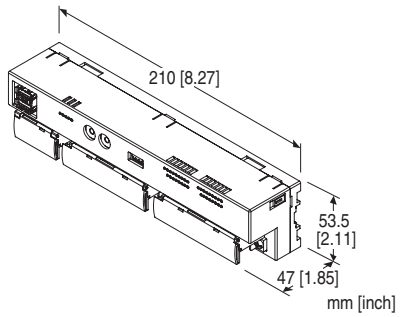
Remote I/O R7K4F Series

MECHATROLINK I/O MODULE

(NPN transistor output & NPN/PNP discrete input, 16 points each, screw terminal block, MECHATROLINK- I/- II use)

Functions & Features

• 16 points NPN transistor output & 16 points NPN/PNP discrete input module for MECHATROLINK- I/- II



MECHATROLINK

MODEL: R7K4FML-6-DCA32A-R[1]

ORDERING INFORMATION

• Code number: R7K4FML-6-DCA32A-R[1]
Specify a code from below for [1].
(e.g. R7K4FML-6-DCA32A-R/Q)
• Specify the specification for option code /Q
(e.g. /C01)

TERMINAL BLOCK

6: Screw terminal block for power supply
Connector for MECHATROLINK-I/-II
Screw terminal block for I/O

I/O TYPE

DCA32A: NPN transistor output &
NPN/PNP discrete input, 16 points each

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)

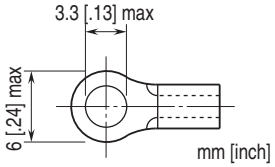
SPECIFICATIONS OF OPTION: Q

COATING (For the detail, refer to our web site.)
/C01: Silicone coating
/C02: Polyurethane coating
/C03: Rubber coating

GENERAL SPECIFICATIONS

Connection
MECHATROLINK: MECHATROLINK-I/-II connector
Power input, I/O: 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 to output to MECHATROLINK or FE to power
Status indicator LED: PWR, ERR, SD, RD
(Refer to the instruction manual for details)
Discrete I/O status indicator LED: Green LED turns on with I/O ON

■Recommended solderless terminal



MECHATROLINK COMMUNICATION

MECHATROLINK mode: Set with DIP switches
(MECHATROLINK-I or -II, data length; Factory setting: MECHATROLINK-II; data length (32 byte)
(Refer to the instruction manual)
Station address: 60H - 7FH
(Function selected with Rotary SW. Factory setting: 61H).
(Refer to the instruction manual)

■ **MECHATROLINK-I**
Baud rate: 4 Mbps
Transmission distance: 50 m max.
Distance between stations: 30 cm min.
Transmission media: MECHATROLINK cable (Model JEPMC-W6003-x-E, Yaskawa Controls Co., Ltd.)
Max. number of slaves: 15
(The maximum number of slaves might change depending on the master unit. Refer to the manual of the master unit)
Transmission cycle: 2 msec. (fixed)
Data length: 17 byte

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■ MECHATROLINK-II
Baud rate: 10 Mbps
Transmission distance: 50 m max.
Distance between stations: 50 cm min.
Transmission media: MECHATROLINK cable (Model JEPMC-W6003-x-E, Yaskawa Controls Co., Ltd.)
Max. number of slaves: 30
(The maximum number of slaves might change depending on the master unit. Refer to the manual of the master unit)
Transmission cycle: 0.25 msec., 0.5 msec., 1 msec., 1.5 msec., 2 msec., 4 msec., 8 msec.
Data length: 17 bytes / 32 bytes selectable (Must choose identical data size for all stations on one network)

INPUT SPECIFICATIONS

Common: Positive or negative common (NPN/PNP) per 16 points
Maximum inputs applicable at once: No limit (at 24 V DC)
Rated input voltage: 24 V DC ±10 %; ripple 5 %p-p max.
ON voltage / current: ≥ 15 V DC (input – COM) / ≥ 3.5 mA
OFF voltage / current: ≤ 5 V DC (input – COM) / ≤ 1 mA
Input current: ≤ 5.5 mA per point at 24 V DC
Input resistance: Approx. 4.4 kΩ
ON delay: ≤ 0.5 msec.
OFF delay: ≤ 1.0 msec.

OUTPUT SPECIFICATIONS

Common: Negative common (NPN) per 16 points
Maximum outputs applicable at once: No limit (at 24 V DC)
Rated load voltage: 24 V DC ±10 %, ripple 5 %p-p max.
Rated output current: 0.1 A per point, 1.6 A per common
Residual voltage: ≤ 1.2 V
Leakage current: ≤ 0.1 mA
ON delay: ≤ 0.5 msec.
OFF delay: ≤ 1.0 msec.
Overload current protection function: Limits the current value when overcurrent is detected
Overheat protection function: Turns OFF the outputs when overheat is detected
(When driving an inductive load, connect a diode in parallel with the load.)

INSTALLATION

Current consumption
•**DC**: Approx. 60 mA
Operating temperature: 0 to 55°C (32 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: Surface or DIN rail (35 mm rail)
Weight: 330 g (0.73 lb)

PERFORMANCE

Insulation resistance: ≥ 100 MΩ with 500 V DC
Dielectric strength: 1500 V AC @ 1 minute (input to output to power)
500 V AC @ 1 minute (MECHATROLINK or FE to input or output or power)

STANDARDS & APPROVALS

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

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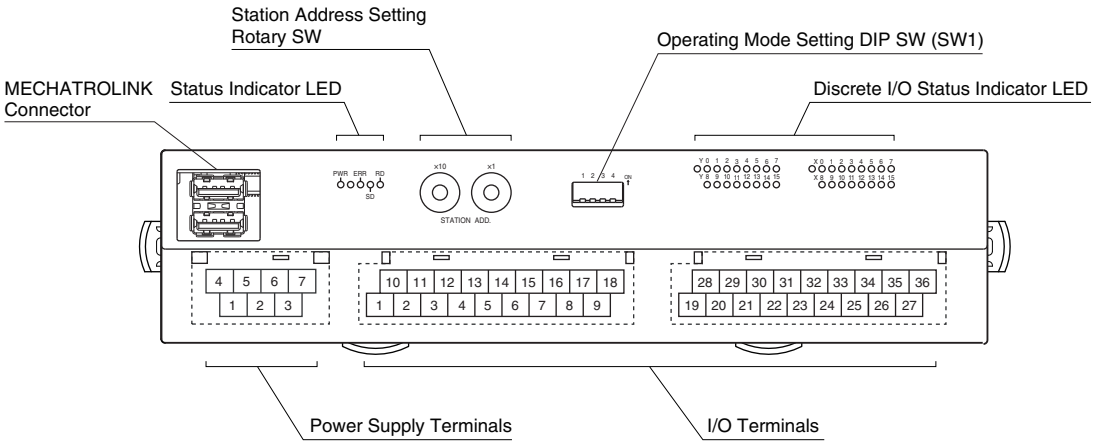
EXTERNAL VIEW



TERMINAL ASSIGNMENTS

■I/O TERMINAL ASSIGNMENT

10	11	12	13	14	15	16	17	18
+24V	Y1	Y3	Y5	Y7	Y9	Y11	Y13	Y15
1	2	3	4	5	6	7	8	9
0V	Y0	Y2	Y4	Y6	Y8	Y10	Y12	Y14

28	29	30	31	32	33	34	35	36
COM	X1	X3	X5	X7	X9	X11	X13	X15
19	20	21	22	23	24	25	26	27
COM	X0	X2	X4	X6	X8	X10	X12	X14

NO.	ID	FUNCTION	NO.	ID	FUNCTION
1	0V	0V (Out Common)	10	+24V	24V DC
2	Y0	Output 0	11	Y1	Output 1
3	Y2	Output 2	12	Y3	Output 3
4	Y4	Output 4	13	Y5	Output 5
5	Y6	Output 6	14	Y7	Output 7
6	Y8	Output 8	15	Y9	Output 9
7	Y10	Output 10	16	Y11	Output 11
8	Y12	Output 12	17	Y13	Output 13
9	Y14	Output 14	18	Y15	Output 15

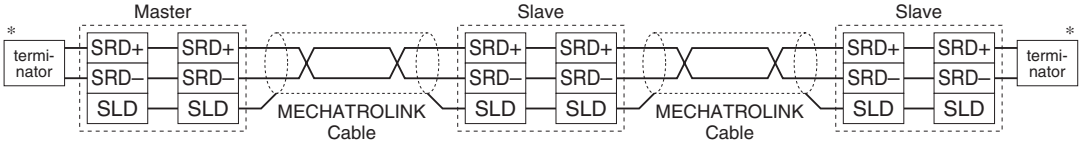
NO.	ID	FUNCTION	NO.	ID	FUNCTION
19	COM	Common	28	COM	Common
20	X0	Input 0	29	X1	Input 1
21	X2	Input 2	30	X3	Input 3
22	X4	Input 4	31	X5	Input 5
23	X6	Input 6	32	X7	Input 7
24	X8	Input 8	33	X9	Input 9
25	X10	Input 10	34	X11	Input 11
26	X12	Input 12	35	X13	Input 13
27	X14	Input 14	36	X15	Input 15

■ **POWER SUPPLY TERMINAL ASSIGNMENT**

4	5	6	7
NC	NC	+24V	0V
1	2	3	
NC	NC	FE	

1. NC –
2. NC –
3. FE Functional earth
4. NC –
5. NC –
6. +24V Power supply (24V DC)
7. 0V Power supply (0V)

■ MECHATROLINK CONNECTION



*Terminator
Be sure to connect the terminating resistors to the unit at both ends of transmission line.
Use the terminating resistor dedicated for MECHATROLINK: Model JEPMC-W6022, Yaskawa Controls Co., Ltd.
Certain types of Master units may have incorporated terminating resistors. Consult the instruction manual of the Master unit.

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MECHATROLINK RELATED COMMANDS

R7K4FML (Simple I/O) communicates with I/O service with no processor, therefore it uses a connectionless communication protocol. There is no application layer either; the R7K4FML interchanges I/O data via data link layer.

■ MECHATROLINK DATA LINK LAYER COMMAND DESCRIPTIONS

The following tables explain the two Commands supported by the R7K4FML.

• MDS Command (04H) Data Format

BYTE	COMMAND	RESPONSE	REMARKS
0	MDS (04H)	S(0) (90H)	Message Data Search (MDS) Command: Read the ID from slave station(s) S(0): Response to MDS
1	0	ID	
2	0		
3	0	0	All 0
4	0	0	
5	0	0	
6	0	0	
7	0	0	
8	0	0	
9	0	0	
10	0	0	
11	0	0	
12	0	0	
13	0	0	
14	0	0	
15	0	0	
16	0	0	
17 : 31	0 : 0	0 : 0	Byte 17 through 31 are always 0 in the 32-byte mode. These bytes are unavailable for MECHATROLINK-I and MECHATROLINK-II in the 17-byte mode.

• CDRW Command (03H) Data Format

BYTE	COMMAND	RESPONSE	REMARKS
0	CDRW (03H)	ACK (01H)	Cyclic Data Read/Write (CDRW) Command: Link transmission Acknowledge (ACK): Positive response to CDRW
1	Out Data: Lowest	In Data: Lowest	Order of data: Little Endian
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16	Out Data: Highest	In Data: Highest	
17 : 31	 (Out Data: Highest)	 (In Data: Highest)	Byte 17 through 31 are unavailable for MECHATROLINK-I and MECHATROLINK-II in the 17-byte mode. (Only available for MECHATROLINK-II in the 32-byte mode)

I/O DATA DESCRIPTIONS

■ **DISCRETE I/O**

In 0 to 15, Out 0 to 15: **0: OFF, 1: ON**

• 17-BYTE MODE

16 points output, Out Data

Byte	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
⋮	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0
15	Out7	Out6	Out5	Out4	Out3	Out2	Out1	Out0
16	Out15	Out14	Out13	Out12	Out11	Out10	Out9	Out8

16 points input, In Data

Byte	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
1	In7	In6	In5	In4	In3	In2	In1	In0
2	In15	In14	In13	In12	In11	In10	In9	In8
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
⋮	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0

• 32-BYTE MODE

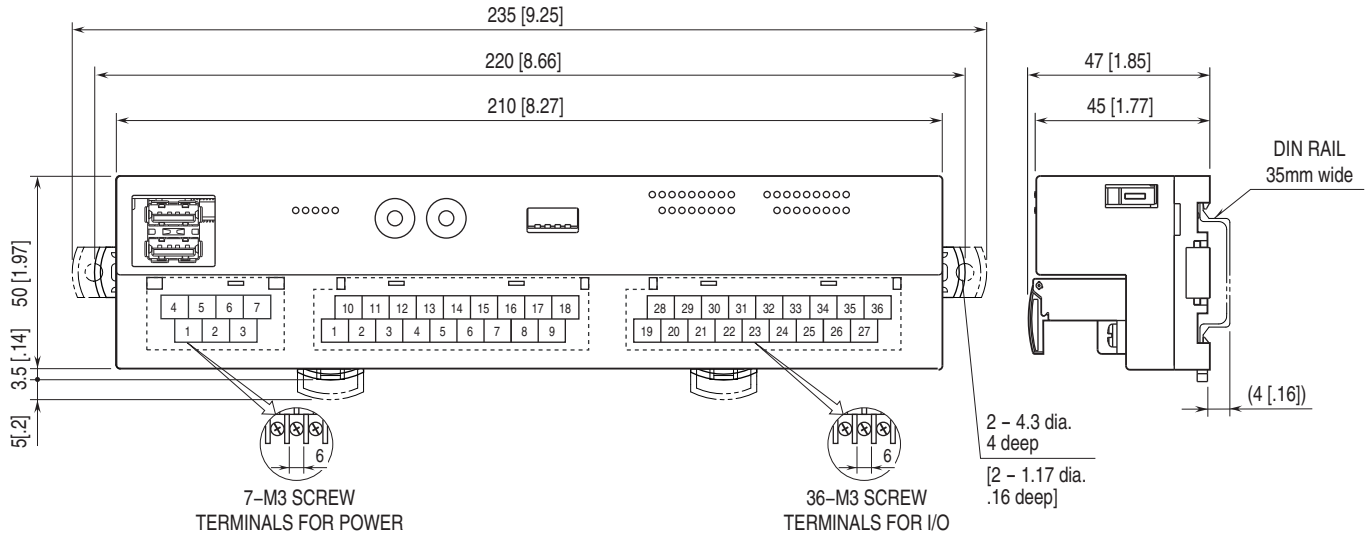
16 points output, Out Data

Byte	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
⋮	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0
31	Out7	Out6	Out5	Out4	Out3	Out2	Out1	Out0
32	Out15	Out14	Out13	Out12	Out11	Out10	Out9	Out8

16 points input, In Data

Byte	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
1	In7	In6	In5	In4	In3	In2	In1	In0
2	In15	In14	In13	In12	In11	In10	In9	In8
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
⋮	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0

EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm [inch]



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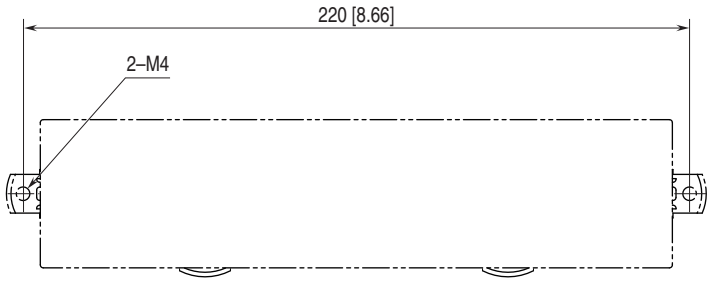
MOUNTING REQUIREMENTS unit: mm [inch]



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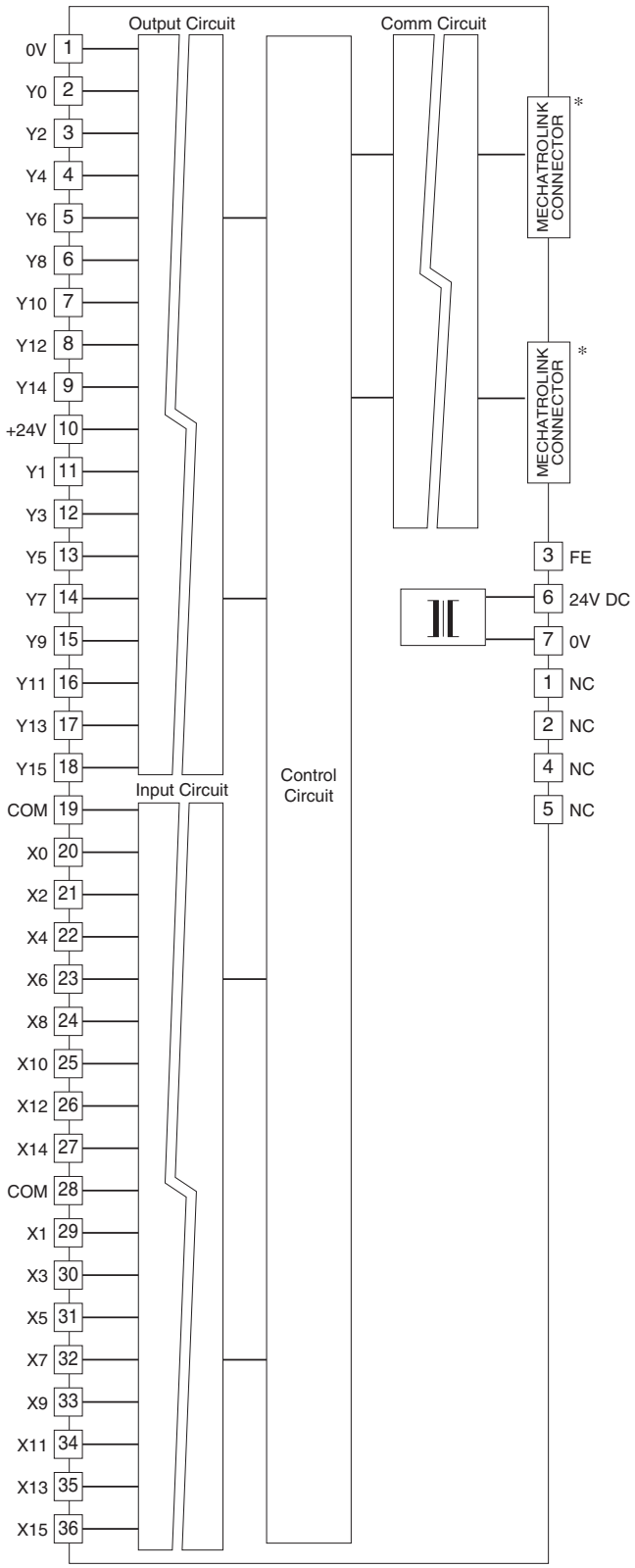
SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM

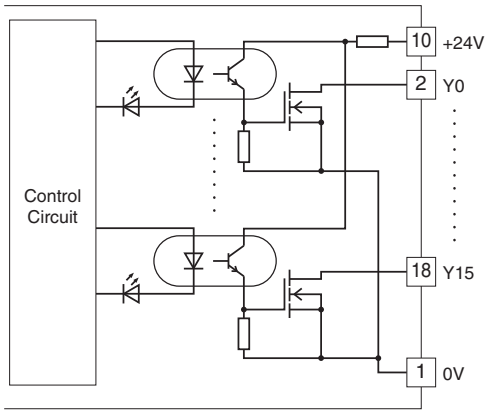
Note: In order to improve EMC performance, bond the FE terminal to ground.

Caution: FE terminal is NOT a protective conductor terminal.

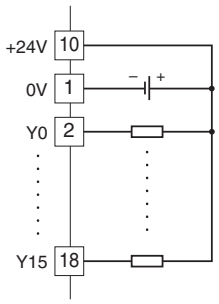


*MECHATROLINK connectors are internally connected.
The network cable can be connected to either one.

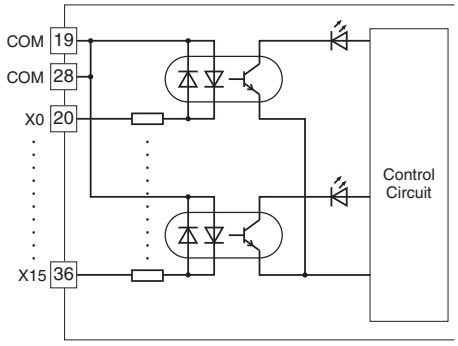
■ **Output Circuit**



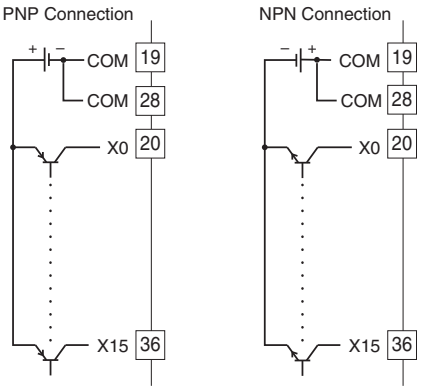
■ **Output Connection Examples**



■ **Input Circuit**



■ **Input Connection Examples**



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⚠ Specifications are subject to change without notice.

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