M-SYSTEM CO.,LTD.

Paperless Recording System

# PAPERLESS RECORDER
(color LCD display)

MODEL **71VR1**

## MODEL & SUFFIX CODE SELECTION

**71VR1–❑001–❑**

**MODEL**

**LANGUAGE** *1
**N** : Japanese
**E** : English

**ANALOG I/O**
**00** : None

**EXTERNAL INTERFACE**
**1** : Modbus

**POWER INPUT**

| AC Power | DC Power |
|---|---|
| **M2**: 100 – 240V AC | **R** : 24V DC |
| | **P** : 110V DC |

**71VR1–❑101–❑**

**MODEL**

**LANGUAGE** *1
**N** : Japanese
**E** : English

**ANALOG I/O**
**10** : DC input, 2-points

**EXTERNAL INTERFACE**
**1** : Modbus

**POWER INPUT**

| AC Power | DC Power |
|---|---|
| **M2**: 100 – 240V AC | **R** : 24V DC |
| | **P** : 110V DC |

**71VR1–❑501–❑** *2

**MODEL**

**LANGUAGE** *1
**N** : Japanese
**E** : English

**ANALOG I/O**
**50** : DC input, 2-points
Universal input, 3-points (V, mA, T/C, RTD)

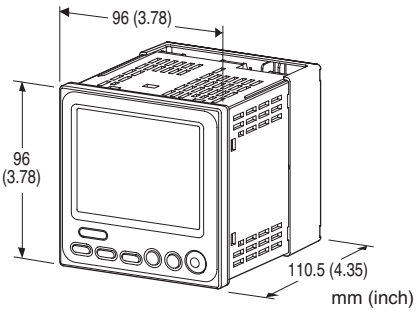
**EXTERNAL INTERFACE**
**1** : Modbus

**POWER INPUT**

| AC Power | DC Power |
|---|---|
| **M2**: 100 – 240V AC | **R** : 24V DC |
| | **P** : 110V DC |

*1. Language (Japanese or English) can be chose by front panel setting.
*2. CE not available

CE




***Functions & Features***

- 96 mm square size
- Records, displays and sets alarms for 8 analog and 8 contact inputs and 8 contact outputs
- Maps the remote I/O data to logical channels
- Built-in I/O: 2 analog, 3 universal and 2 contact inputs and 2 contact outputs
- Trigger function: Records only necessary part of the data
- Recorded data can be transferred to a PC with memory cards or COP-IRDA and converted to CSV format with 71VRCFG
- TFT color LCD
- IP65 front panel
- Separable two pieces terminal block
- Safety terminal cover tethered to the device with a strap
- CE marking

## ORDERING INFORMATION

Specify code number. (e.g. 71VR1-N101-M2)

## RELATED PRODUCTS

- Infrared Communication Adaptor (model: COP-IRDA)
- PC configurator software (model: 71VRCFG)
  Downloadable at M-System's web site:
  http://www.m-system.co.jp
- Memory card (Hagiwara Sys-Com NSD6-002GT)
  A memory card is required to store data in the 71VR1.
  Use the specified model number of memory card.
- Precision Resistor Module (model: REM2-50)
  Use for mA universal input
- Remote I/O R3 series
  Modbus interface module (model: R3-NM1)
- Remote I/O R5 series
  Modbus interface module (model: R5-NM1)
- Modbus I/O module (model: R7M)
  R7 Configurator Software (Model: R7CON)
  Modbus communication parameters of the R7M must be configured by using R7CON and the dedicated cable.
- Devices equipped with Modbus communication.
  For detailed information, visit the M-System's web site:
  http://www.m-system.co.jp

## GENERAL SPECIFICATIONS

**Degree of protection**: IP65; applicable to the front panel of the recorder with single mounting according to the specified panel cutout
**Construction**: 96 mm square panel flush mounting
**Connection**: M3 screw terminal
**Screw terminal material**: Nickel-plated steel (torque 0.5 N·m)
**Material**: Flame resistant resin (black)
**Isolation**: Analog input each other to contact input to contact output 1 to contact output 2 to Modbus interface to power input to FE (Functional Earth)

**Sample rate**:

| NUMBER OF MODBUS LOGICAL CHANNELS | SAMPLE RATE (sec) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0.1 | 0.2 | 0.5 | 1 | 2 | 5 | 10 |
| 0 | Y *2 | Y *2 | Y | Y | Y | Y | Y |
| 1 to 2 | --- | Y *2 | Y | Y | Y | Y | Y |
| 3 to 5 | --- | --- | Y | Y | Y | Y | Y |
| 6 to 10 | --- | --- | --- | Y | Y | Y | Y |
| 11 to 20 | --- | --- | --- | --- | Y | Y | Y |
| 21 to 24 | --- | --- | --- | --- | --- | Y | Y |

[Legend] Y: Selectable, ---: Not selectable
*2. Selectable when without thermal input settings

**Number of assignable logical channels**
**Analog input**: 8 points maximum
**Contact input**: 8 points maximum
**Contact output**: 8 points maximum
**Data storage**: Stores Trend and Alarm history in memory card.
**Trend:** Stored in files named time and date.
60000 samples in one file
Storage capacity: 200 files maximum
Storage time: Approx. 13 days at storing rate 0.1 sec., approx. 138 days at 1 sec., approx. 1388 days at 10 sec.
**Alarm history:** Stored in alarm history file, 200 items maximum.

**■ DISPLAY**
**Display device**: 3.5-inch TFT LCD
**Display colors**: 256
**Resolution**: 320 × 240 pixels
**Backlight**: LED
**Display update interval**: 500msec.

## INPUT

**■ DC CURRENT INPUT (Ai 1, Ai 2)**
(Range) -20 – +20mA: 100Ω

**■ DC VOLTAGE INPUT (Ai 1, Ai 2)**
(Range) -1 – +1V : 1MΩ
-5 – +5V : 1MΩ
-10 – +10V : 1MΩ

**■ CONTACT INPUT (Di 1, Di 2):** Dry contact, 2 points
**Input resistance**: Approx. 1.8kΩ
**Common**: Negative
**Sensing**: 12V DC
**ON current/resistance**: ≥1.5mA, ≤1.5kΩ
**OFF current/resistance**: ≤0.75mA, ≥15kΩ

**■ UNIVERSAL INPUT (Ai 3, Ai 4, Ai 5)**
**• DC current input**
(Range) -20 – +20mA: 50Ω
**• DC voltage input**
(Range) -1 – +1V : 1MΩ
-5 – +5V : 1MΩ
-10 – +10V : 1MΩ
**• Thermocouple input**: K, E, J, T, B, R, S, C, N, U, L, P, PR
**Input resistance**: 30kΩ minimum
**Burnout sensing**: ≤0.1μA
**Burnout indication**: Maximum value (upscale burnout) of the usable range

| T/C | USABLE RANGE (°C) | CONFORMANCE RANGE (°C) |
|---|---|---|
| K (CA) | -272 to +1472 | -150 to +1370 |
| E (CRC) | -272 to +1120 | -170 to +1000 |
| J (IC) | -260 to +1300 | -180 to +1200 |
| T (CC) | -272 to +500 | -170 to +400 |
| B (RH) | 24 to 1920 | 400 to 1760 |
| R | -100 to +1860 | 200 to 1760 |
| S | -100 to +1860 | 0 to 1760 |
| C (WRe 5-26) | -52 to +2416 | 0 to 2315 |
| N | -272 to +1400 | -130 to +1300 |
| U | -252 to +700 | -200 to +600 |
| L | -252 to +1000 | -200 to +900 |
| P (Platinel II) | -52 to +1496 | 0 to 1395 |
| (PR) | -52 to +1860 | 0 to 1760 |

Overrange input (out of the usable range) is handled as burnout.

**• RTD input**: Pt 100 (JIS '97, IEC), Pt 100 (JIS '89), JPt 100 (JIS '89), Pt 50Ω (JIS '81), Ni 100, Cu 10, Cu 50
**Input resistance**: 1MΩ minimum
**Maximum leadwire resistance**: 100Ω per wire
**Burnout indication**: Maximum value (upscale burnout) of the usable range
**Sensing current**: ≤1mA

| RTD | USABLE RANGE (°C) | CONFORMANCE RANGE (°C) |
|---|---|---|
| Pt 100 (JIS '97/IEC) | -240 to +900 | -200 to +850 |
| Pt 100 (JIS '89) | -240 to +900 | -200 to +660 |
| JPt 100 (JIS '89) | -236 to +560 | -200 to +510 |
| Pt 50Ω (JIS '81) | -236 to +700 | -200 to +649 |
| Ni 100 | -100 to +252 | -80 to +250 |
| Cu 10 (25°C) | -212 to +312 | -50 to +250 |
| Cu 50 | -100 to +200 | -50 to +150 |

Overrange input (out of the usable range) is handled as burnout.

## OUTPUT

■ **CONTACT OUTPUT (Do1, Do2)**

• **Relay Output**

**Relay rating**: 250V AC @5A (cos ø = 1)
30V DC @5A (resistive load)
**Maximum switching voltage**: 250V AC or 30V DC
**Maximum switching power**: 65VA or 60W
**Minimum load**: 5V DC @10mA
**Mechanical life**: $2 \times 10^7$ cycles

■ **NETWORK INTERFACE**

• **Modbus-RTU**: Retrievable analog data is Int data (signed 16 bit) only.
**Transmission**: Half-duplex, asynchronous, no procedure
**Interface**: Conforms to EIA RS-485
**Max. transmission distance**: 500 meters
**Baud rate**: 4800, 9600, 19200, 38400 bps
**Data bit**: 8 bits
**Parity**: Odd
**Stop bit**: 1 bit
**Max. number of nodes**: 15 (except the master)
**Media**: Shielded twisted-pair cable (CPEV-S 0.9 dia.)

• **Infrared Interface**

**Interface**: IrDA
**Max. transmission distance**: ≤0.2 m (with COP-IRDA and 71VRCFG)

## INSTALLATION

**Power input**

**AC**: Operational voltage range 85 – 264V
50 / 60 Hz
approx. 7VA at 100V
approx. 10VA at 240V

**DC**: Operational voltage range for R: 24V ±10%, P: 85 – 150V; approx. 6W; ripple 10% p-p max.

**Operating temperature**: -5 to 55°C (23 to 131°F)
**Operating humidity**: 30 to 90% RH (non-condensing)
**Atmosphere**: No corrosive gas or heavy dust
**Mounting**: Panel flush mounting
**Panel cutout dimensions**: 92×92 mm (3.62”×3.62”)
**Usable panel thickness**: 0.5 – 10 mm (0.02” – 0.39”)
**Dimensions**: W96×H96×D110.5 mm (3.78”×3.78”×4.35”)
**Weight**: 550 g (1.2 lbs)

## PERFORMANCE

**DC input**

**Accuracy**: ≤ ±0.1% ±1 digit

**Thermocouple input**

**Conversion accuracy**: ±1°C (±2°C for B, R, S, C, PR)
**CJC error**: ±2°C maximum at 25°C ±10°C
±4°C maximum for R, S, PR

**RTD input**

**Conversion accuracy**: ±1°C (±3°C for Cu 10)

**Temp. coefficient**: ≤ ±0.015%/°C (±0.008%/°F)
≤ ±0.05%/°C (±0.03%/°F) for Cu 10
**Line voltage effect**: ≤ ±0.1% over voltage range
**Response time**: ≤ 0.5 sec. for DC input with the sample rate set to 100 msec.
≤ 2.5 sec. for T/C, RTD input with the sample rate set to 500 msec.
Response time of alarm output, 0 – 100% at 90% setpoint.
**Calendar clock accuracy**: Monthly deviation 2 minutes at 25°C
**Battery backup**: Approx. one month
**Insulation resistance**: ≥100MΩ with 500V DC
(Analog input each other to contact input to contact output 1 to contact output 2 to Modbus interface to power input to FE)
**Dielectric strength**: 2000V AC @1 minute
(Analog input each other to contact input to contact output 1 to contact output 2 to Modbus interface to power input to FE)

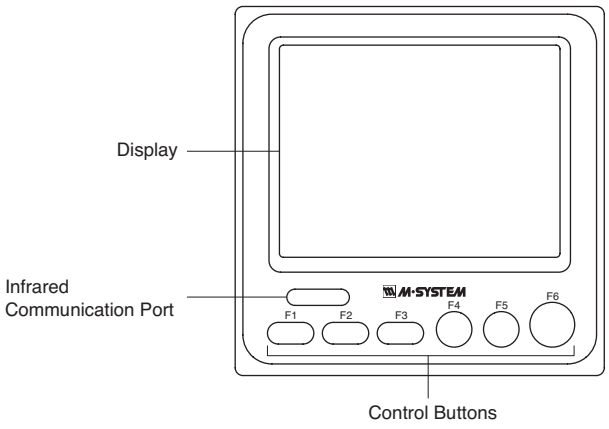
## STANDARDS & APPROVALS

**CE conformity**: EMC Directive (2004/108/EC)
EN 61000-6-4 (EMI)
EN 61000-6-2 (EMS)
Low Voltage Directive (2006/95/EC)
EN 61010-1
Installation Category II
Pollution Degree 2
Max. operating voltage 300V
Analog input or contact input or contact output or network interface to power to FG: Reinforced insulation
Analog input each other to contact input to contact output each other to network interface: Basic insulation

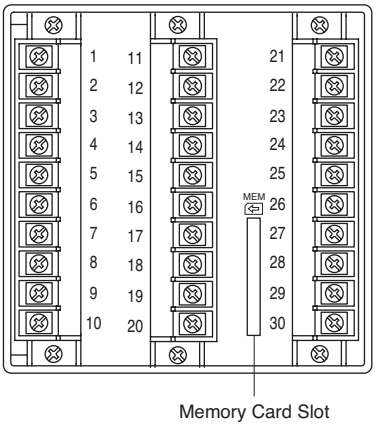
**Protection against access to the terminal blocks**:
Finger protection (VDE 0660-514)

## COMPONENT IDENTIFICATIONS

■ **FRONT VIEW**

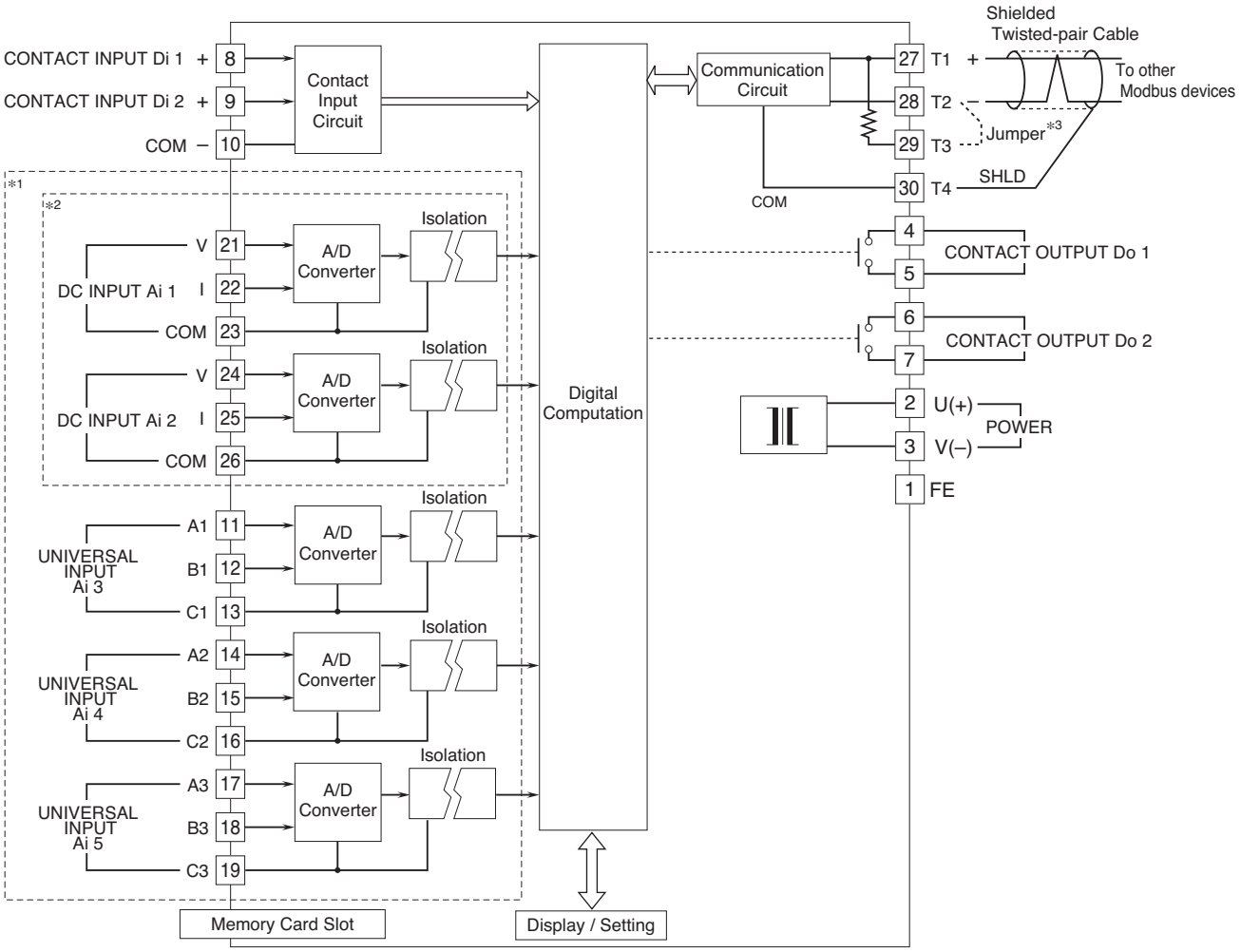



■ **REAR VIEW**




The terminals for number 11 through 20 are only with 5-points input.

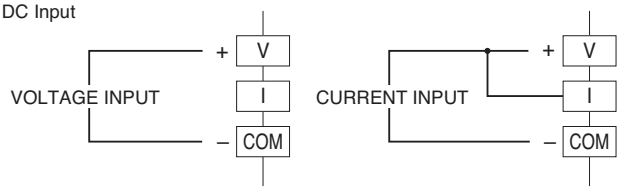
## SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM




*1. Only with 5-point inputs
*2. Only with 2-point DC inputs
*3. When the device is located at the end of a transmission line
via twisted-pair cable (when there is no cross-wiring), close across the terminals T2 - T3 with a leadwire.

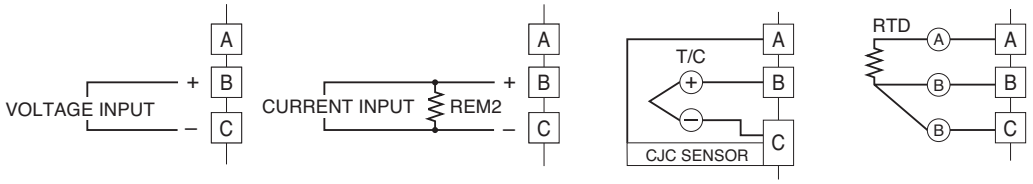
### ■ INPUT CONNECTION E.G.

• DC Input



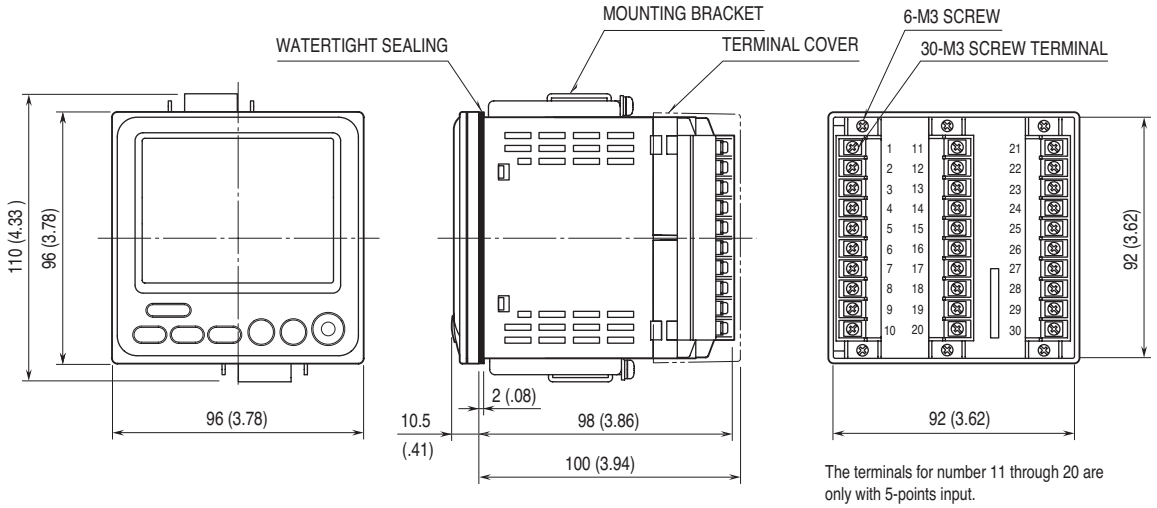

NOTE: Short across the terminals V and I for Current Input.

• Universal Input




NOTE: For mA input, the REM2 is required.

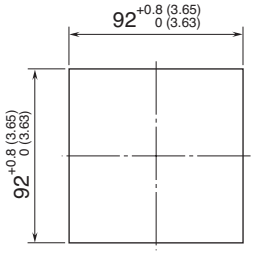
## EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm (inch)




The terminals for number 11 through 20 are only with 5-points input.

## MOUNTING REQUIREMENTS

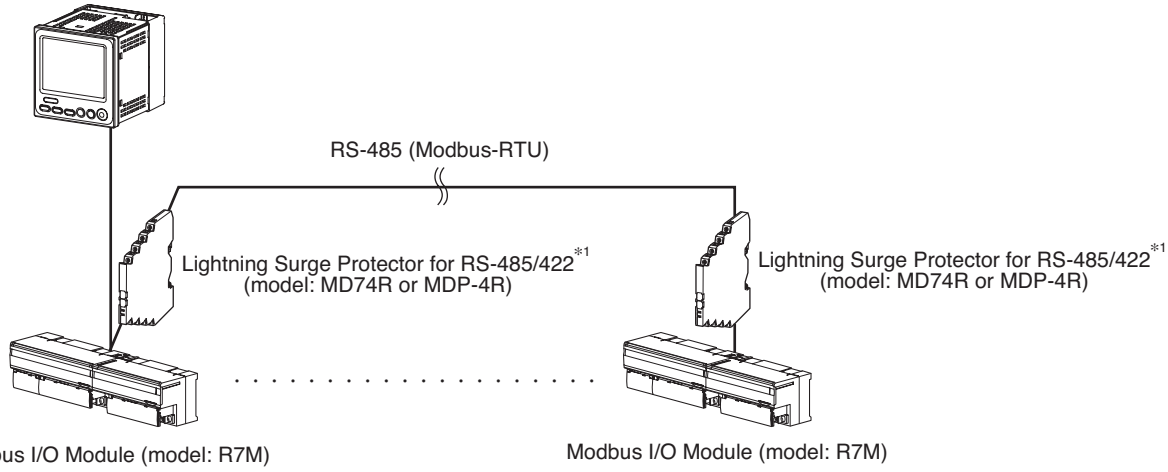
■ **PANEL CUTOUT unit: mm (inch)**




Usable panel thickness: 0.5 – 10 mm (0.02 to 0.39 inch)

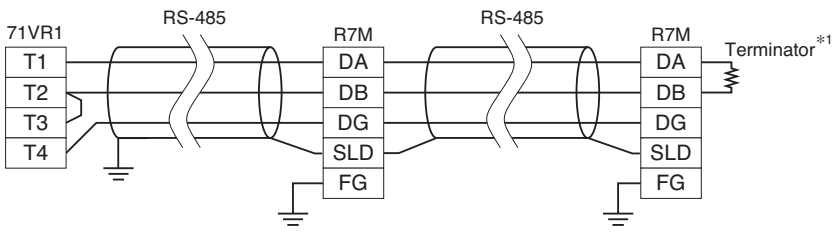
## SYSTEM CONFIGURATION EXAMPLES

Paperless Recorder (model: 71VR1)




*1. Insert lightning surge protectors recommended in this example if necessary.

## MODBUS WIRING DIAGRAM




*1. Use a terminating resistor when the device is at the extreme end of a transmission line.