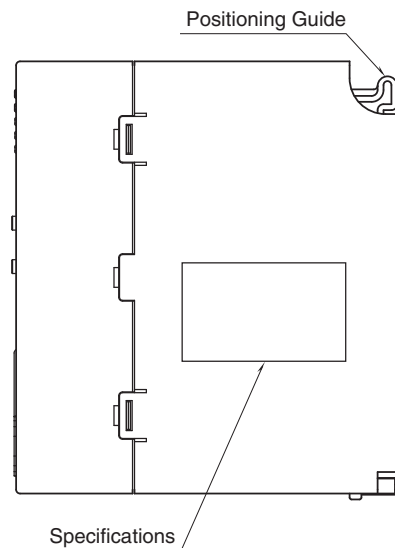 EMI EN 61000-6-4
  EMS EN 61000-6-2
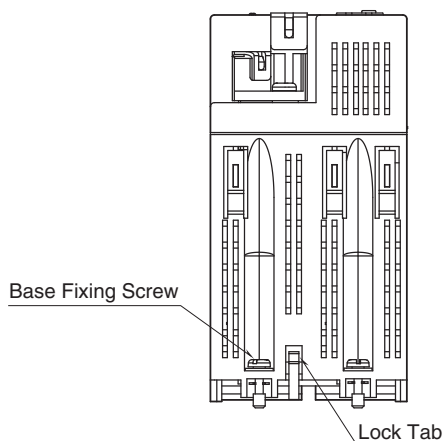RoHS Directive

EXTERNAL VIEW

■ **FRONT VIEW**

■ **SIDE VIEW**

■ **BOTTOM VIEW**

TERMINAL ASSIGNMENTS
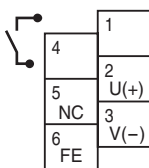
NO.	ID	FUNCTON
1	RUN contact output	RUN contact output
2	U (+)	Power supply (24 V DC)
3	V (−)	Power supply (0 V DC)
4	RUN contact output	RUN contact output
5	NC	Not used
6	FE	Functional earth

EXTERNAL DIMENSIONS   unit: mm [inch]
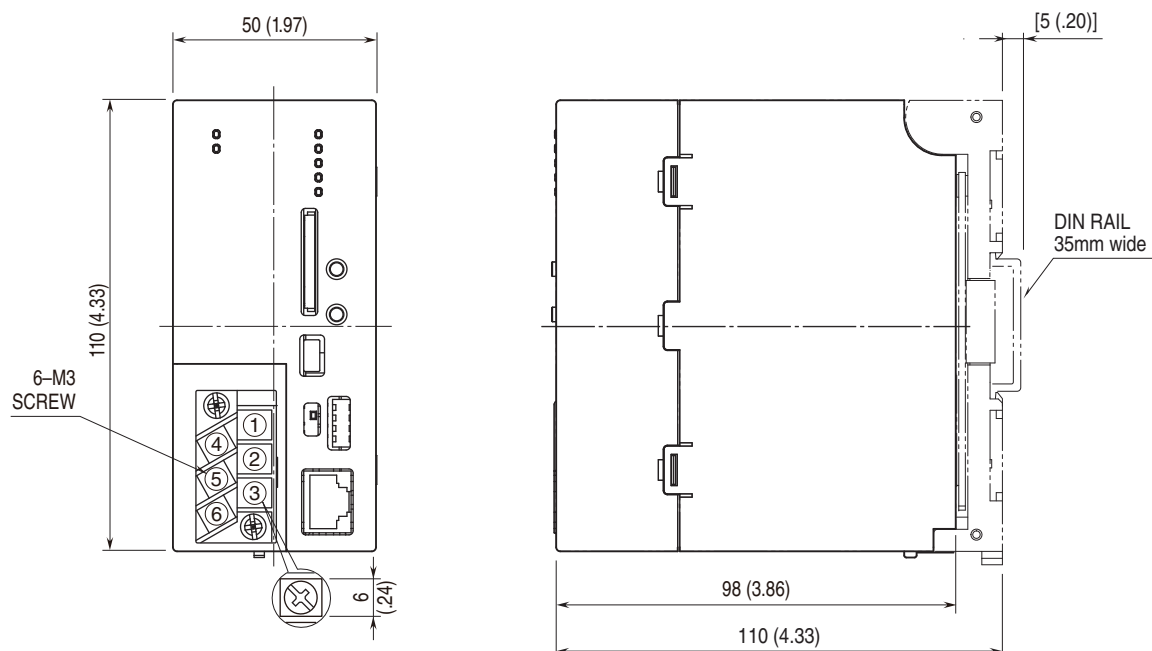
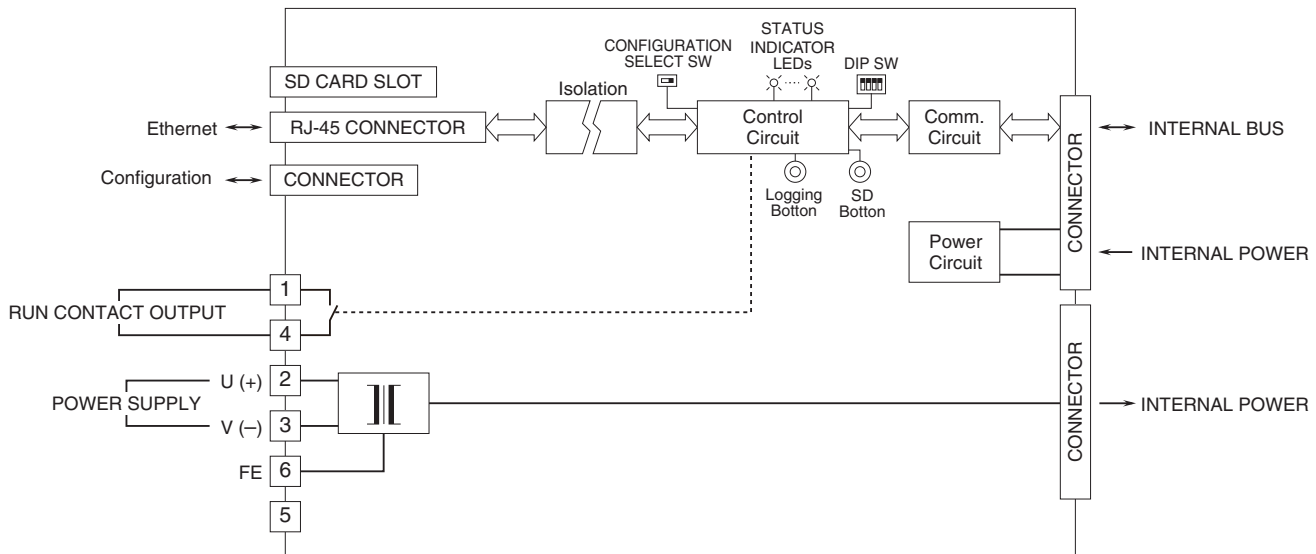## SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM

Note: In order to improve EMC performance, bond the FE terminal to ground.

Caution: FE terminal is NOT a protective conductor terminal.

DATA STORING

The trend data, event data and comment data are stored into the memory blocks with specified storing rate. These data can be transferred into the SD card with the timing according to the storing rate.

■ No. of memory blocks

• 50 memory blocks

■ Event data

• Event: Transition of analog input zone, transition of pulse input zone, status change of discrete input

• Event detection interval: Same as trend data sampling cycle

• Stored contents: Date/time, event

• Number of event: 3000 (per one memory block)

■ Comment data

• Number of characters for comment: 32

• Stored contents: Date/time, comment.

• Number of comment: 1000 (per one memory block)

■ Trend data

• Channel: Max. 120 points (Choose among followings: analog input (AI), discrete input (DI), pulse input (PI), function input (OI), discrete output (DO)

• Number of records: Save maximum 50000 samples per one block

STORING RATE	SAMPLING CYCLE	PEN	AI	DI	PI	OI	DO
5 ms	5 ms	16	16	32	16	16	32
10 ms	5 ms	16	16	32	16	16	32
50 ms	5 ms	16	16	32	16	16	32
100 ms	100 ms	32	32	64	32	32	64
500 ms	100 ms	32	32	64	32	32	64
1 sec.	100 ms	32	32	64	32	32	64
2 sec.	1 sec.	32	32	64	32	32	64
5 sec.	1 sec.	32	32	64	32	32	64
10 sec.	1 sec.	32	32	64	32	32	64
1 min.	1 sec.	120	64	64	32	32	64
2 min.	1 sec.	120	64	64	32	32	64
5 min.	1 sec.	120	64	64	32	32	64
10 min.	1 sec.	120	64	64	32	32	64
15 min.	1 sec.	120	64	64	32	32	64
30 min.	1 sec.	120	64	64	32	32	64
1 hour	1 sec.	120	64	64	32	32	64

■ SD card
• Recording contents: Trend data, event data, comment data, settings information

STORING RATE	TRANSFER INTERVAL
5 ms	3 min.
10 ms	5 min.
50 ms	10 min., 30 min.
100 ms	10 min., 30 min., 1 hour
500 ms	30 min., 1 hour, 6 hours
1 sec.	1 hour, 6 hours, 12 hours
2 sec.	1 hour, 6 hours, 1 day
5 sec.	6 hours, 12 hours, 1 day
10 sec.	6 hours, 12 hours, 1 day
1 min.	1 day, 1 week
2 min.	1 day, 1 week
5 min.	1 day, 1 week, 1 month
10 min.	1 day, 1 week, 1 month
15 min.	1 day, 1 week, 1 month
30 min.	1 day, 1 week, 1 month
1 hour	1 week, 1 month

Note: Defining no specification of interval (50000 points) is available for all storing rate.

• Data format
Trend data, event data and comment data are saved with dedicated format (binary, extension "TRD") or CSV format. Setting information is saved into text format (xml format, extension "xml").

• Data file name
File name is created with YYYYMMDDHHMMSS and daylight saving time (S or D) in the beginning of sample.
(e.g. 20140212100000S.TRD)

• Viewer Software
The data transferred to SD card can be displayed with using dedicated Viewer Software (model: TRViewer). Also, data can be converted to CSV format file.

• Auto file delete
When auto file delete is disabled, data are recorded until there is no remaining space in the SD card. When auto file delete is enabled and the remaining space in the SD card reaches 100MB or less, the data is deleted from the oldest.

• Storable time duration
(rough guide for 4GB SD card "TRD")

STORING RATE	16 pens	32 pens	64 pens	120 pens
5 ms	3 days			
10 ms	6 days			
50 ms	25 days			
100 ms	50 days	30 days		
500 ms	8 months	4 months		
1 sec.	1 year	9 months		
2 sec.	2 years	1 year		
5 sec.	7 years	4 years		
10 sec.	10 years	7.5 years		
1 min.−1 hour	10 years (max. 10 years)			

Note: When only trend logging is enabled.

• Storable time duration
(rough guide for 4GB SD card "CSV")

STORING RATE	16 pens	32 pens	64 pens	120 pens
5 ms	34 hours			
10 ms	69 hours			
50 ms	14 days			
100 ms	28 days	15 days		
500 ms	4 months	78 days		
1 sec.	9 months	5 months		
2 sec.	1.5 years	10 months		
5 sec.	3.5 years	2 years		
10 sec.	7 years	4 years		
1 min.−1 hour	10 years (max. 10 years)			

Note: When only trend logging is enabled.

COMMUNICATION

■ IP
Supports DHCP client. Allows manual setting of IP address, subnet mask, default gateway and DNS server.

■ Web server function
This unit works as a Web server, and allows 'Data,' 'Trend' and 'Event Log' to be viewed from a remote location.
Compatible terminals, browser
• iPad (iPadOS 13.7): Safari
• Android tablet (Android 9): Chrome 85.0.4183.101
• Windows PC (Windows 7, 8.1, 10), Edge 85.0.565.44, Internet Explorer 11, Firefox 75.0,
  Chrome 85.0.4183.102

■ Modbus/TCP master
Allows I/O expansion with remote I/Os such as R3 or R7 series. Collectively handles data from measuring points in multiple locations.
■ Connectable devices
• R3-NE1
• R5-NE1
• R6-NE1, R6-NE2
• R7E series
• R9EWTU
• 72EM2-M4
• GR8-EM
• DL8 series
• TR3EX
• IT series
• 73VR series

■ SLMP Client
Allows I/O expansion by connecting with the SLMP-compatible CPU unit of Mitsubishi programmable controller MELSEC. Collectively handles data from measuring points in multiple locations
■ Connectable MELSEC model

- MELSEC iQ-R series
- MELSEC iQ-F series
- MELSEC Q series

■ **Max. number of connectable devices (Number of slaves)**

- 12 nodes (selectable from among Modbus/TCP and SLMP devices)

Establishes connection for the number of slaves connected.
Note) The number of connectable devices may differ depending on the specifications of each device.
Specially, the number of slaves to be connected under 72EM2, GR8, or, WL40EW2 is limited to 8 as the max. number of connections of the device is 8.
Note that a communication error can occur when two or more slaves are connected under WL40EW2 as it does not have the Cache function.
Avoid such an error by setting the Pause period (interval between communications) longer, for example, so that communication with one slave does not coincide with communication with another slave.

■ **Max. I/O points**

- **Analog input:** 64 points
- **Discrete input:** 64 points
- **Pulse input:** 32 points
- **Discrete output:** 64 points

■ **Modbus/TCP slave**

Remotely monitored with SCADA. Operations such as recording start/stop, entering comment, specifying folder/file name for SD card transfer destination and setting folder name for ftp transfer destination are possible from PLC.

ALARM OUTPUT

DO designated as alarm contact output can be turned ON at event occurrence.

EVENT REPORTING E-MAIL

Reporting e-mail function available at event or designated time.
Encrypted communication is supported. (SMTP over SSL).
The TR30 turns a designated Do ON after transmitting the report.

· Number of e-mail attention: 32
· Number of event report text: 32
· Number of regular report text: 1
· Channel status: AI, DI, PI, OI, DO status attachable to e-mail
· Output at transmitting failure: 1 point

FTP CLIENT

It is available to upload the file saved in the SD card to FTP server.

STORING RATE	TRANSFER INTERVAL
5 ms	3 min.
10 ms	5 min.
50 ms	10 min., 30 min.
100 ms	10 min., 30 min., 1 hour
500 ms	30 min., 1 hour, 6 hours
1 sec.	1 hour, 6 hours, 12 hours
2 sec.	1 hour, 6 hours, 1 day
5 sec.	6 hours, 12 hours, 1 day
10 sec.	6 hours, 12 hours, 1 day
1 min.	1 day, 1 week
2 min.	1 day, 1 week
5 min.	1 day, 1 week, 1 month
10 min.	1 day, 1 week, 1 month
15 min.	1 day, 1 week, 1 month
30 min.	1 day, 1 week, 1 month
1 hour	1 week, 1 month

Note: If interval is maximum, the data is transferred at the time when 50000 points is stored.

FTP SERVER

Reading and deleting files in the SD card by an FTP client is available.
Operation verified FTP client
- Explorer
- Web browser
Internet Explorer version 11
Chrome 57.0.2987.98
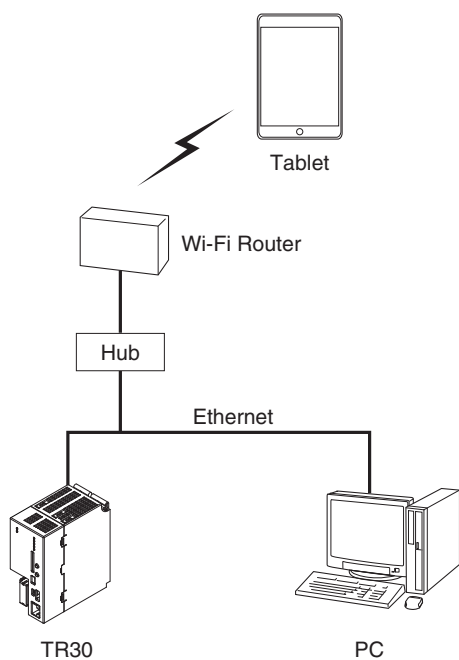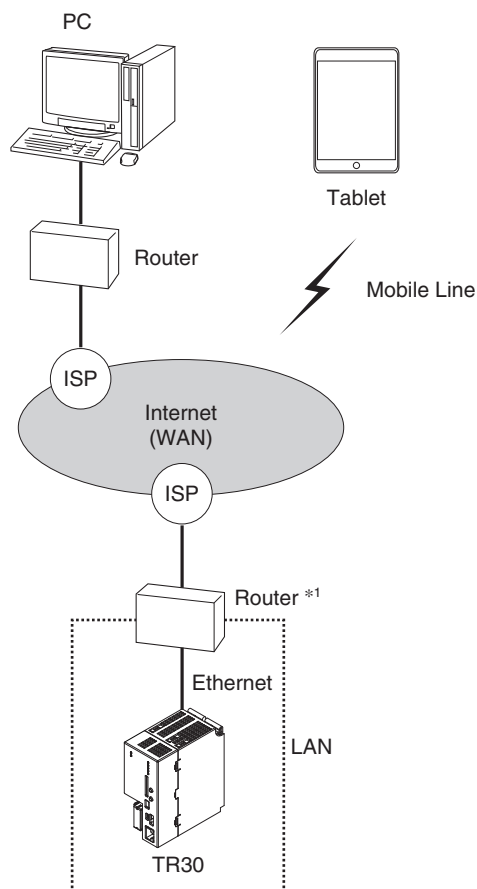- FFFTP 1.98g

ARITHMETIC FUNCTION

Addition and subtraction, multiplication, division, square root, moving average, delay buffer, exp, common logarithm, natural logarithm, peak hold(max/min), analog accumulation, power, F value calculation, inverse logarighm and scaling are available with function input (OI).
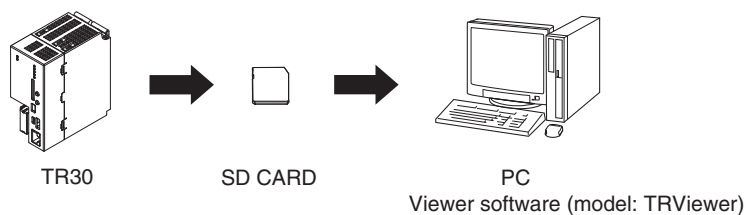
OTHER FUNCTIONS

Configuration: Configurable with the dedicated software model: TRGCFG

SYSTEM CONFIGURATION EXAMPLES

Devices other than the TR30 in below provided by the user.

■ VIA LOCAL NETWORK (LAN)

Tablet

Wi-Fi Router

Hub

Ethernet

TR30

PC

■ VIA INTERNET (WAN)

PC

Router

Tablet

Mobile Line

ISP

Internet
(WAN)

ISP

Router *1

Ethernet

LAN

TR30

*1. D.DNS service or static IP address is reguired.

■ STAND-ALONE

TR30

SD CARD

PC
Viewer software (model: TRViewer)

Note: Data storing to SD card is performed at every transfer interval.

⚠ Specifications are subject to change without notice.