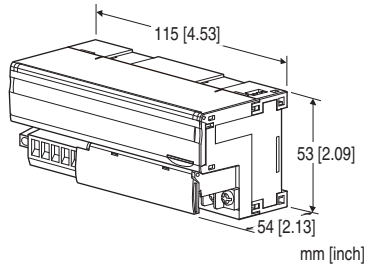
Remote I/O R7 Series

DeviceNet® I/O MODULE

(thermocouple input, 4 points, isolated)

Functions & Features

- 4 points thermocouple input module for DeviceNet
- Extension module can be connected
- Input sensor can be selected with the front DIP switches for all channels
- Individual channels, zero adjustment, span adjustment, and scaling can be set with the configurator software (model: R7CON)



MODEL:R7D–TS4[1]

ORDERING INFORMATION

- Code number: R7D-TS4[1]

Specify a code from below for [1].
(e.g. R7D-TS4/Q)

- Specify the specification for option code /Q
(e.g. /C01/SET)

I/O TYPE

TS4: Thermocouple input, 4 points

[1] OPTIONS

Standards & Approvals

blank: CE marking

/UL: UL approval, CE marking

Other Options

blank: none

/Q: Option other than the above (specify the specification) (UL not available)

SPECIFICATIONS OF OPTION: Q (multiple selections)

COATING (For the detail, refer to our web site.)

/C01: Silicone coating

/C02: Polyurethane coating

/C03: Rubber coating

EX-FACTORY SETTING

/SET: Preset according to the Ordering Information Sheet (No. ESU-7802-B)

RELATED PRODUCTS

- PC Configurator cable (model: MCN-CON or COP-US)
- PC configurator software (model: R7CON)
- EDS file

The EDS files and configurator software are downloadable at our web site.

(Extension modules are registered in the EDS file as a combination of a basic module)

- Discrete input extension module (model: R7D-EAx)
- Discrete output extension module (model: R7D-ECx)

GENERAL SPECIFICATIONS

Connection

DeviceNet: Euro type connector terminal
(applicable wire size: 0.2 to 2.5 mm^2, stripped length 7 mm)

Input: M3 separable screw terminal (torque 0.5 N·m)

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

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

Applicable wire size: 0.25 to 1.65 mm^2 (AWG 22 to 16)

Screw terminal: Nickel-plated steel

Housing material: Flame-resistant resin (gray)

Isolation: Input 0 to input 1 to input 2 to input 3 to DeviceNet

Zero adjustments: Configurable via R7CON

Span adjustments: Configurable via R7CON

Extension: No extension (*), Discrete input 8 or 16 points, Discrete output 8 or 16 points
Selectable with the front DIP SW
(*) Factory default setting

Conversion rate: Selectable with the front DIP SW

Thermocouple setting: Configurable via the front DIP switch or R7CON

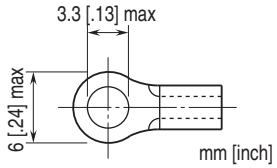
Burnout setting: Selectable between upscale (*) and downscale with the front DIP switch
(*) Factory default setting

Linearization: Standard

Cold junction compensation: CJC sensor attached to the input terminals

Configurator connection: 2.5 dia. miniature jack

■Recommended solderless terminal



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DeviceNet COMMUNICATION

Network cable: Approved for DeviceNet
Baud rate setting: 125 kbps (default), 250 kbps, 500 kbps, auto-tracking (rotary switch)
(Refer to the instruction manual.)
Status indicator LEDs: MS, NS
(Refer to the instruction manual for details.)
Node address setting: 1 - 63 (rotary switch, default:00)
(Refer to the instruction manual.)
Communication: Supports poll and cyclic
(Bit-strobe and COS (change of state) are not suported)

INPUT SPECIFICATIONS

Input resistance: ≥ 30 kΩ
Burnout sensing: ≤ 0.1 μA

T/C	BURNOUT INDICATION (°C)		CONFORMANCE RANGE (°C)
	Downscale	Upscale	
K (CA)	-272	+1472	-150 to +1370
E (CRC)	-272	+1120	-170 to +1000
J (IC)	-260	+1300	-180 to +1200
T (CC)	-272	+ 500	-170 to + 400
B (RH)	24	1920	1000 to 1760
R	-100	+1860	380 to 1760
S	-100	+1860	400 to 1760
C (WRe 5-26)	-52	+2416	100 to 2315
N	-272	+1400	-130 to +1300
U	-252	+ 700	-200 to +600
L	-252	+1000	-200 to +900
P (Platinel II)	-52	+1496	0 to 1395
(PR)	-52	+1860	300 to 1760

T/C	BURNOUT INDICATION (°F)		CONFORMANCE RANGE (°F)
	Downscale	Upscale	
K (CA)	-458	+2682	-238 to +2498
E (CRC)	-458	+2048	-274 to +1832
J (IC)	-436	+2372	-292 to +2192
T (CC)	-458	+932	-274 to +752
B (RH)	75	3488	1832 to 3200
R	-148	+3380	716 to 3200
S	-148	+3380	752 to 3200
C (WRe 5-26)	-62	+4381	212 to 4199
N	-458	+2552	-202 to +2372
U	-422	+1292	-328 to +1112
L	-422	+1832	-328 to +1652
P (Platinel II)	-62	+2725	32 to 2543
(PR)	-62	+3380	572 to 3200

INSTALLATION

Supply voltage to network: 11 – 25 V DC supplied through the network terminal block
Current Consumption:
Approx. 60 mA @ 24 V DC
Approx. 110 mA @ 11 V DC
Operating temperature: -10 to +55°C (14 to 131°F)
Storage temperature: -20 to +65°C (-4 to +149°F)
Operating humidity: 30 to 90 %RH (non-condensing)
Atmosphere: No corrosive gas or heavy dust
Mounting: DIN rail (35 mm rail)
Weight: 200 g (0.44 lb)

PERFORMANCE

Conversion accuracy: ±1°C (±1.8°F) except ±2°C (±3.6°F) for B, R, S, C, PR
Conversion rate: 250 msec. (*) or 500 msec. selectable
(*) Factory default setting
Converted data range:
• Engineering unit value (°C, K) × 10 (integer)
• Engineering unit value (°F)
Cold junction compensation error:
±1.0°C at 25 ±10°C (±1.8°F at 77 ±18°F)
±1.5°C (±2.7°F) for R, S, PR
Temp. coefficient: ±0.015 %/°C (±0.008 %/°F) of max. span
Response time: Conversion rate × 2 + 50 msec. (0 – 90 %)
Insulation resistance: ≥ 100 MΩ with 500 V DC
Dielectric strength: 1500 V AC @ 1 minute (input 0 to input 1 to input 2 to input 3 to DeviceNet)

STANDARDS & APPROVALS

EU conformity:
EMC Directive
EMI EN 61000-6-4
EMS EN 61000-6-2
RoHS Directive
Approval:
UL/C-UL nonincendive Class I, Division 2,
Groups A, B, C, and D
(ANSI/UL 121201, CAN/CSA-C22.2 No.213-17)
UL/C-UL general safety requirements
(UL 61010-1, CAN/CSA-C22.2 No.61010-1)
Note: This equipment is to be supplied by a Class 2 power supply when using as conformity with UL/C-UL.

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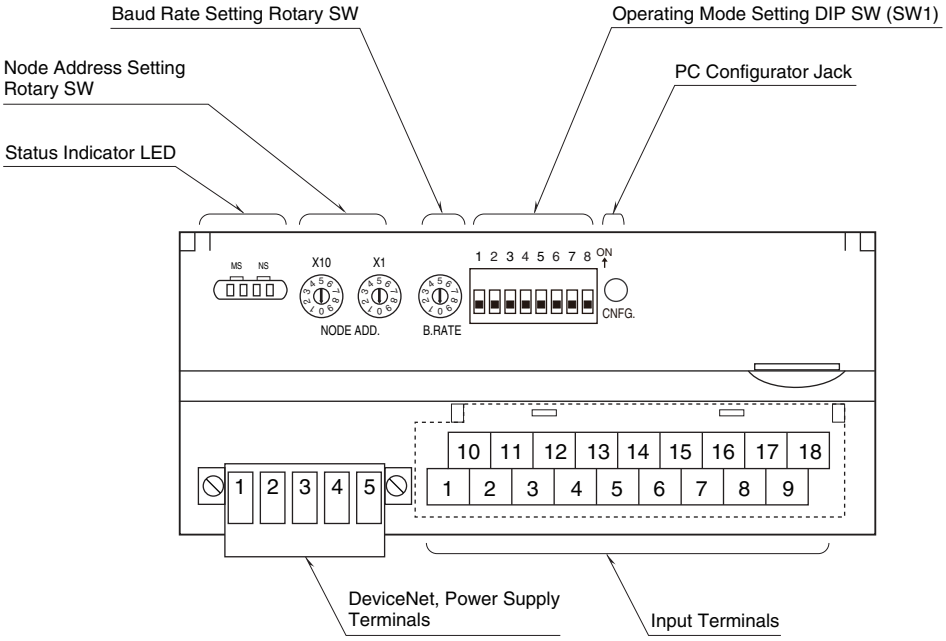
EXTERNAL VIEW



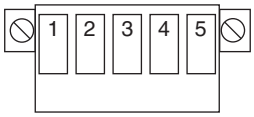
TERMINAL ASSIGNMENTS

■ INPUT TERMINAL ASSIGNMENT

10	11	12	13	14	15	16	17	18
+IN0	–IN0	+IN1	–IN1	NC	+IN2	–IN2	+IN3	–IN3
1	2	3	4	5	6	7	8	9
+CJ0	–CJ0	+CJ1	–CJ1	NC	+CJ2	–CJ2	+CJ3	–CJ3

NO.	ID	FUNCTION	NO.	ID	FUNCTION
1	+CJ0	CJC + 0	10	+IN0	T/C + 0
2	–CJ0	CJC – 0	11	–IN0	T/C – 0
3	+CJ1	CJC + 1	12	+IN1	T/C + 1
4	–CJ1	CJC – 1	13	–IN1	T/C – 1
5	NC	No connection	14	NC	No connection
6	+CJ2	CJC + 2	15	+IN2	T/C + 2
7	–CJ2	CJC – 2	16	–IN2	T/C – 2
8	+CJ3	CJC + 3	17	+IN3	T/C + 3
9	–CJ3	CJC – 3	18	–IN3	T/C – 3

■ DeviceNet TERMINAL ASSIGNMENT



PIN NO.	COLOR	ID	FUNCTION
1	Red	V+	Network power supply +
2	White	CAN_H	Network data High
3	–	Drain	Shield
4	Blue	CAN_L	Network data Low
5	Black	V–	Network power supply –

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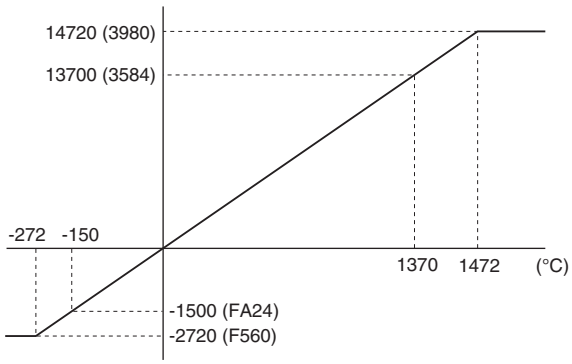
DATA CONVERSION

■ INPUT RANGE AND DATA CONVERSION (FACTORY DEFAULT SETTING)

Engineering unit value °C or K is multiplied by 10 and expressed in 16 bits. °F data is represented in engineering unit value, without multiplication. Negative value is represented in 2's complements.

• Input TYPE K Thermocouple

Input Value	Converted Data, Decimal	Converted Data, Hex
≤ -272°C	-2720	F560
-150°C	-1500	FA24
1370°C	13700	3584
≥ 1472°C	14720	3980



DATA ALLOCATION

• Example 1. Analog Input Module, without Status

Output Data

Begin +0	Analog Input Module	CH0
+1		CH1
+2		CH2
+3		CH3

Input Data

None

• Example 2. Analog Input Module, with Status

Output Data

Begin +0	Analog Input Module	CH0
+1		CH1
+2		CH2
+3		CH3
+4	Status	

Input Data

None

• Example 3. Analog Input Module + R7D-EA16, with Status

Output Data

Begin +0	Analog Input Module	CH0
+1		CH1
+2		CH2
+3		CH3
+4	R7D-EA16	
+5	Status	

Input Data

None

• Example 4. Analog Input Module + R7D-EC16x, with Status

Output Data

Begin +0	Analog Input Module	CH0
+1		CH1
+2		CH2
+3		CH3
+4	Status	

Input Data

Begin +0	R7D-EC16x

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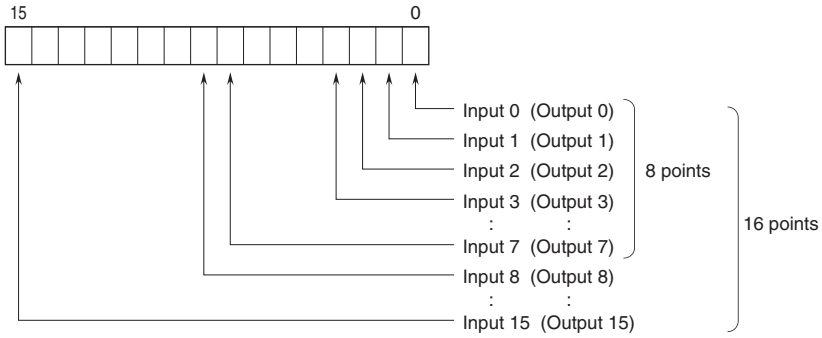
I/O DATA DESCRIPTIONS

■ ANALOG INPUT

16-bit binary data
Negative values represented in 2's complements

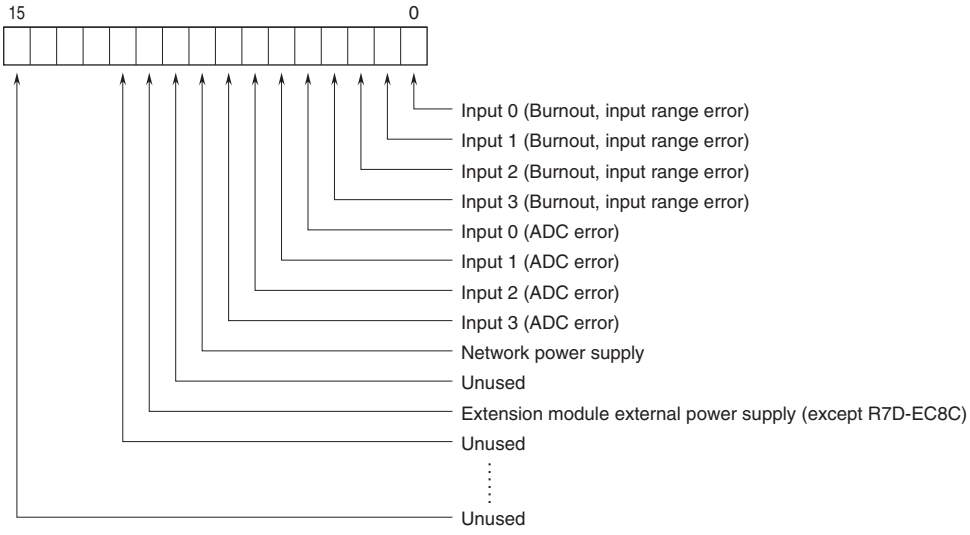
■ DISCRETE I/O



0 : OFF
1 : ON

■ STATUS

Bit 0 to 7: Analog input modules can show input status of each channel.
Bit 8 to 10: Shows the power supply status.



Burnout, input range error (≤ -15%, ≥ +115%)
0 : Normal 1 : Error
ADC error (no response from ADC)
0 : Normal 1 : Error
Power supply
0 : Normal 1 : Error

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TRANSMISSION DATA DESCRIPTIONS

■ BASIC MODULE

Transmitted data (word) depends upon the modules types.

MODEL	OUTPUT DATA*1 (R7D to Master)	INPUT DATA*2 (Master to R7D)
R7D-TS4	4	0

■ EXTENSION MODULE

Transmitted data (word) for the extension module is added.

MODEL	OUTPUT DATA*1 (R7D to Master)	INPUT DATA*2 (Master to R7D)
R7D-EAx	1	0
R7D-ECx	0	1

■ STATUS

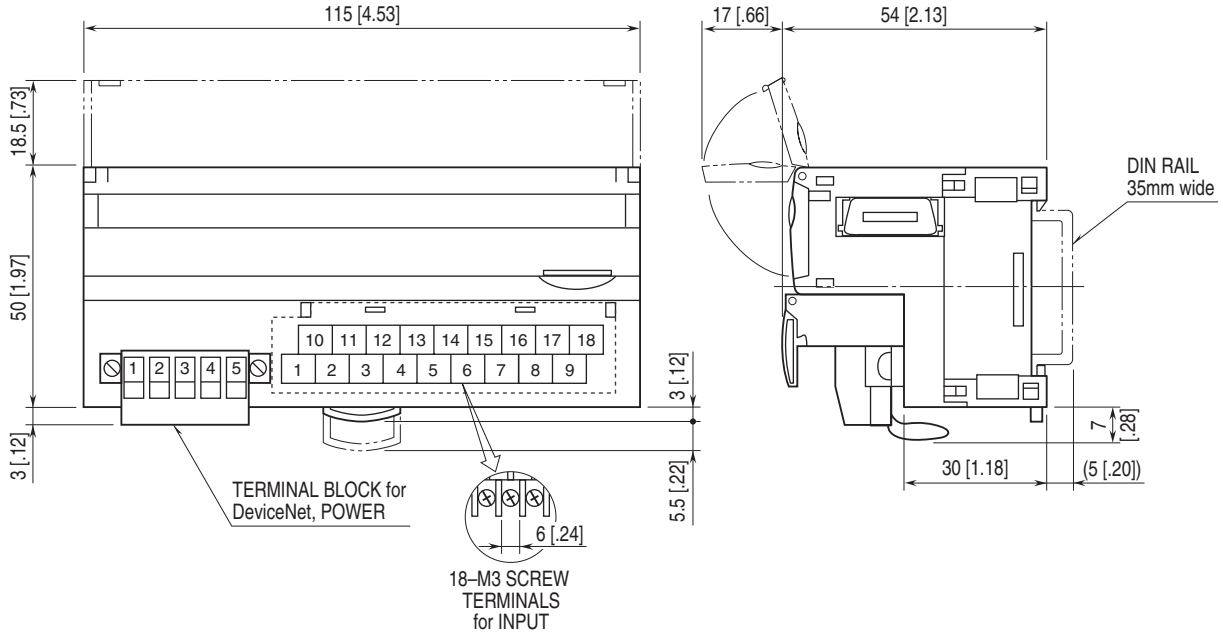
Status signal can be included in the transmission data when the setting is enabled using the PC Configurator software (model: R7CON). For details, refer to “STATUS in I/O DATA DESCRIPTIONS”.

STATUS	OUTPUT DATA*1 (R7D to Master)	INPUT DATA*2 (Master to R7D)
Enabled	1	0
Disabled	0	0

*1. Output Data means those sent to the master.

*2. Input Data means those received from the master.

EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm [inch]



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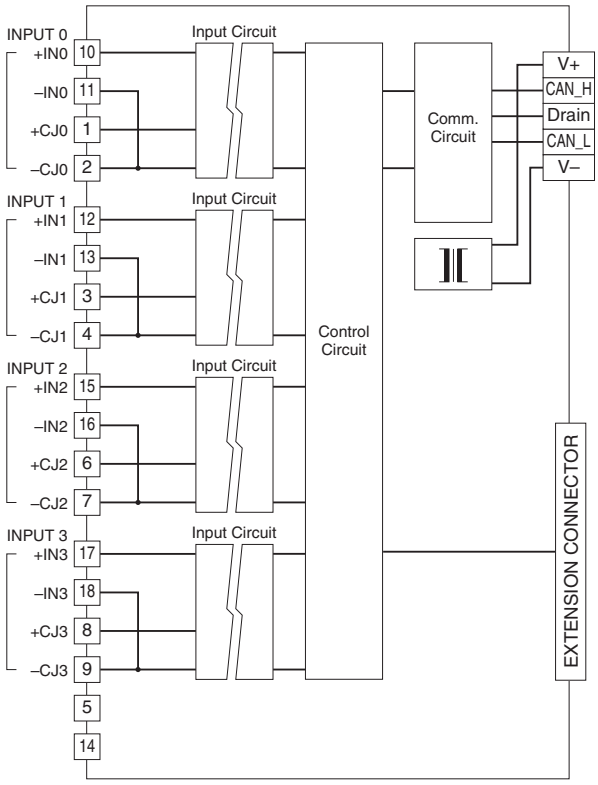
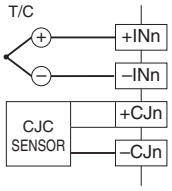
SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM



■ **Input Connection Example**



⚠ Specifications are subject to change without notice.

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