Specifications Connection Autonics FIBER OPTIC SENSOR BF4R-E/BF4G-E(External synchronization input type) • BF4R-R/BF4G-R(Remote sensitivity setting type) Standard type setting type Model Green light source BF4GP **BF4 SERIES** iš je dame **≖∰**D-> BF4G BF4G-E BF4G-R ₽._© Current consump Max. 45mA (Brown)+V (Brown)+V PNP open collector output NPN open collector output Load (Black)Control output Load voltage: Max. 30VDC • Load current: 100mA Residual voltage • NPN: Max. 1V(load current: 100mA), Max. 0.4V(load current: 16mA) PNP: Max. 2.5V Load Control output (White)Self-diagnosis output (White)Self-diagnosis output ON state under unstable sensing(When the target stays for 300ms in unstable area) or ON state when control output short-circuited 12-24VDC (Pink)External synchronization input sensitivity setting Load voltage: Max. 30VDC • Load current: 50mA Residual voltage - NPN: Max. 1V(load current: 50mA), Max. 0.4V(load current:16mA) / Self-diagnosis output Orange)OFF input of Load Load remote setting PNP: Max. 2.5V Selectable by the sensitivity setting button ON/OFF in front of this unit Short-circuit protection, Reverse polarity protection circuit Operation mode (Blue)0V Light source Red LED/Green LED(Modulated) Thank you very much for selecting Autonics products. onse time For your safety, please read the following before using. Control output ndicator(OUT) Installations Caution for your safety Green LED flashes when the target stays in stable sensing area Stable indicator(STAB) 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. Hook the front part of the amplifier on DIN rail(or bracket). Built in In case of using L bracket ※Please observe the cautions that follow; **∆Warning** Serious injury may result if instructions are not followed. @Press the rear part of the Remote sensitivity **∆Caution** Product may be damaged, or injury may result if instructions are not followed Built in amplifier on DIN rail(or bracket) setting function DIN rail The following is an explanation of the symbols used in the operation manual. Built-in selectable FREQ 1 or FREQ 2 by ON/OFF button • In case of using screw ▲ Caution:Injury or danger may occur under special conditions. revention function imer function Selectable) OFF delay timer(Approx. 40ms fixed) When releasing the amplifie Max. 2kgf⋅cm **⚠** Warning Push the back of amplifier toward mbient illuminatio Sunlight: Max. 11,000/x, Incandescent lamp: Max. 3,000/x(Receiver illumination) 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. Please contact us if it is required. (3) and lift the hole for fiber toward Noise strength ± 240V the square wave noise(pulse width: 1μs) by the noise simulator up then simply take it out without tools. *Notice: If setting bolt is tightened with over Insulation resistar Min. 20MΩ (at 500VDC megger) DIN rai ecified tightening torque, hood of .5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours fiber optic cable may be damaged It may cause electric shock or a fire 3. Connection of fiber optic cable & amplifier 500m/s2 (50G) X, Y, Z directions for 3 times re -10 to 50°C, Storage: -20 to 70°C **⚠** Caution ment Ambient humidity 35 to 85%RH, Storage: 35 to 85%RH ①Open the lock lever to "√ " direction. ②Insert the fiber optic cable in the amplifier slowly. (Depth: 10mm) ③Close the lock lever to " → " direction. 1. This unit shall not be used outdoors. Materia It might shorten the life cycle of the product or cause electric shock. Use this product inside only. Do not use the ø 4mm, 4-wire, Length: 2m(AWG22, Core diameter: 0.08mm, Number of cores: 60, Insulator diameter: ø 1.25mm) ø 4mm, 6-wire, Length : 2m(AWG24 product outdoors or location subject to temperatures or humidity outside. Cable Core diameter: 0.08mm, Number of cores: 40, Insulator diameter: ø 1mm (Ex: rain, dirty, frost, sunlight, condensation, etc.) Do not use this unit in place where there is flammable or explosive gas. It may cause a fire or explosion. Mounting bracket, Bolts/nuts ■ Mode setting CE 3. Please observe the rated voltage and do not supply AC power. Approx. 65g Weight Change the mode selection switch to SET 4. Please check the polarity of power and wrong wiring. It may cause damage to this unit. It may cause damage to this unit. 5. Do not use this unit in place where there is vibration or impact. Sensitivity setting Set/Release the interference prevention function ■ Control output circuit diagram 6. In cleaning the unit, do not use water or an oil-based detergent. It may cause electric shock or a fire. Press ON+OFF at the same time for 2se NPN open collector output Light ON Dark ON Internal circuit External connection External cor STAB indicator flashes continuously Part identification (Brown)+V Press ON button Press OFF buttor (Black)Contro at light ON at light ON Standard type(BF4R/BF4RP/BF4G/BI External synchronization Release the interference Set the interference Remote sensitivity setting type(BF4R-R/BF4G-R) input type(BF4R-E/BF4G-E) ≸10kΩ ¦(Pink) Press OFF button Press ON button prevention function (White)Self (Dual frequency mode) 8 - Control output indicator(Red) 8 at light OFF W. at light OFF Frequency1 Stable indicator(Green) $10k\Omega$. ≥10kΩ STAB indicator flashes one time Press ON and OFF Press OFF button Press ON button when the difference of sensitivity buttons at the same Timer selection switch Frequency 1, (Blue)0V 🛉 (Frequency 2, between ON and OFF is enough time(Normal mode R NO (Black) but STAB indicator flashes 5 tin Load Max. 0.5ms) Max. 0.7ms) Control 00 output 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 external sensitivity setti Function Fiber optic cable model Sensitivity adjustment Adjustment by the sensitivity setting button(All models) Fiber optic cable model name(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 ③Press ON button in state of installed the sensing target (Press ON button without the sensing target for the thr When there is not enough sensitivity Diffuse reflective difference between ON state and 0 to OFF state, the stable indicator(STAB flashes five times at unstable 35mm DIN rail 14 Specification(Example) (Unit:mm -**D**-•**-O** sensing area. (Note) ⑦Change the mode selection switch to LOCK. After this, addition ON/OFF button input is ensing Dimension Light ON Light ON (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 %1: BF4R/BF4RP/BF4G/BF4GP 4 T-320-05 15R 0.5 150 0 cable spec. :ø 4, 4-wire, 2m BF4R-E/BF4R-R/BF4G-E/ \ ø 1 M3X0.5 Through -beam 2000 Through-beam (Note)The sensitivity can operate at 3 12 Self-diagnosis function unstable detecting area. T-420-10 30R -*Setting sensitivity is memorized 0 · When fiber hood is stained by dus-0 ction of the emitter, reducing received light source, then self-diag **~® ←**® output will turn ÿ 2.2 Dark ON Dark ON Move to after adjusting the sensitivity. Stable sensing is not available. Adapter -Dark ON(Diffuse reflective type) Most of adjustments except ③ & ③ are same as Light ON mode. -Press ON button without the sensing target. (⑤ state) -Press OFE button with the sensing target. (⑤ state) -Light ON: The control output turns on at light ON state and turns off at light OFF state. D-320-05 15R 0.03 Stable light ON √2-ø 1 2-ø 0.5 The self-diagnosis output turns off during stable sensing. (① position) 2000 -Dark ON: 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 D-620-10 0.03 8 @ # H ②In case of Light ON 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) In case of Dark ON Press sensitivity setting button from OFF to ON without the sensing target. (Or set OFF input for remote sensitivity setting to Low level) ③Set the mode selection switch to LOCK. <Application> In case of extending sensing distance as the diffusive reflective type. In case of use the through-beam type at bad environment. (Brown) +V Remote adjustment of sensitivity/RFAR_P/RFACL_P and the Company of the case of the ca 2-ø 2.2 \ M6X0.75 Light ON Light OFF diagnosis output turns on, self-diagnosis output turns off at lower than stable light OFF light level or upper than stable light ON level. Stability indicator on of other models is indicated in total catalogue. ** 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) Dimension Features Remote adjustment of sensitivity(BF4R-R/BF4G-R only) BF4R-R/BF4G-R type can adjust the sensitivity with = input signal lines without the mode selection switch. (Black) Control output Standard type(BF4R/BF4G/ BF4RP/BF4GP), Remote sen-sitivity setting type(BF4R-R/ BF4G-R) have built-in approx. 40ms M3X0.5 ø 4.6 (White) Self-diagnosis output 0 Ø Non-sensing (Pink) ON input of remote sensitivity setting -Adjustment at Light ON -SWI(ON input of remote sensitivity setting): SW1 turns on and then turns off instead of @ state of adjustment by the sensitivity setting button. -SW2(OFF input of remote sensitivity setting): SW2 turns or and then turns off instead of @ state of adjustment by the setting at Oark OM. (Orange)OFF input of remote sensitivity setting BF4G-R) have bullt-in approx. 4011 fixed OFF-delay timer. The timer works when the time selection switch is set to 'OFD'. 1000 ON OFF ø 5.8 M4X0.7 (Blue) 0\ Fiber optic cable The output turns off afte 0 Topodas sommo 0 ing on for 40ms at OFF positio TH-410 turning on tor 40ms at OFF positior 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. (Shock, Vibration Adjustment at Dark ON 1000 Light ON note 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 Darl ON by the sensitivity setting button. ø 9 **1** 000 00 00 9 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-diagnosis output turns on for 40ms and then the sensor keeps normal sensing state. (Refer to below time chart.) Self-diagnosis 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. External synchronization input function(BF4R-E/BF4G-E only) 1000 By using external synchronization function, the time for making sensing can be specified by external synchronization Trigger synchronization and gate synchronization are available Caution for using <Time Chart Light ON> Do not scratch the section of fiber optic cable. Intercept a strong source of light as like sunlight, spotlight within inclination angle range of photoelectric sensor. T1≥ 1,000ms(After the power turns on. wer supply 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 3. Do not apply a strong tensile force to fiber optic cable. 4. In case of installing the fiber optic cable, be sure not to curve the fiber optic cable over tolerance that mentioned In case of instanting the liber optic cable, be sure not to curve the 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 a poice. T3\(\text{300ms}\)(When ON or OFF input of remote sensitivity setting is applied, self-diagnosis output turns on after Remote sensiti setting ON inpu Input signal condition for External synchronization Approx. 40ms self-diagnosis output turns on after 300ms) 1. T4≒ 40ms (ON time of self-diagnosis output) 5. T5≥ 50ms(When ON input of remote sensitivity setting is applied, apply OFF input of remote sensitivity setting after 500ms) 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 Low 0-1VDC Output for trigger synchronization is fixed as 40ms. Self-diagnosis output(Answer back function) te) T4 ×1: Inner signal state before GATE TRIG JL : GATE sending as control output for sensing signal which the sensor detects. Switching power supply TRIG +V te)During period T3(Approx. 300ms), switching power supply unit, as a power source, please earth Frame 0V OV F.G. C(0.001 to 0.1μF/400V): Condencer for removing noise (SMPS) Ground(F.G.) terminal, and connect condenser between 0V and F.G. terminals to remove noise. Interference prevention function(All models) BE4 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, transmission to the can check normal or abnormal state of the sensor with by setting different transmission frequencies ②Altitude Max. 2.000m 1 It shall be used indoor Interference prevention function(Operation of dual frequency mode) ③Pollution Degree 2 4 Installation Category III First sensor-FREQ.1(Response time:max, 0.5ms) **%It** may cause malfunction if above instructions are not followed OSEt the mode selection switch to SET. OPress ON, OFF SW for 2sec, at the sar OThe STAB indicator flickers continuously. OPress ON button SiThe STAB indicator turns off. OSEt the mode selection switch to LOCK. If input of stop transmission is at high If input of stop transmission is at low or open state, light is transmitted Press ON, OFF SW for: The STAB indicator flickers continuously. Press OFF button. The STAB indicator turns off. Set the mode selection with to LOCK. Major products I temperature controllers SSR/Power controllers Counters Timers Panel meters Tachometer/Pulse(Rate)meters Sensor controllers Sensor controllers <Input signal condition fo hotoelectric sensors To ber optic sensors To Autonics Corporation 100 1 m stop transmission disable> State Signal condition ■ Fiber optic sensors Door side sensors Door side sensors Door side sensors Proximity sensors Proximity sensors Proximity sensors Rotary encoders Notary enco High or Open Flash Flash Autories http://www.autonics.com switch to LOCk High 4.5-30VDC or Open Satisfiable Partner For Factory Automation Low 0-1VDC Release interference prevention function(Operation of normal mode)-Response time: Max. 0.5ms (Blue)0V Set the mode selection switch to SET. ■ HEAD QUARTERS ②Press ON, OFF buttons for 2 sec. at the same time ※①: Transmission area 7D → 🔘 Input of stop High(OFF) OFTESS ON, OFF DUIDINS for 2 sect. at the same time. OTHE STAB indicator flashes continuously. OPress ON, OFF buttons at the same time. OTHE STAB indicator turns off. OSet the mode selection switch to LOCK. In case of using interference prevention function, hysteresis & response time will be longer than normal mode operation. Stop transmission area OVERSEAS SALES 2 2 2 I T #402-404, Bucheon Techno Park, 655, Pyeongche Wonmi-gu, Bucheon, Gyeonggi-do, Korea TEL: 82-32-610-2730 / FAX: 82-32-329-0728 E-mail: sales@autonics.com Low(ON) X1: If transmission is stopped, control output must turn on, but if control output does Flash not turn on, it processes that sensor ha Sensing output (Dark ON) OFF Abr EP-KE-08-0240L The above specifications are subject to change and some models may be discontinued without notice