BOS 72K-..-RA20-…
Fiber Optic Amplifier with Display
INSTRUCTION MANUAL

CONTROLS

OUTPUT LED
The yellow LED on indicates that the NO output is closed.

DISPLAY (4 green-colored digits)
The display indicates the signal level received, the switching threshold and messages relative to the parameter setting.
Please refer to the "SETTING" paragraph for setup procedure indications.

STABILITY LED (S)
The green stability LED on indicates that the received signal has a safety margin larger than 30% of the output switching value.

DELAY LED (T)
The green delay LED on indicates that the function is active.

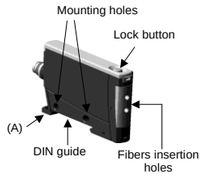
SPEED LED (H)
The green speed LED on indicates that the sensor is functioning with the maximum switching frequency.

SET PUSHBUTTON
A long push on the pushbutton activates the self-setting procedure.
The REMOTE input allows the external SET control.
This pushbutton also allows you to set the sensor's parameters.

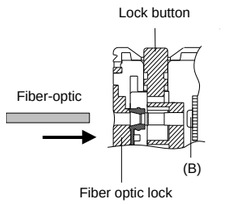
+ PUSHBUTTON and - PUSHBUTTON
A long push temporarily on both pushbuttons gives access to the setting menu of the parameters.
The switching threshold can be changed pressing the + or – pushbutton.
Please refer to the "SETTING" paragraph for setup procedure indications.

INSTALLATION

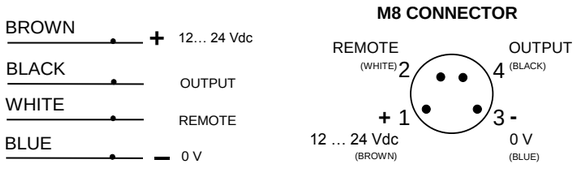
The transparent command protection cover rotates more than 130° in order to have an easy access.
The cover can be removed opening it completely and pulling it slightly. With a slight pressing, it can be replaced back.
Mount the sensor on a DIN rail or use the fixing holes and screws (M3x20 or longer).
For mounting on DIN rail, insert first part (A).



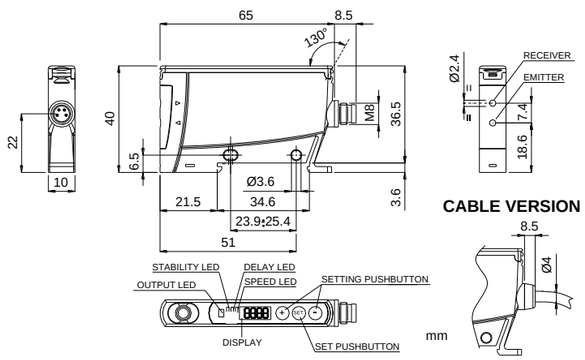
Installation of the fiber optics:
Press the lock pushbutton and keep it pressed until all the fibers have been completely inserted.
Insert the fibers in the corresponding holes as described in the dimension drawing.
The transparent fiber optic fixing block allows you to easily check that the fibers are correctly inserted.
The insertion resistance is due to the O-ring seal; please insert the fibers about 6mm deeper until they touch the stop (B).



CONNECTIONS



DIMENSIONS



TECHNICAL DATA

Power supply:	12 … 24 Vdc ±10% (Reverse polarity protection)
Ripple:	2 Vpp max.
Consumption (Output current excluded):	≤ 50 mA
Outputs:	NPN (BOS 72K-NU-RA20-...) or PNP (BOS 72K-PU-RA20-...)
Output current:	100 mA max.
Output saturation voltage:	≤ 2 V
Response time:	500 µs max. at low speed/100 µs max. at fast speed
Switching frequency:	1 KHz max. at low speed/5KHz. max. at fast speed
Indicators:	4 digit DISPLAY (GREEN); OUTPUT LED (YELLOW) STABILITY LED (GREEN) DELAY LED (GREEN); SPEED LED (GREEN)
Setting:	SET pushbutton; + pushbutton; - pushbutton
Data retention:	non volatile EEPROM memory
Operating temperature:	-10 … 55 °C
Storage temperature:	-25 … 70 °C
Electrical protection:	Class 2
Emission type:	RED (670 nm)
Ambient light rejection:	EN 60947-5-2
Vibrations:	0.5 mm amplitude, 10 … 55 Hz frequency, for every axis (EN60068-2-6)
Shock resistance:	11 ms (approx. 30 G) 6 shock for every axis (EN60068-2-27)
Housing material:	ABS
Mechanical protection:	IP65 (TYPE 1 ENCLOSURE)
Connections:	2 m ∅ 4 mm cable (BOS 72K-..RA20-02) M8 4-pole connector (BOS 72K-..RA20-S75)
Weight:	115 g. max. cable vers. / 30 g. max. connector vers.

SETTING

Simple one touch set-up
Two different setting possibilities are available:
- *OneTouch* – a long pressure of the SET pushbutton allows self-setting.
- *FINE DETECTION* – to be used only in particularly critical conditions. This setting procedure is used only when the one touch is not sufficient.

● pushbutton pressed ○ pushbutton not pressed

BOS 72K-..-RA20-… setting
The one touch setting defaults in the LIGHT operating mode.
When using proximity fibers, the output is closed and the output LED is ON when the object is detected.
When using thru-beam fibers, the output is closed and the output LED is ON when the object does not interrupt the beam (i.e. the object is not detected).

- *<u>One Touch (standard detection)</u>*

Place the object to detect in front of the proximity fibers within the operating range, or in the middle of the thru-beam fibers.

	Bar Graph			Display				Keyboard		
OUT	S	T	H	Dig1	Dig2	Dig3	Dig4	+	SET	-
□	□	□	□	1	9	4	5	○	●	○

- *Press the SET pushbutton for at least 2 seconds*

OUT	S	T	H	Dig1	Dig2	Dig3	Dig4	+	SET	-
□	□	□	□	E	a	s	y	○	●	○

- *The "Easy" text appears for One Touch detection*
- *The single detection is made releasing the pushbutton*

-

OUT	S	T	H	Dig1	Dig2	Dig3	Dig4	+	SET	-
□	□	□	□	1	9	4	5	●	○	●

- *The switching threshold value begins to blink*
- *The switching threshold can be changed using the + or – pushbuttons*
- *The sensor returns to the Normal mode, visualizing the received signal, after 5 sec.of inactivity*

- ***<u>Fine detection</u>***

This mode offers an improved detection precision. The sensor can function either in the DARK operating or in the LIGHT operating mode.
Place the object to detect in front of the proximity fibers within the operating distance, or in the middle of the thru-beam fibers.

	Bar Graph			Display				Keyboard		
OUT	S	T	H	Dig1	Dig2	Dig3	Dig4	+	SET	-
□	□	□	□	1	9	4	5	○	●	○

- *Press the SET pushbutton for at least 4 seconds*

OUT	S	T	H	Dig1	Dig2	Dig3	Dig4	+	SET	-
■	□	□	□	S	E	T	1	○	●	○

- *The "SET1" text appears to detect the object's condition*
- *The output LED begins to blink releasing the SET pushbutton, The "SET2" text appears*

OUT	S	T	H	Dig1	Dig2	Dig3	Dig4	+	SET	-
■	□	□	□	S	E	T	2	○	●	○

- Remove the object to detect and press the SET pushbutton again

OUT	S	T	H	Dig1	Dig2	Dig3	Dig4	+	SET	-
□	□	□	□	1	9	4	5	●	○	●

- *If the detection is correct, the switching threshold value begins to blink*
- *The switching threshold can be changed with the + or – pushbutton*
- *The sensor returns to the Normal mode, visualizing the received signal, after 5 sec.of inactivity*

OUT	S	T	H	Dig1	Dig2	Dig3	Dig4	+	SET	-
□	■	□	□	F	A	I	L	○	●	○

- *The "FAIL" message appears if the detection is not correct and the output turns off*
- *The STABILITY LED blinks*

Switching threshold setting

	Bar Graph			Display				Keyboard		
OUT	S	T	H	Dig1	Dig2	Dig3	Dig4	+	SET	-
□	□	□	□	1	9	4	5	●	○	●

- *Press the + or – pushbutton for at least 2 seconds*

OUT	S	T	H	Dig1	Dig2	Dig3	Dig4	+	SET	-
□	□	□	□	1	9	4	5	●	○	●

- *The switching threshold value begins to blink*

OUT	S	T	H	Dig1	Dig2	Dig3	Dig4	+	SET	-
□	□	□	□	1	9	5	3	●	○	●

- *The switching threshold value is changed pressing the + or – pushbutton*
- *The units change at each pressure*
- *The digits change if the pressure is maintained*
- *The display returns to the Normal mode if the pushbuttons are not pressed for at least 5 seconds*

PARAMETER SETTING

	Bar Graph			Display				Keyboard		
OUT	S	T	H	Dig1	Dig2	Dig3	Dig4	+	SET	-
□	□	□	□	1	9	4	5	●	○	●

- *Pressing temporally the + and – pushbuttons 2sec.*

OUT	S	T	H	Dig1	Dig2	Dig3	Dig4	+	SET	-
□	■	□	□	M	E	n	u	○	●	○

- *The "Menu" text appears, access to the parameter setting is obtained releasing the buttons*

Visualization of the delay value
By simply pressing the + or – pushbutton, the menu is visualized (forwards and backward) showing the following:

OUT	S	T	H	Dig1	Dig2	Dig3	Dig4	+	SET	-
□	■	□	□	d	E	L	0	●	○	●
				d	E	L	1	○	●	○
				d	E	L	2	○	●	○
				d	E	L	3	○	●	○
				d	E	L	4	○	●	○

At each push of the SET pushbutton, the different levels of the output time delay are visualized cyclically and the relative delay value is also memorized.
When the "del0" message is visualized, the T LED is off; it is on in all the other levels (del…del3).
The + pushbutton has to be pressed to continue through the setting menu (the – pushbutton to go backwards).
The delay levels are: 0=no delay; 1=5ms; 2=10ms; 3=20ms; 4=40ms.

Visualization of the sensor's switching frequency

OUT	S	T	H	Dig1	Dig2	Dig3	Dig4	+	SET	-
□	■	□	□	d	E	L	0	●	○	●
				n	O	r	M	○	●	○

At each push of the SET pushbutton, the different levels of the switching frequency are visualized.
When the Fast speed is selected the H LED is on; the H LED is off if the low "NorM" speed is selected.
The + pushbutton has to be pressed to continue through the setting menu (the – pushbutton to go backwards).

Visualization of the sensor's LIGHT/DARK logic switching

OUT	S	T	H	Dig1	Dig2	Dig3	Dig4	+	SET	-
□	□	□	□	L	-	O	n	●	○	●
				d	-	O	n	○	●	○

At each push of the SET pushbutton, the two logic types (LIGHT or DARK) are visualized.
When the LIGHT mode is selected the "L-On" is visualized; "d-On" to select the DARK mode.
The + pushbutton has to be pressed to continue through the setting menu (the – pushbutton to go backwards).

Visualization of the display orientation

OUT	S	T	H	Dig1	Dig2	Dig3	Dig4	+	SET	-
□	□	□	□	D	S	u	P	●	○	●
				D	S	d	n	○	●	○

At each pressure of the SET pushbutton, the visualization of the messages on the display is inverted.
The + pushbutton has to be pressed to continue through the setting menu (the – pushbutton to go backwards).

Visualization of the display turning off

OUT	S	T	H	Dig1	Dig2	Dig3	Dig4	+	SET	-
□	□	□	□	D	S	O	n	●	○	●
				D	S	O	F	○	●	○

At each pressure of the SET pushbutton, the turning off or on of the display is visualized.
If "dSOF" is selected the display will be turned off when back to the normal mode and turned on at each pressure. It will turn off again if not pressed for at least 5 sec.
The + pushbutton has to be pressed to continue through the setting menu (the – pushbutton to go backwards).

Visualization of the SAVE parameters set by the user

OUT	S	T	H	Dig1	Dig2	Dig3	Dig4	+	SET	-
□	□	□	□	S	A	V	E	●	○	●

All the changed values will be memorized by pressing the SET pushbutton and you exit the menu, returning to the normal mode.
The + pushbutton has to be pressed to continue through the setting menu (the – pushbutton to go backwards).

Visualization of the parameter RESET with pre-set values

OUT	S	T	H	Dig1	Dig2	Dig3	Dig4	+	SET	-
□	□	□	□	r	S	E	t	●	○	●

The default parameters are reset when the SET pushbutton is pressed.
The "RESET" text blinks until the pushbutton is pressed.
The sensor returns to function normally when the button is released.

Default parameters:		
	Delay	***NO DELAY***
	Switching frequency	***NORM***
	Switching logic	***LIGHT***
	Orientation	***DS_UP***
	Display	***DS_ON***

REMOTE FUNCTION

The REMOTE wire connected to +Vdc is equal to pressing the SET pushbutton. The *<u>keyboard block</u>* is activated if at the sensor powering the REMOTE wire is connected +Vdc, and thus the SET pushbutton is no longer active. To deactivate the *<u>keyboard block</u>* the sensor has to be turned off and then turned on with the REMOTE wire not connected.

WARRANTY
Balluff Inc warrants its products to be free from defects.
Balluff Inc will repair or replace, free of charge, any product found to be defective during the warranty period of 36 months from the manufacturing date.
This warranty does not cover damage or liability deriving from the improper application of Balluff products.

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