Product Data

Electrical Data

		SST (Transmitter)	SSR (Receiver)
Supply voltage		18 – 30 V dc	
Max. Voltage ripple		15 % (within supply range)	
Current consumption		100 mA (RMS)	75 mA
Max. outputs load	Digital	-	100 mA
	Analogue	-	Voltage: $Z_{load} ≥ 1kΩ$ Current: $Z_{load} ≤ 600Ω$
Reverse polarity protected		Yes	
Short circuit protected		Yes	
Inductive load protection		-	Yes

Environmental Data

Light immunity @5° incidence	> 100.000 lux
Temperature, operation	-30 to + 60 ºC
Sealing class	IP 67
Marking	UKCA CE

Available Models

	Model	Beam spacing	Range
Transmitter	SST 02-xxx-xxx-05-H-1D1-0.5-J5	5 mm	10 m
	SST 02-xxx-xxx-10-H-1D1-0.5-J5	10 mm	
	SST 02-xxx-xxx-20-H-1D1-0.5-J5	20 mm	
	SST 02-xxx-xxx-40-H-1D1-0.5-J5	40 mm	
Receiver	SSR 02-xxx-xxx-05-H-IO-UUK-ZZW-0.5-J12	5 mm	0.5 m – 10 m
	SSR 02-xxx-xxx-10-H-IO-UUK-ZZW-0.5-J12	10 mm	
	SSR 02-xxx-xxx-20-H-IO-UUK-ZZW-0.5-J12	20 mm	
	SSR 02-xxx-xxx-40-H-IO-UUK-ZZW-0.5-J12	40 mm	

Connection

Wiring Diagrams

5 pin, M12

Sensor Plug (Male)   Cable Plug (Female)

	Blue
	Black
	Grey
	Brown
	White

12 pin, M12

Sensor Plug (Male)   Cable Plug (Female)

	Pink
	Grey-Pink
	Yellow
	Red-Blue
	Black
	Green
	Red
	Brown
	Violet
	Blue
	White
	Grey

SST 5 pole M12 male connector   SSR 12 pole M12 male connector
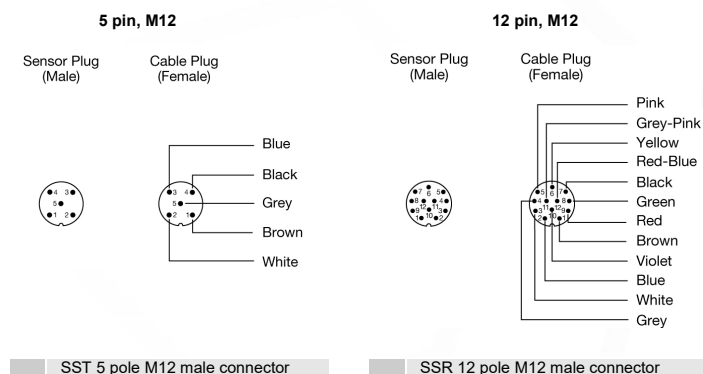
Transmitter Model	Black wire connected to (-)	Black wire not connected	Black wire connected to (+)
SST 02-xxx-xxx-xx-H-1D1-0.5-J5	not transmitting	transmitting	transmitting
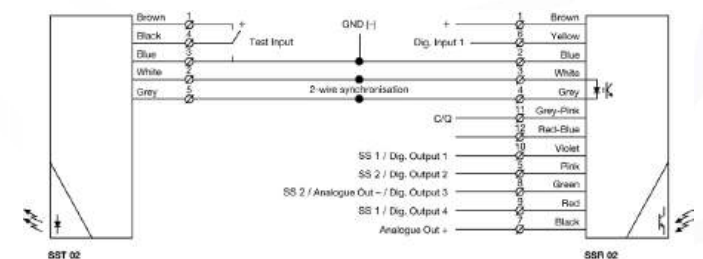
Wiring diagram

UUK-ZZW	Pin 5 Pink	Pin 6 Yellow	Pin 7 Black	Pin 8 Green	Pin 9 Red	Pin 10 Violet
AC2 - DN2	Dig. NPN Out 2	Dig. Input 1	Analog Out +	Analog Out -	-	Dig. NPN Out 1
AC2 - DP2	Dig. PNP Out 2	Dig. Input 1	Analog Out +	Analog Out -	-	Dig. PNP Out 1
ANN - DN4	Dig. NPN Out 2	-	-	Dig. NPN Out 3	Dig. NPN Out 4	Dig. NPN Out 1
ANN - DP4	Dig. PNP Out 2	-	-	Dig. PNP Out 3	Dig. PPN Out 4	Dig. PNP Out 1
ANN – SS2	SS 2	-	-	SS 2	SS 1	SS 1

"-" = Not used

Type name: SSR 02-xxx-xxx-xx-H-**UUK-ZZW**--0.5-J12.
The letters **UUK-ZZW** determine the output configuration of the SSR 02.

IO-Link Master M12 5 pin: Pin 3 (blue) to GND and pin 4 (black) to C/Q

Output configurations

Installation & Adjustments

Installation

The light curtain is configured by the PC program 'IO-Link Device Tool V5.1' from TMG, described in the following pages. Before using it, check the power supply complies with electrical data.

1   Mount the transmitter (SST) and receiver (SSR) facing each other and correctly aligned.

2   Wire the sensor according to the wiring diagram.
Notice that the pin 2 on the SSR and the pin 3 on SST (blue wires) must be connected to a common GND (–).
Make sure the SSR output load does not exceed 100 mA.

3   Check for correct wiring before turning power on.

4   When the power on indicator (green LED) on SSR and SST is on, the system is operating.

5   The position of the receiver and transmitter must not be changed after power-up. The light curtain is only intended for static applications.

SST Test Input

The transmitter SST can be externally disabled and enabled via the black control wire for test purposes. When the transmitter is disabled the action of the receiver corresponds to breaking all beams.

SSR Digital Input 1

The digital input can be used to switch between two different output readings on the analogue output.
The time from a transition on the digital input to a transition on the analogue output is dependent on the number of beams.
The maximum transition time can be calculated as 500us + the number of beams multiplied by 15us.
Using cross beam scan mode will double the number of beams.
While communication on the IO-Link in ongoing, the transition time will be considerably longer.

Indicators

| SSR	Red LED	Status indicator
SSR	Yellow LED	Follows state of Digital Output 1
SSR & SST	Green LED	Power on indicator

Troubleshooting

Probable Reason	Corrective Action

1. Symptom: Status indicator (Red LED) on SSR is constant on.

SST has no power.	Check supply and supply cable to the SST
SST & SSR white, grey and blue wires are not connected correctly.	Connect the wires.

2. Symptom: Output indicator (Yellow LED) on SSR is flashing.

Severe electrical interference.	Separate SSR and SST supply cable from high voltage cables.
Severe ambient light.	Swap position of SSR and SST.
Cross talk from another light curtain or photo sensor	Swap position of SSR and SST.
Cross talk from a nearby HF strip light	Swap position of SSR and SST or remove the strip light.

3. Symptom: Digital outputs do not response when IR beams are obstructed.

One or more beams are blocked, or the rails are out of sensing range.	Remove obstruction or reduce the distance between the rails.
The test input on SST is activated	Remove SST pin 4 (black wire) from ground.
Outputs are not configured for simple detection of obstructions	If needed, factory reset the SSR using the Parameter tab in the PC program '

SENSOR PARTNERS

SSR02 and PC connection

To setup or adjust a SS02, it is required to use TMG IO-Link Device Tool together with TMG-USB IO-Link Master, or another IO-Link PC application with its USB-adaptor.
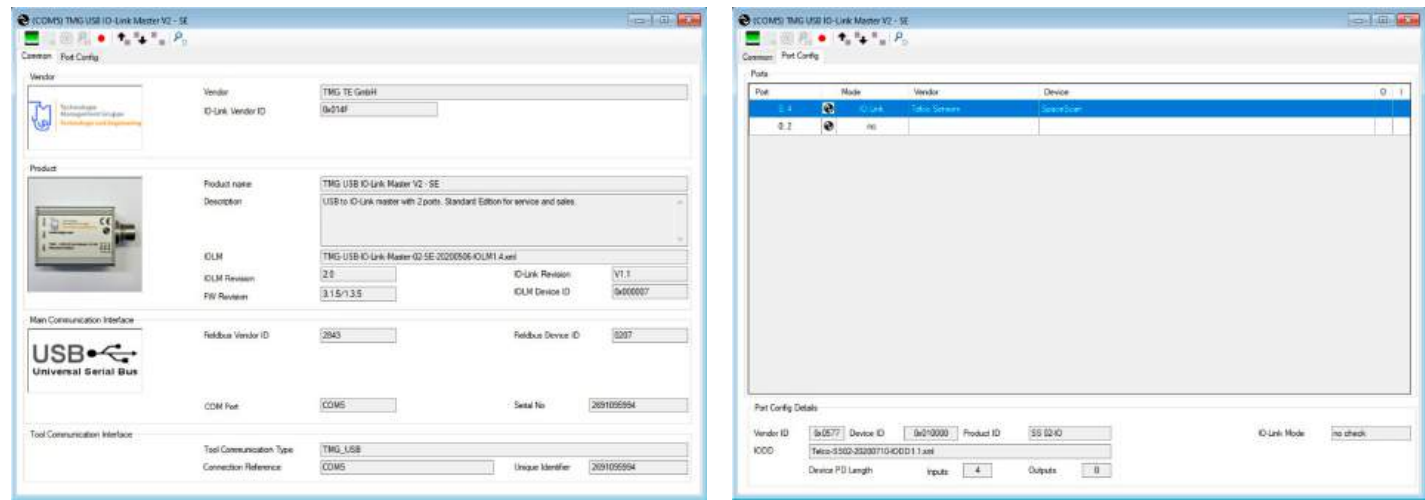
How to connect

Connect the TMG-USB IO-Link Master USB-adaptor to the USB-port of the PC and to the cable of the SS02.

Download the IO-Link Device Tool software and the SS02-IODD file from the Telco Sensors website in https://www.telcosensors.com/downloads selecting Software in Document type section.
Install the TMG IO-Link Device Tool V5.1.1-5122 SE – Setup file and run the program.
Import the SS02-IODD by selecting "Import IODD" in the Options menu, previously downloaded.

Click on "Search Master" and select the Master in the popup window.
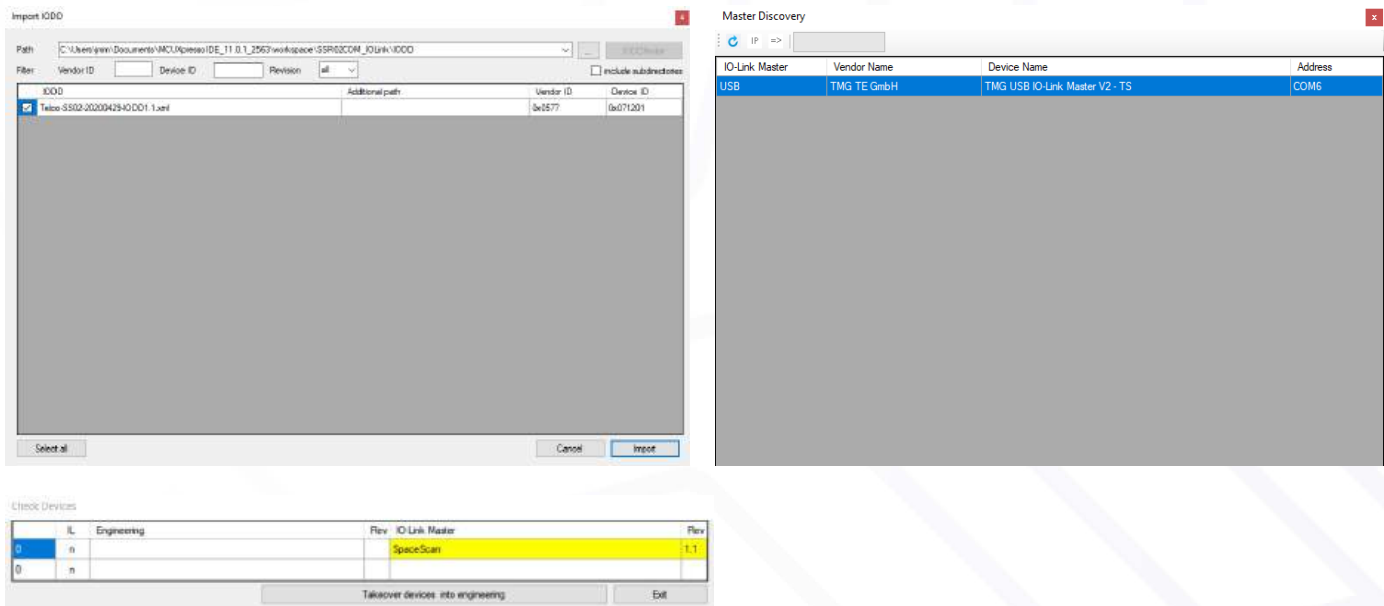
Click on "Go Online"   .

Click on "Check Devices"   .

Click on "Takeover devices into engineering" to the SpaceScan (SS 02) device.
Double click on the row with the SS02, to open the Device menus.

Click on "Upload from Device"   to upload the SS 02 settings.

For more information see TMG's User Manual for the IO-Link Device Tool.
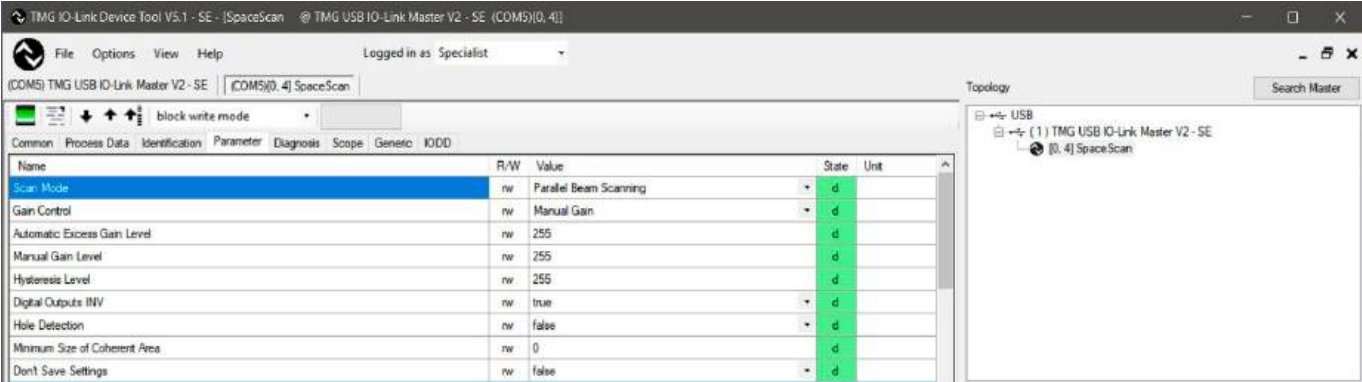
Popup windows:

Parameters

On the Parameter tab, you can set up all the parameters of the light curtain.

General settings

Standard Command – Restore Factory Settings
Restores all user-settings to default values.

Curtain type HW
The light curtains self-identification of type.

Beam spacing
The light curtains self-identification of beam spacing.

Beam count
The light curtains self-identification of number of beams.

Scan mode
Select between Parallel or Cross beam.
On cross beam mode, the number of actual beams is increased from N straight beams to (3*N)-2 beams giving a denser beam pattern, with larger detection certainty.
If objects are positioned in the centre, or close to the centre, between transmitter and receiver the measurement resolution is increased to the double, i.e. the crossed beam mode adds an additional virtual beam between each of the straight beams, in total N-1 extra virtual beams. When crossed beam mode is selected the number of beams is increased to (2*N)-1 in total, which therefore also will be the new maximum of the analogue output. Be aware that objects have to be taken out of the light curtain when switching from parallel beam mode into crossed beam mode when it is in automatic gain mode. The reason is that the gain of the crossed beams has to be initialised.

Channels normally closed
Select between true or false.
Changing the selection will invert the outputs.

Hole detection
If Hole Detection is activated, the status of all beams will be individually inverted, that means that 'made beams' are converted to 'broken beams' (and inversely), whereby holes (unbroken beams) will be perceived as objects obstructing beams for the following analysis.

Gain mode
Select between Manual gain mode or Automatic gain mode. Keep objects out of the light curtain when switching to automatic gain mode or when adjusting the excess gain level, because the initial setting of each beam requires information about signal strength for an unbroken beam.

Excess gain level
In Automatic Gain mode it is possible to set the excess gain level.

Manual gain level
In the Manual Gain mode, it is possible to set the Manual Gain Level (a fixed gain level).

Hysteresis level
In both manual and automatic gain is it possible to set the Hysteresis level.

Minimum coherent area
The Smoothing Function tells the SSR to ignore objects which are smaller than a specific size. If the Smoothing Function is set to 3, any object that interrupts 3 or less adjacent beams will be ignored. Smoothing can be used, e.g., to ignore interference caused by wood chips while sawing a log.
The effect is obtained by a pre-processing of the beam's status where all groups of adjacent broken beams with less than or equal to 3 beams are substituted by made beams.
This smoothing function is carried out after the 'hole detection' pre-processing.
If coherent Area is changed with the digital input, the Space Scan Terminal need to be disconnected and connected again to see the change in the input box on the Space Scan Terminal program.

Don't save settings
When false is selected the settings will be saved to the permanent memory in the SSR02 light curtain, so that they will not be deleted when taking off the power. When using a PLC to continually write settings to the SSR02, this setting should be true because repeated writing to the permanent memory is only guaranteed for a minimum of 10000 times. This setting is false as factory default. When the checkbox is true, the latest setting will be remembered.

Note: It is recommended to press "Download to Device" ⬇ after every change in the parameters tab to ensure that the settings have been stored in the SS 02.

Analog output

Enabled
Select between true or false. True will only work if the light curtain has an analogue output.

Type
Select between Voltage or Current.

Mode (Control input low. NC)
Select between logic modes when the control-input is either low or not connected.

Disabled. The output will be zero.

First Beam Blocked. Position of the first beam blocked.

First Beam Made. Position of the first beam made.

Last Beam Blocked. Position of the last beam blocked.

Last Beam Made. Position of the last beam made.

Middle Beam Blocked. Position of the (FBB+LBB)/2 rounded to nearest integer.

Total Beams Blocked. Total number of beams blocked.

Total Beams Made. Total number of beams made.

Contiguous Beams Blocked. Reads out the number of beams in the largest group of adjacent beams blocked.

Contiguous Beams Made. Reads out the number of beams in the largest group of adjacent beams made.

Number of Transitions. The number of transitions in the beam pattern between made beams and blocked beams.

Outside dimensions. Reads out LBB - FBB+1, corresponding to the size of a single object contained in the beam pattern, counted in beam breaks.

Inside dimensions. Reads out the count of beams made between first beam broken and last beam broken. This corresponds to the size of a hole in a single solid object in the light curtain.

Contiguous First Beam Blocked. Reads out the number of the first beam in the largest group of adjacent beams blocked.

Contiguous Last Beam Blocked. Reads out the number of the last beam in the largest group of adjacent beams blocked.

Speed and Direction. Reads out the velocity of an object. If objects are moving in direction of larger beam numbers, the beam number the velocity is positive. If the objects are moving in the direction of smaller beam numbers, the velocity is negative.

Mode (Control input high)
Same as "Mode (Control input low. NC)" but active when the control-input is high.

Minimum speed Control low
Used when "Mode (Control input low. NC)" is in Speed and Direction mode.
Used to define the velocity that corresponds to 4 mA/ 0 V. Both negative and positive values in the interval between -40 m/s and +40 m/s can be used.

Maximum speed Control low
Used when "Mode (Control input low. NC)" is in Speed and Direction mode.
Used to define the velocity that corresponds to 20 mA/ 10 V. Both negative and positive values in the interval between -40 m/s and +40 m/s can be used.

Minimum speed Control high
Used when "Mode (Control input high)" is in Speed and Direction mode.
Used to define the velocity that corresponds to 4 mA/ 0 V. Both negative and positive values in the interval between -40 m/s and +40 m/s can be used.

Maximum speed Control high
Used when "Mode (Control input high)" is in Speed and Direction mode.
Used to define the velocity that corresponds to 20 mA/ 10 V. Both negative and positive values in the interval between -40 m/s and +40 m/s can be used.

Forced output
Enables the user to set the output value. This function can be used for test and calibration purposes.

Forced value
User can select the output value in beams, when Forced output is used.

Moving average time constant
User can specify a damping on the Analogue output. Can advantageously be used in Speed and Direction mode.

SIO

Enabled
Select between true or false to decide whether the IO-Link Standard IO mode is enabled.

Mode
Select between logic modes of SIO output. Most modes work together with "Operator" and "Trigger Level"

Disabled. The output will be off.

First Beam Blocked. Position of the first beam blocked.

First Beam Made. Position of the first beam made.

Last Beam Blocked. Position of the last beam blocked.

Last Beam Made. Position of the last beam made.

Middle Beam Blocked. Position of the (FBB+LBB)/2 rounded to nearest integer.

Total Beams Blocked. Total number of beams blocked.

Total Beams Made. Total number of beams made.

Contiguous Beams Blocked. Reads out the number of beams in the largest group of adjacent beams blocked.

Contiguous Beams Made. Reads out the number of beams in the largest group of adjacent beams made.

Number of Transitions. The number of transitions in the beam pattern between made beams and blocked beams.

Outside dimensions. Reads out LBB - FBB+1, corresponding to the size of a single object contained in the beam pattern, counted in beam breaks.

Inside dimensions. Reads out the count of beams made between first beam broken and last beam broken. This corresponds to the size of a hole in a single solid object in the light curtain.

Contiguous First Beam Blocked. Reads out the number of the first beam in the largest group of adjacent beams blocked.

Contiguous Last Beam Blocked. Reads out the number of the last beam in the largest group of adjacent beams blocked.

Any Beam Blocked. The output is active if one or more beams are broken.

Any Beam Blocked in Area. The output is active if one or more beams are broken with beam numbers that are larger than or equal to ABBA Level 1 and smaller than or equal to ABBA Level 2.

Signal Alarm. The output is active if the light curtain has a signal alarm.

Operator
Select the comparison operator between the Mode value and the Trigger value.

Function Compare Value
Select the value that the Mode value should be compared with.

Forced output.
Enables the user to set the output value. This function can be used for test and calibration purposes.

Forced value.
Select true for On and false for Off.

On delay
Select delay when going from not active to active output.

Off delay
Select delay when going from active to not active output.

	Warning
⚠	This device is not to be used for Personnel Protection in Machine Guarding Safety applications. This device does not include the self-checking redundant circuitry necessary to allow its use in personnel machine guarding stand-alone safety applications.

Digital output 1 – 4

Blanking

Measure blanking
Blanking means to deactivate beams resulting one or more areas in the light curtain where the status of the beams is ignored.
Beams can be blanked by simply reading obstructed beams from the light curtain by pressing the button **Measure blanking**. After upload, the obstructed and now blanked beams will be written in the text boxes.

Blanking:
Blanking can also be setup by writing directly which beams to be blanked in the text box Blanking [1] to Blanking [48].
Every textbox corresponds to eight beams. Beam number one correspond to bit one in textbox one, beam number two correspond to bit 2 and so on.
Writing one in the Blanking [1] will blank beam one. Writing 3 will blank beam one and two. Writing 255 means that all beams are blanked in the eight beams that textbox correspond to.
Only the text boxes corresponding to the number of straight beams in the light curtain are active. E.g. With 48 beams the values Blanking [1] to Blanking [6] are active, because that covers all 48 beams.

Process data

On the Process data tab, you will see status of the outputs and input. Only the available outputs/input will show any values.

Name	Value		Unit
[-] Input and Output Status			
SIO	true	◉	
Digital Output 1	true	◉	
Digital Output 2	true	◉	
Digital Output 3	true	◉	
Digital Output 4	true	◉	
Digital Input	false	○	
Analog Output Value	0		
Signal Alarm	false	○	

Identification

On the Identification tab, you will see the information about the light curtain.

Name	R/W	Value	State	Unit
Vendor Name	ro	Telco Sensors	d	
Vendor Text	ro	https://www.telcosensors.com	d	
Product Name	ro	SpaceScan	d	
Product ID	ro	SS 02-IO	d	
Product Text	ro	Telco Light Curtain	d	
Firmware Version	ro	SSR02_COM_v1.15/SSR02_FE_v1.9	d	
Production Year	ro	2020	d	
Production Month	ro	7	d	
Configuration	ro	ANN-DP4	d	
Configuration Self-Identification	ro	ANN-Dx4	d	
Beam Spacing	ro	5	d	
Beam Count	ro	48	d	
Standard Command	wo	Restore Factory Settings		

Warning

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SENSOR PARTNERS