## Specifications Connection Autonics FIBER OPTIC SENSOR $BF4R-E/BF4G-E(\text{External synchronization input type}) \bullet BF4R-R/BF4G-R(\text{Remote sensitivity setting type})$ input type etting type Red light source BF4R BF4R-E BF4R-R BF4RP **BF4 SERIES** isi get isi Model Green light source Power voltage 12-24VDC ± 10%, Ripple p-p:Max. 10% (Brown)+V (Brown)+V NPN open collector output Load current: Min.100mA, Applied voltage: Max.30VDC Output voltage:Min.power supply -2.5V Load Black)Control output Load Load current: Min. 100mA, Applied voltage: Max. 30VDC Residual voltage: Max. 1V(at 100mA load current), Max. 0.4V(at 16mA load current) White)Self-diagnosis (White)Self-diagnosis output 12-24VD0 ON state under unstable sensing(When the target stays for 300ms in unstable area) or ON state when control output short-circuited (Pink)External synchronization input sensitivity setting Orange)OFF input of Load current: Min.50mA (Orange)Emission disable input Load Load oad current: Min. 50mA, Applied voltage: Max. 30VDC Self-diagnosis output Applied voltage: Max.30VDC Output voltage:Min.power supply -2.5V remote sensitivity setting voltage: Max. 1V(at 50mA load current), Max. 0.4V(at 16mA load current) \*\*BF4RP/BF4GP(PNP open collector output) goes with the dotted line. \*\*There are no pink & orange wires at Standard type(BF4R/BF4RP/BF4G/BF4GP). \*\*This connection is for diffuse reflective type fiber cable. It also can be used with through-beam type one Operation mode Selectable by the sensitivity setting button ON/OFF in front of this unit Short-circuit protection, Reverse polarity protection circuit Thank you very much for selecting Autonics products. For your safety, please read the following before using. Light source Red LED/Green LED(Modulated) Installations Caution for your safety Control output ndicator(OUT) Red LED 1. Mounting amplifier unit 2. Installation of fiber optic cable \*\*Please keep these instructions and review them before using this unit. When mounting the amplifier In case of using L bracket Stable indicator(STAB) Green LED flashes when the target stays in stable sensing a (i) Hook the front part of the amplifier on DIN Rail(or bracket). ※Please observe the cautions that follow; L bracket Built in **∆Warning** Serious injury may result if instructions are not followed @Press the rear part of the External synchror zation function △ Caution Product may be damaged, or injury may result if instructions are not followed amplifier on DIN Rail(or bracket). (Gate/Trigger) DIN Rai The following is an explanation of the symbols used in the operation manual. Remote sensitivity Built in • In case of using screw ▲ Caution:Injury or danger may occur under special conditions setting function Tightening torqu Built-in selectable FREQ.1 or FREQ.2 by ON/OFF button When releasing the amplifie prevention function Max. 2kgf⋅cm **⚠** Warning Push the back of amplifier toward I. In case of using this unit with machinery (Ex: nuclear power control, medical equipment, ship, vehicle, train, airplane, combustion apparatus, safety device, crime/disaster prevention equipment, etc) which may cause damages to human life or property, it is required to install fail-safe device. It may cause a fire, human injury or damage to property. 2. Do not disassemble and modify this unit. If needs, please contact us. OFF delay timer(Approx. 40ms fixed) 3 and lift the hole for fiber toward up then simply take it out Sunlight: Max. 11,000/x, Incandescent lamp: Max. 3,000/x Ambient illumination Notice: If setting bolt is tightened with over specified tightening torque, hood of fiber optic cable may be damaged. ± 240V the square wave noise(pulse width: 1μs) by the noise 1,000VAC 50/60Hz for 1 minute DIN Rai Dielectric strength Min. 20MΩ (at 500VDC megger) It may cause an electric shock and cause a fire 3. Connection of fiber optic cable & amplifier 1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 **⚠** Caution 500m/s2 (50G) X, Y, Z directions for 3 times ①Open the lock lever to "√ " direction. ②Insert the fiber optic cable in the amplifier slowly. (Depth: 10mm) ③Close the lock lever to " /> " direction. -10 to 50°C, Storage: -20 to 70°C 1. This unit shall not be used outdoors. ment Ambient humidity It might shorten the life cycle of the product or give an electric shock. Use this product inside only. Do not use the 35 to 85%RH, Storage: 35 to 85%RH product outdoors or location subject to temperatures or humidity outside (Ex: rain, dirty, frost, sunlight, condensation, etc.) Materi ø 4, 4P, Length: 2m ø 4, 4P, Length: 2m, AWG 24, AWG 22, Insulation | Ø 4, 6P, Length: 2m, AWG 24, AWG 22, Insulation diameter: Ø 1.0 Do not use this unit in place where there is flammable or explosive gas. It may cause a fire or explosion. Cable AWG 22 ■ Mode setting diameter: ø 1.2 3. Please observe the rated voltage and do not supply AC power Mounting bracket, Bolts/nuts It may result in damage to this unit. 4. Please check the polarity of power and wrong wiring. It may result in damage to this unit. Change the mode selection switch to SET Approx. 65g 5. Do not use this unit in place where there is vibration or impact. Sensitivity setting Set/Release the interference prevention function It may result in damage to this unit. 6. In cleaning the unit, do not use water or an oil-based detergent. It may cause an electric shock and cause a fire. Control output circuit diagram Press ON+OFF at the same time for 2se NPN open collector output Internal circuit External connection STAB indicator flashes continuously ■ Part identification (Brown)+V Press OFF buttor Press ON button at light ON at light ON Standard type(BF4R/BF4RP/BF4G/BF External synchronization Release the interference Set the interference Remote sensitivity setting type(BF4R-R/BF4G-R) ≸10kΩ (Pink) input type(BF4R-E/BF4G-E) prevention function (White)Self (Dual frequency mode) 8 Control output indicator(Red) 8 ₩. diagnosis at light OFF at light OFF Frequency1 Stable indicator(Green) $10k\Omega$ STAB indicator flashes one time **≥**10kΩ Press ON and OFF Press ON button Press OFF button when the difference of sensitivity buttons at the same Timer selection switch (Blue)0V 🛉 (Frequency 1, (Frequency 2, between ON and OFF is enough but STAB indicator flashes 5 time time(Normal mode NON:Not use ti R OF OFD:OFF Delay time (Black) Load Max. 0.7ms) Max 0.5ms) when the difference is not enough Control Max. 0.5ms) output - 00 24VDC {GATE:Gate synchronization TRIG:Trigger synchronization (White)Self ± 10% STAB indicator turns off - Sensitivity setting button Set the mode selection switch to Lock.(Completes setting) OFF input of Function Fiber optic cable model Sensitivity adjustment Adjustment by the sensitivity setting button(All models) Dimensions (Unit:mm) Mount the fiber optic cable within sensing distance ®When there is enough sensitivity difference between ON state and OFF state, the stable indicator(STAB @Change the mode selection switch to SET. flashes one time only at stable sensing area. ③Press ON button in state of installed the sensing target (Press ON button without the sensing target for the thr When there is not 32.8 enough sensitivity Diffuse reflective difference between ON state and Truca Truca OFF state, the stable indicator(STAB flashes five times at unstable 35mm DIN Rail 14 Specification(Example) (Unit:mm -**D**-•**-O** sensing area. (Note) ⑦ Change the mode selection switch to LOCK. After this, addition ON/OFF button input is □ Controlled and the part □ Cont ensing Light ON Light ON Adapter (4) The stable indicator(STAB) flashes at ON state OUT STAB Ф| J (Check the target position) not valid and the set sensitivity shall not be X1: BF4R/BF4RP/BF4G/BF4GP 4 T-320-05 15R ø 0.5 150 0 cable spec. :ø 4, 4P, 2m BF4R-E/BF4R-R/BF4G-E/ \ ø 1 M3X0.5 2000 3 12 hrough-beam (Note)The sensitivity can operate at **™** Self-diagnosis function unstable detecting area T-420-10 30R ---XSetting sensitivity is memorized When fiber hood is stained by dus II. 0 **~® ←**® when power turns off ÿ 2.2 ※Do not touch the fiber optic cable Dark ON Dark ON after adjusting the sensitivity Adapter -Dark ON Mode(Diffuse reflective type) Most of adjustments except ③ & ⑤ are same as Light Press ON button without the sensing target. (③ state) Stable sensing is not available as Light ON mode D-320-05 15R 0.03 . Stable light ON √2-ø 1 2-ø 0.5 Press OFF button with the sensing target. (⑤ state) Light ON mode: The control output turns on at light ON state and turns off at light OFF state. The self-diagnosis output turns off during stable sensing. (① position) 2000 -Dark ON mode: The control output turns off at light OFF state and turns on at light OFF state reflective 3 15 -In case of setting as max. sensitivity ① Set the mode selection switch to SET. D-620-10 0.03 between stable light OFF leve and stable light ON level, self-diagnosis output turns on @In case of Light ON mode Press sensitivity setting button from ON to OFF without the sensing target. (Or set ON input for remote sensitivity setting to Low level, and then set OFF input for remote sensitivity setting to Low level, 2-ø 2.2 \ M6X0.75 sensitivity setting to Low level, and unen set on a miputosis the largest of the press sensitivity setting button from OFF to ON without the sensing target. (Or set OFF input for remote sensitivity setting to Low level, and then set ON input for remote sensitivity setting to Low level) (Set the mode selection switch to LOCK. Application> In case of extending sensing distance as the diffusive reflective type. In case of extending sensing distance as the diffusive reflective type. In case of use the through-beam type at bad environment. (Brown) +V (Rlack) Control output Light ON Light OFF self-diagnosis output turns off at lower than stable light OFF light level or upper than stable light ON level. \*\* Adapter marked fiber optic cable should be used with adapter Above sensing distance is for red light. (Green light: 10% of distance of red light Under the control output turns on, if the over-current supplied in control output, then self-diagnosis output turns or Accessories (Unit:mm) OFF Delay timer function(BF4R/BF4G/BF4RP/BF4GP/BF4R-R/BF4G-R only) Model Dimension Features (Black) Control output Remote adjustment of sensitivity(BF4R-R/BF4G-R only) Standard type(BF4R/BF4G/ BF4RP/BF4GP), Remote sen-sitivity setting type(BF4R-R/ BF4G-R) have built-in approx. 40ms fixed OFF-delay timer. The timer works when the timer ø 4.6 BF4R-R/BF4G-R type can adjust the sensitivity with input signal lines without the mode selection (White) Self-diagnosis output 0 Ø Timer selection switch (Pink) ON input of remote sensitivity setting TH-310 -Adjustment at Light ON Mode (Orange)OFF input of rea -Aujustment at Light ON Mode -SW1(ON input of remote sensitivity setting): SW1 turns on and then turns off instead of ③ state of adjustment by the sensitivity setting button. -SW2(OFF input of remote sensitivity setting): SW2 turns or and then turns off instead of ⑥ state of adjustment by the s-Adjustment at Dark ON Mode 1000 ON ction switch is set to 'OFD' ø 5.8 M4X0.7 Serection switch is set to 'OFD'. The output turns off after turning on for 40ms at OFF position of the consists of the consis (Blue) 0V Fiber optic cable OFF OFF 0 Topodas sommo 0 protection pipe (Shock, Vibration, TH-410 turnning on for 40ms at OFF position of the sensing output. It is useful when the response time of the connected device is slow or when the sensing signal from a tiny object is too short. 1000 Cable cut) Light ON SW2(OFF input of remote sensitivity setting): SW2 turns on and then turns off instead of ③ state of adjustment by the sensitivity setting button. • SW1(ON input of remote sensitivity setting): SW1 turns on and then turns off instead of ⑤ state of adjustment ø 5.5 M6X0.75 Dark ON by the sensitivity setting button. 0 FDH-610 Answer Back function(BF4R-R/BF4G-R only) When ON or OFF input of remote sensitivity setting is applied, after 300ms self-diag External synchronization input function(BF4R-E/BF4G-E only) 1000 and then the sensor keeps normal sensing state. (Refer to below time chart.) Self-alignosis output does not turn on if there is no difference of sensitivity between ON input and OFF input and stable sensing is not excuted, but stable sensing operates after 340ms. nal synchronization function, the time for making sensing can be specified by Trigger synchronization and gate synchronization are available ■ Caution for using <Time Chart:Light ON Mode> 1 Do not scratch the section of fiber ontic cable T1≥ 1,000ms(After the power turns on, Dunorsatiating section of ingit as like sunlight, spotlight within inclination angle range of photoelectric sensor. Intercept a strong source of light as like sunlight, spotlight within inclination angle range of photoelectric sensor. Do not apply a strong tensile force to fiber optic cable. In case of installing the fiber optic cable, be sure not to curve the fiber optic cable over tolerance that mentioned it can be set after 1sec.) 2. T2≥ 5ms(ON or OFF input time of remote sensitivity setting must be n ON OFF ON OFF wer supply in case of instaining the liber optic cable, be sure not to curve me liber optic cable over tolerance that mentioned in total catalog. When wire the fiber optic sensor with high voltage line, power line in the same conduit, it may cause malfunction or mechanical trouble. Therefore please wire separately or use different conduit. Avoid installing the unit where there is severe corrosive gas, or dust, etc. In case of connecting inductive load such as DC relay at load, use shielded cable, diode and varistor in order to moise. 5ms) T3≒ 300ms(When ON or OFF input of remote sensitivity setting is applied, self-diagnosis output turns on after Remote sensitive setting ON inputer the contract of the contr Input signal condition for External synchronization Approx. 40ms State Signal condition ON High 4.5-30VDC or Open Noise. 8. The amplifier cable shall be used shortly, because it may cause malfunction by surge through the long cable. 9. When it is stained by dirt at a detecting part of the fiber optic cable, please clean the sensing part with dry cloth softly. But do not use an organic materials such as alkali, acid, chromic acid. 10. When the unit is supplied by Switching +V Photo Output for trigger synchronization is fixed as 40ms. 0-1VDC Self-diagnosis output(Answer back function) sensitivity setting is applied, apply OFF input of remote sensitivity setting after te) T4 X1: Inner signal state before sending as control output for sensing signal which the sensor detects. D, ote)Durina period T3(Approx. 300ms). Switching +V TRIG \_\_\_\_: GATE \_\_\_: TRIG switching power supply unit, as a power source, please earth Frame power supply (SMPS) 0V do not change the received light valu by moving the object, etc. C(0.001 to 0.1μF/400V): F.G. Condencer for removing noise Ground(F.G.) terminal, and connect condenser between 0V and F.G. terminals to remove noise. Interference prevention function(All models) BF4 series have a built-in interference prevention function, two fiber optic cables can be mounted very closely Stop transmission function(BF4R-E/BF4G-E only)-Operation Test 11. Installation environment Below test is available under light ON state only. If input of stop transmission is at Low state, trans It can check normal or abnormal state of the second. by setting different transmission frequencies ② Altitude Max. 2.000m 1 It shall be used indoor nterference prevention function(Operation of dual frequency mode) 3 Pollution Degree 2 at Low state, transmission light v al state of the sensor without mo Installation Category III First sensor-FREQ.1(Response time:max. 0.5ms) Second sensor-FREQ.2(Response time:max. 0.7ms) OSE the mode selection switch to SET. Press ON, OFF SW for 2sec. at the sar Tickers continuously. Press ON button The STAB indicator turns off. Set the mode selection switch to LOCK. XIt may cause malfunction if above instructions are not followed If input of stop transmission is at low or open state, light is transmitted tate, light is not transmitte ■ Major products Photoelectric sensorsFiber optic sensors Autonics Corporation http://www.autonics.com Proximity sensors Area sensors <Input signal condition for stop transmission disable> ll on Door/Door side sensors ■ Pressure sensors High o Open Flash Flash Autories Counters ■ Timers Satisfiable Partner For Factory Automation CountersRotary encoders High 4.5-30VDC or Open ■ Display units EAD QUARTERS 0-1VDC Power controllers Release interference prevention function(Operation of normal mode)-Response time: Max. 0.5ms (Blue)0V Panel meters ■ Graphic/Logic panels Set the mode selection switch to SET Corea OVERSEAS SALES: Bidg. 402 3rd Fl., Bucheon Techno Park, 193, Yakd Temperature controllers Tachometer/Pulse(Rate) meters ©FTIESS UTV, UTF DUITORS OF Z SEC. At the same time. ③The STAB indicator flashes continuously. ④Press ON, OFF buttons at the same time. ③The STAB indicator turns off. ⑤Set the mode selection switch to LOCK. ※In case of using interference prevention function, hysteresis & response time will be longer than normal mode operation. ②Press ON, OFF buttons for 2 sec. at the same time ③The STAB indicator flashes continuously. Input of stop High(OFF) ※①: Transmission area ⊅ . Wonmi-gu, Bucheon-si, Gyeonggi-do, 420-7: TEL:82-32-610-2730 / FAX:82-32-329-0728 2 2 I T Temperature/Humidity transducers Low(ON) X1: If transmission is stopped, control output Switching power supplies Stepping motors/drivers/motion controllers Field network devices must turn on, but if control output does Flash Autonies not turn on, it processes that sensor ha The proposal of a product improvement Sensing output Laser marking system(CO2, Nd:YAG) Laser welding/soldering system and development : product@autonics.com OFF Abr \*The above specifications are subject to change without notice EP-KE-08-0240K