

Digital Fiber Amplifier with IO-Link interface

D4RF, D4IF SERIES

IO-Link setting file (IODD file) can be downloaded from our web site.

<https://www.optex-fa.com>

OPTEX FA CO., LTD.

Communication specifications

Minimum cycle time		0.5 ms	
Baud rate		COM 3 (230.4kbps)	
M-Sequence code in Pre-operate mode		0	
M-Sequence code in Operate mode		4	
ISDU support		Yes	
IO-Link revision		1.1	
Number of process input data bytes		4 byte	
Number of process output data bytes		0 byte	
Vender ID		DEC: 1076	HEX: 0434
Device ID	20529 (D4RF-TD)	DEC: 65546	HEX: 1000A
	20767 (D4RF-TD-Y)		
	20530 (D4RF-T)	DEC: 65545	HEX: 10009
	20531 (D4RF-TC4)		
	20752 (D4IF-T)		
	20753 (D4IF-TC4)		
	20995 (D4RF-T-Y)		

Process Data Format

With the D4RF, D4IF series, the content of process input data transmitted via IO-Link communication can be selected from the following two formats.

*The format of process input data can be switched by using Index 120.

#	Description		Byte No.	Bit							
				7	6	5	4	3	2	1	0
1	When value of Index 120 is 0x00 *Default setting	Received light level and output	n+0	Received light level (no units)							
			n+1	Reserved							
			n+2	Reserved							
			n+3	Reserved				Qint. 2	Qint. 1	QL 2	QL 1
2	When value of Index 120 is 0x12	Counter value and output	n+0	Counter value							
			n+1	Reserved							
			n+2	Reserved							
			n+3	Reserved				Qint. 2	Qint. 1	QL 2	QL 1

Word assignment

Example: When using the IO-Link master of OPTEX FA (default setting: little endian)

Word No.	Byte							
	Higher order byte				Lower order byte			
N+0	Process data n+2				Process data n+3			
N+1	Process data n+0				Process data n+1			

Word No.	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
N+0	Reserved												Qint. 2	Qint. 1	QL 2	QL 1
N+1	Received light level (no units)															

Service Data

Category	Name	Index No. DEC (HEX)	Sub index No.	Read/Write *	Backup	Format	Length in bytes	Default	Setting details	Remarks (Unit)
System	System command	2 (0x02)	0	W		UINT	1		0x41: 1-point teach (threshold 1) 0x42: 1-point teach (threshold 2) 0x43: 2-point teach (teach point 1) 0x44: 2-point teach (teach point 2) 0x45: Through teach 0x47: Auto teach start 0x48: Auto Teach stop 0x4B: Zone teach 0x81: Setting reset 0x82: Restore factory settings 0xC0: Reset counter 0xC1: Preset counter 0xD0: Load preset number 0xD1: Save to preset number 0xD6: Zero set of measurement value 0xD7: Zero reset of measurement value 0xE4: Reset diagnostics parameter	
General Settings	Access Lock	12 (0x0C)	0	R/W	✓	UINT	2	0	bit 01: Storage lock bit 02: Parameter lock bit 03: Key lock	
Identification	Vendor Name	16 (0x10)	0	R		STRING	8	OPTEX FA		
	Product Name	18 (0x12)	0	R		STRING	8	D4RF-TD D4RF-TD-Y D4RF-T D4RF-TC4 D4IF-T D4IF-TC4 D4RF-T-Y		
	Product ID	19 (0x13)	0	R		STRING	5	20529 20530 20531 20752 20753 20767 20995		20529: D4RF-TD 20530: D4RF-T 20531: D4RF-TC4 20752: D4IF-T 20753: D4IF-TC4 20767: D4RF-TD-Y 20995: D4RF-T-Y
	Product Text	20 (0x14)	0	R		STRING	26	Photoelectric Fiber Sensor		
	Serial Number	21 (0x15)	0	R		STRING	8	YYWWNNNN		Y=Year, W=CW, N=Number
	Hardware Version	22 (0x16)	0	R		STRING	4			
	Firmware Version	23 (0x17)	0	R		STRING	6			
	Application Specific Tag	24 (0x18)	0	R/W	✓	STRING	32	*****		
Observation	Device Status	36 (0x24)	0	R		UINT	1		0x00: Device is OK 0x01: Maintenance required 0x02: Out of specification 0x04: Failure	

*R: Read only, W: Write only, R/W: Read/Write

Category	Name	Index No. DEC (HEX)	Sub index No.	Read/ Write *	Backup	Format	Length in bytes	Default	Setting details	Remarks (Unit)
Observation	Detailed Device Status	37 (0x25)	0	R		UINT	9		Expressed in 3 bytes per set of EVENT information currently occurring Event #1 n+0, n+1: Event code 0x1800: High temperature (depends on high temperature setting of index 179, subindex 1) 0x1801: Low temperature (depends on low temperature setting of index 179, subindex 2) 0x1802: Operating hours (depends on operating hours setting of index 179, subindex 3) 0x1803: Received light level diagnostic 0x1804: Short-circuit on output n+2: Event details Bit 00 to 02: Source (0: Unknown, 4: On application) Bit 03: Reserved Bit 04 to 05: Type (1: Notification, 2: Warning, 3: Failure) Bit 06 to 07: Mode (1: One-off, 2: Resolved, 3: Occurred) Same format as above for events #2...3 thereafter.	
Detection Setting	Teach channel	58 (0x3A)	0	R/W		UINT	1	0	0x00: default Quint. = Quint.1 0x01: Quint.1 0x02: Quint.2	
Observation	Teach status	59 (0x3B)	0	R		UINT	1		Bit 0 to 3: Teach status 0: IDLE 1: 1-PT SUCCESS 2: 2-PT SUCCESS 3: 1/2-PT SUCCESS 4: WAITING FOR COMMAND 5: BUSY 7: ERROR Bit 4: Teach status SP1 TP1 0: Not taught 1: Successfully taught Bit 5: Teach flag SP1 TP2 0: Not taught 1: Successfully taught Bit 6: Teach flag SP2 TP1 0: Not taught 1: Successfully taught	
Detection Settings	Quint. 1 SP1/SP2: Quint. 1 threshold 1	60 (0x3C)	1	R/W	✓	INT	2	100	15 to 9999 (default)*	*The threshold value carries depending on the response time setting. Reference) Minimum threshold value per response time 16µs :20 70µs :19 250µs :15 500µs :16 1ms :23 2ms :28 8ms :27 If a value outside the threshold range is written, a parameter error occurs, so rewrite with a value within the range.
	Quint. 1 SP1/SP2: Quint. 1 threshold 2		2	R/W	✓	INT	2	200	15 to 9999 (default)*	
	Quint. 1 configuration: Quint. 1 switchpoint logic	61 (0x3D)	1	R/W	✓	UINT	1	0	0x00: Light on/N.O. 0x01: Dark on/N.C.	
	Quint. 1 configuration: Quint. 1 switchpoint mode		2	R/W	✓	UINT	1	1	0x00: Not used 0x01: 1-point mode 0x02: 2-point zone mode 0x80: Edge height jump	
	Quint. 1 configuration: Quint. 1 switchpoint hysteresis		3	R/W	✓	UINT	2	5	1 to 99	Unit: %
	Quint.2 SP1/SP2: Quint. 2 threshold 1	62 (0x3E)	1	R/W	✓	INT	2	100	15 to 9999 (default)*	*The threshold value carries depending on the response time setting. Reference) Minimum threshold value per response time 16µs :20 70µs :19 250µs :15 500µs :16 1ms :23 2ms :28 8ms :27 If a value outside the threshold range is written, a parameter error occurs, so rewrite with a value within the range.
	Quint.2 SP1/SP2: Quint. 2 threshold 2		2	R/W	✓	INT	2	200	15 to 9999 (default)*	
	Quint. 2 configuration: Quint. 2 switchpoint logic	63 (0x3F)	1	R/W	✓	UINT	1	0	0x00: Light on/N.O. 0x01: Dark on/N.C.	
	Quint. 2 configuration: Quint. 2 switchpoint mode		2	R/W	✓	UINT	1	1	0x00: Not used 0x01: 1-point mode 0x02: 2-point zone mode 0x80: Edge height jump	
	Quint. 2 configuration: Quint. 2 switchpoint hysteresis		3	R/W	✓	UINT	2	5	1 to 99	Unit: %
Identification	Device/function name	64 (0x40)	0	R/W	✓	STRING	32	*****		

*R: Read only, W: Write only, R/W: Read/Write

Category	Name	Index No. DEC (HEX)	Sub index No.	Read/ Write *	Backup	Format	Length in bytes	Default	Setting details	Remarks (Unit)
Detection Settings	Teach offset	90 (0x5A)	0	R/W	✓	INT	1	10	0 to 99	Unit: %
	Setup edge height jump Quint. 1: Cycle offset	93 (0x5D)	1	R/W	✓	UINT	1	10	1 to 255	
	Setup edge height jump Quint. 1: Mini- mum height jump		2	R/W	✓	UINT	2	100	32 to 9999 (default)*	*The threshold value varies depending on the response time setting. Reference) Minimum threshold value per response time 16μs :32 70μs :37 250μs :32 500μs :32 1ms :47 2ms :49 8ms :55 If a value outside the threshold range is written, a parameter error occurs, so rewrite with a value within the range.
	Setup edge height jump Quint. 1: Maxi- mum height jump		3	R/W	✓	UINT	2	9999	32 to 9999 (default)*	
	Setup edge height jump Quint. 1: Hysteresis		4	R/W	✓	UINT	2	5	1 to 9999	
	Setup edge height jump Quint. 1: Jump direction		5	R/W	✓	UINT	1	2	0x00: Positive edge 0x01: Negative edge 0x02: Positive and negative edge	
	Setup edge height jump Quint. 2: Cycle offset	94 (0x5E)	1	R/W	✓	UINT	1	10	1 to 255	
	Setup edge height jump Quint. 2: Min. height jump		2	R/W	✓	UINT	2	100	32 to 9999 (default)*	*The threshold value varies depending on the response time setting. Reference) Minimum threshold value per response time 16μs :32 70μs :37 250μs :32 500μs :32 1ms :47 2ms :49 8ms :55 If a value outside the threshold range is written, a parameter error occurs, so rewrite with a value within the range.
	Setup edge height jump Quint. 2: Max. height jump		3	R/W	✓	UINT	2	9999	32 to 9999 (default)*	
	Setup edge height jump Quint. 2: Hysteresis		4	R/W	✓	UINT	2	5	1 to 9999	
	Setup edge height jump Quint. 2: Jump direction		5	R/W	✓	UINT	1	2	0x00: Positive edge 0x01: Negative edge 0x02: Positive and negative edge	
	Response time	95 (0x5F)	0	R/W	✓	UINT	1	4	0x00: 8000 μs 0x01: 2000 μs 0x02: 1000 μs 0x03: 500 μs 0x04: 250 μs 0x05: 70 μs 0x06: 16 μs	
General Settings	Emitter setting: Emitter status	97 (0x61)	1	R/W		UINT	1	0	0x00: Emitter on 0x01: Emitter off	
	Emitter setting: Emitter power		2	R/W	✓	UINT	1	0	0x00: Maximum 0x01: Middle 0x02: Minimum 0x0A: Auto	
	Emitter setting: Emitter APC		3	R/W	✓	UINT	1	1	0x00: Off 0x01: On	
Detection Settings	ASC	112 (0x70)	0	R/W	✓	UINT	1	0	0x00: Off 0x01: On - standard 0x02: On - fast 0x03: On - max	
General Settings	Process data select	120 (0x78)	0	R/W	✓	UINT	1	0	0x00: AO = Present receiver level live 0x12: AO = Smart Task analog value Counter	
I/O Settings	Pin 2 setting	121 (0x79)	0	R/W	✓	UINT	1	17	D4RF-TD, D4RF-TD-Y 0x00: Not used 0x01: External input (Multi operations) 0x10: Emitter off 0x11: Teach input 0x03: Load preset D4RF-T, D4RF-TC4, D4IF-T, D4IF-TC4, D4RF-T-Y 0x00: Not used 0x01: External input (Multi operations) 0x10: Emitter off 0x11: Teach input 0x21: Received light alarm output 0x22: Switching signal DO2 0x23: Detection output Quint.1 0x24: Detection output Quint.2 0x27: Switching signal DO1 0x28: Switching signal DO1/	
	Pin 5 setting	122 (0x7A)	0	R/W	✓	UINT	1	34	0x00: Not used 0x21: Received light alarm output 0x22: Switching signal DO2 0x23: Detection output Dint.1 0x24: Detection output Dint.2 0x27: Switching signal DO1 0x28: Switching signal DO1/ 0x02: Acknowledge	D4RF-TD, D4RF-TD-Y
Diagnosis	Temperature: Present temperature	153 (0x99)	1	R		INT	1			
	Temperature: Highest temperature all time		2	R		INT	1			
	Temperature: Lowest temperature all time		3	R		INT	1			
	Temperature: Highest temperature since last reset		4	R		INT	1			
	Temperature: Lowest temperature since last reset		5	R		INT	1			
	Received light level	175 (0xAF)	0	R		UINT	1		0 to 254 255 (not available)	Unit: %
	Received light level threshold	176 (0xB0)	0	R/W	✓	UINT	1		0 to 90	
	Alarm limit for diagnostic parameters: High temperature	179 (0xB3)	1	R/W	✓	INT	1	80	-128 to 127	
	Alarm limit for diagnostic parameters: Low temperature		2	R/W	✓	INT	1	-30	-128 to 127	
	Alarm limit for diagnostic parameters: Operating hours		3	R/W	✓	UINT	4	40000	0 to 1000000	

*R: Read only, W: Write only, R/W: Read/Write

Category	Name	Index No. DEC (HEX)	Sub index No.	Read/ Write *	Backup	Format	Length in bytes	Default	Setting details	Remarks (Unit)
Observation	Present receiver level (live)	180 (0xB4)	0	R		UINT	2			
	Upper Threshold (switch-on) dynamic	181 (0xB5)	0	R		UINT	2			
Diagnosis	Operating hours: Total operating hours	190 (0xBE)	1	R		UINT	4			
	Operating hours: Operating hours since last reset		2	R		UINT	4			
Identification	Find me	204 (0xCC)	0	R/W		UINT	1	0	0x00: Find me deactivated 0x01: Find me activated	
General Settings	Preset number	222 (0xDE)	0	R/W		UINT	1	1	1 to 5	
Observation	System status	226 (0xE2)	0	R		UINT	2		Bit 6: Received light alarm output 0: Alarm not active 1: Alarm active Bit 7: Input signal status Pin2 0: External input OFF 1: External input ON	
General Settings	Notification handling	227 (0xE3)	0	R/W	✓	UINT	1	0	0x00: All enabled 0x01: All disabled 0x02: Events enabled, PD invalid flag disabled 0x03: Events disabled, PD invalid flag enabled	
	Display setting: Display mode, channel 1	234 (0xEA)	1	R/W	✓	UINT	1	0	0x00: Value (absolute) 0x01: Bar graph 0x02: Percentage value 0x03: Counter value 0x04: Edge value	
	Display setting: Display mode, channel 2		2	R/W	✓	UINT	1	0	0x00: Value (absolute) 0x01: Bar graph 0x02: Percentage value 0x03: Counter value 0x04: Edge value	
	Display setting: Display brightness		3	R/W	✓	UINT	1	100	10 to 100	
	Display setting: Eco mode		4	R/W	✓	UINT	1	0	0x00: Off 0x01: On	
	Display setting: Rotate display		5	R/W	✓	UINT	1	0	0x00: Off 0x01: On	
	Display setting: Invert display		6	R/W	✓	UINT	1	0	0x00: Off 0x01: On	
	Display setting: Alarm display		7	R/W	✓	UINT	1	0	0x00: Off 0x01: On	
	Display setting: Language		8	R/W	✓	UINT	1	1	0x01: English 0x06: Spanish 0x07: Simplified Chinese 0x08: Japanese 0x0A: Korean	
	Display hold setting: Hold mode, channel 1	235 (0xEB)	1	R/W	✓	UINT	1	0	0x00: Off 0x01: Peak/bottom 0x02: Peak 0x03: Bottom 0x04: Time	
	Display hold setting: Hold mode, channel 2		2	R/W	✓	UINT	1	0	0x00: Off 0x01: Peak/bottom 0x02: Peak 0x03: Bottom 0x04: Time	
Smart task	Counter mode	1001 (0x3E9)	0	R/W	✓	UINT	1	2	0x00: Up 0x01: Down 0x02: OFF	
	Preset mode	1002 (0x3EA)	0	R/W	✓	UINT	1	0	0x00: Preset internal disabled 0x01: Preset internal enabled	
	Preset value	1003 (0x3EB)	0	R/W	✓	UINT	2	0	0 to 16383	
	Comparator value low	1004 (0x3EC)	0	R/W	✓	UINT	2	10	0 to 16383	
	Comparator value high	1005 (0x3ED)	0	R/W	✓	UINT	2	10	0 to 16383	
	Counter value	1006 (0x3EE)	0	R	✓	UINT	2			
	Filtering time 1	1033 (0x409)	0	R/W	✓	UINT	4	0	0 to 30000000	
	Received light level D1	1034 (0x40A)	0	R	✓	UINT	2			
	Filtering time 2	1035 (0x40B)	0	R/W	✓	UINT	4	0	0 to 30000000	
	Received light level D2	1036 (0x40C)	0	R	✓	UINT	2			
	Input selector 1	1081 (0x439)	0	R/W	✓	UINT	1	0	0x00: Qint.1 0x01: Qint.2 0x40: Ext.input 1	
	Input selector 2	1082 (0x43A)	0	R/W	✓	UINT	1	1	0x00: Qint.1 0x01: Qint.2 0x40: Ext.input 1	
	Logic 1	1083 (0x43B)	0	R/W	✓	UINT	1	0	0x00: DIRECT 0x03: Window Mode 0x04: Hysteresis	
	Logic 2	1084 (0x43C)	0	R/W	✓	UINT	1	0	0x00: DIRECT 0x03: Window Mode 0x04: Hysteresis	
	Timer 1 mode	1085 (0x43D)	0	R/W	✓	UINT	1	0	0x00: Deactivated 0x01: On-delay timer 0x02: Off-delay timer 0x03: On/Off-delay timer 0x04: Pulse (one shot) 0x05: On-delay pulse timer	
	Timer 2 mode	1086 (0x43E)	0	R/W	✓	UINT	1	0	0x00: Deactivated 0x01: On-delay timer 0x02: Off-delay timer 0x03: On/Off-delay timer 0x04: Pulse (one shot) 0x05: On-delay pulse timer	
	Timer 1 setup	1087 (0x43F)	0	R/W	✓	UINT	2	1	1 to 30000	Unit: ms
	Timer 2 setup	1088 (0x440)	0	R/W	✓	UINT	2	1	1 to 30000	Unit: ms
	Output mode 1	1089 (0x441)	0	R/W	✓	UINT	1	0	0x00: Not inverted 0x01: Inverted	
	Output mode 2	1090 (0x442)	0	R/W	✓	UINT	1	0	0x00: Not inverted 0x01: Inverted	
	Timer 1.1 setup	1091 (0x443)	0	R/W	✓	UINT	2	1	1 to 30000	Unit: ms
	Timer 2.1 setup	1092 (0x444)	0	R/W	✓	UINT	2	1	1 to 30000	Unit: ms
I/O Settings	Ext. input for input mode	1093 (0x445)	0	R/W	✓	UINT	1	0	0x00: Not inverted 0x01: Inverted	

*R: Read only, W: Write only, R/W: Read/Write

