ATEX Infra-Red Beam Set

GS100 Hazardous Areas Infra-Red Beam

Detect. Illuminate. Deter

PULSE MODULATED ACTIVE INFRA-RED BEAM FOR HAZARDOUS AREAS ZONE 1 OR ZONE 2

The GS100 IR beam set carries ATEX certification for use within the petrochemical industry, or other similar industries where an explosion-proof, flameproof, weather, or dust proof housing is required.

The electronic modules and associated housings have been designed & assembled in accordance with ATEX DIRECTIVE 2014/34/EU.

Product Description	Flameproof IR Transmitter & IR Receiver Enclosure II 2 G Ex d op is IIC T6 Gb -20 °C ≤ Ta ≤ +40 °C, IP66 II 2 D Ex tb op is IIIC T80°C Db IP66
Type	EMH29

CERTIFICATION AND CONFORMITY

EN 60079-0:2012/A11:2013, EN 60079-1:2014, EN 60079-31:2014, EN62368-1:2014

Suitable for:

European Classification
Group II Category 2 G Zone 1 & Zone 2 Hazardous areas

North American Classification
Class I, Division 1 & Class I, Division 2

European Classification
Group II Category 2 D Zone 21 & Zone 22 Hazardous areas

North American Classification
Class II, Division 1 & Class II, Division 2

In accordance with EC type examination certificate No. TRAC13ATEX0054X, a review of EN 60079-0:2012/A11:2013, EN 60079-1:2014, EN 60079 31:2014 and Manufacturing Specification and Parts List-06109 EMH29-06108.

This product is a component system and is intended for inclusion within other equipment fitted by professional installers only.
The unit must not be operated as stand alone equipment.

Where applicable, compliance with the EMC directive or Machinery Directive is the responsibility of the installer.

CERTIFICATION	CE UK CA

GENERAL

The GS100 beam set is a detection device only, and is designed to be used in association with alarm annunciation equipment, or other devices that provide a means of monitoring the GS100 voltage free relay alarm output (i.e. CCTV / NVR integrations, etc).

The beam set comprises of two parts, an infra-red beam transmitter, and an infra-red beam receiver. Both modules are mounted within a flameproof (EExd) enclosure c/w gasket, chromate primed and polyester coated white finish.

A heat strengthened plate glass aperture is incorporated in which the infra-red beam is projected (via TX optics) and monitored (via RX optics). An interruption in the 'aligned' beams path, is designed to provide a change of relay state at the receiver (N/C & N/O alarm relay O/P).

A heater element can optionally be provided in both the transmitter (TX) and the receiver (RX), to help combat the build up of condensation.

It is however normal practice to fit such a device to the RX housing only, as an attempt to tamper with the TX device will automatically generate an output at its associated receiver. i.e. if the TX optics are moved, supply interrupted, or device is low in voltage, the low energy projected infra-red beam, or no projected beam present, will be detected by its associated receiver.

As the beam sets use an infra-red light source that is invisible to the human naked eye, a beam alignment voltage output is provided for this process, via a terminal (align. O/P), or test pin.

The voltage O/P is designed to be used with a standard voltmeter (0 – 10VDC).

The GS100 incorporates both high security 'Asynchronous', and 'Synchronous' beam set synchronisation, allowing many sets of beams to be installed on the same site, or indeed stacked above each other (greater detection), without 'cross interference'.

The use of the synchronisation facility when installing only one set, or several sets in different locations of a site is recommended (although not essential). Doing so will ensure that the receiver (RX) circuitry ignores other infra-red light sources that may unknowingly be present and falling directly on the RX optical axis (invisible to see).

Synchronisation monitoring is incorporated when the interconnections are made, refer to technical specification.

It is recommended that the 12VDC supply have a floating output to accept the negative earth, and that all cables should be screened throughout their entirety.

SPECIFICATIONS

TRANSMITTER	
DETECTION TYPE	Dual
PROTECTION DISTANCE	10m – 100m / with 75% attenuation
INPUT VOLTAGE	Nominally 12Vd.c Min 10.5Vd.c Max. 15Vd.c (15mA)
EFFECTIVE TRANSMITTED BEAM ANGLE	6° approximately
TAMPER OUTPUT	1 x voltage free N/C contact: Max. rating 24V 1A 30VA
HEATER CURRENT	125mA
IR WAVELENGTH	880nm
DIMENSIONS	160 x 146 x 137mm
TEMPERATURE RANGE	-20 °C +40 °C
WEATHER PROTECTION	IP66

RECEIVER	
DETECTION TYPE	Dual
INPUT VOLTAGE	Nominally 12Vd.c Min 10.5Vd.c Max. 15Vd.c (40mA)
ALARM OUTPUT	1 x voltage free change over contact: Max. rating 24V 1A 30VA
RESPONSE TIME	> 20ms < 40ms
DWELL TIME	800ms
HORIZONTAL ADJUSTMENT	+/- 15 degrees
VERTICAL ADJUSTMENT	+/- 15 degrees
TAMPER OUTPUT	1 x voltage free N/C contact: Max. rating 24V 1A 30VA
HEATER CURRENT	125mA
DIMENSIONS	160 x 146 x 137mm
SYNCHRONISATION MODES	Synchronous connection & Asynchronous connection in both modes Synchronising Link monitoring is incorporated as standard
TEMPERATURE RANGE	-20 °C +40 °C
WEATHER PROTECTION	IP66

Note: Housing manufacturer installation & maintenance instructions can be found within the housing and should be observed prior to fixing.

TW-MM100 (Transmitter) USER NOTICE:
When unpacked or fitted within housing, never leave the Transmitter optics facing towards direct sunlight.

12v DC		O/P	O/P	I/P	
-	+	Sync	Sync	Ext	Spare
1	2	3	4	5	6

TW-MM100 (Receiver) USER NOTICE:
When unpacked or fitted within housing, never leave the Receiver optics facing towards direct sunlight.

12v DC		I/P	O/P	O/P	RELAY OPs		
-	+	Sync	Sig	Align	N/O	C	N/C
1	2	3	4	5	6	7	8

ADDITIONAL FEATURES

The equipment utilises pulse modulation.

For high security and avoidance of cross talk between beam sets, the system can be synchronised by means of an ‘asynchronous’ connection. For lower security and avoidance of cross talk between beam sets, the system can be synchronised by means of a ‘synchronous’ connection.

The GS100 circuitry incorporates ‘Sync. Line’ monitoring, providing a change of relay state (alarm O/P) at the receiver (RX), if the synchronisation cable is maliciously or accidentally cut, or short circuited.

The product is guaranteed against faulty workmanship for a period of 2 years from date of despatch.

Our progressive design policy reserves us the right to modify our products, data and specification, without prior notice.

The infra-red beam is designed as a detection device only and its output used for connection to an alarm control / monitoring panel. As such we will not accept responsibility for any theft / damage.

INSTALLATION GUIDANCE NOTES
Please additionally refer to any supporting instructions that may be provided by the housing manufacturer and may be present within the TX or RX housing.

Using the M6 mounting holes at the rear of both TX and RX housings, the units should be mounted on a rigid, vibration free flat surface. Depending upon the structure being fixed to, it may be necessary to employ some form of mounting plate, as the housings must not in any instances be drilled.

The transmitter (TX) & receiver (RX) unit should be mounted so as to face each other squarely, and at the same height, assuming that the ground is level.

The optical heads of the TX & RX can be adjusted (+/- 15deg. approx.), however the housing aperture restricts movement and should be used as a means of overcoming unavoidable inaccuracies that may occur during installation.

Further adjustment is catered for in the TX & RX mounting plates. Two sets of mounting holes are provided (one set above the other), allowing the electronics and associated optics positions within the housings to be shifted in the vertical plane.

Where greater angles are required, then this should be dealt with using suitable adjustable mounting plates.

Cable type, mechanical protection, and entry glands should be provided by others and suitable for the type of installation.
When choosing the appropriate cable for the installation, consideration needs to be paid to the TX & RX terminal cable size (refer to tech. spec.) and in particular to the size of conductor used for the 12V DC supply voltage over the length of the cable run (to avoid voltage drop).

Where it is decided to use optional heater elements to combat condensation build up on the glass apertures (external exposed locations), then it is good practice to use a separate pair of conductors for the supply voltage to the heater terminal connections.

The TX & RX units should be connected in accordance with the wiring diagrams provided, with connection made to the heaters and tamper switches where fitted.

A separate terminal block is provided on the underside of each heater module, and requires a 12V DC supply voltage for heater operation (refer to tech. spec. for current of each heater). For ease of installation, the termination block is removable (pull downward off of board connection mounting pins). Note: cable connections are to the outer two terminals only, the centre one not being used.

A separate terminal block is provided via a 'flying lead' from the tamper switch (housing lid removal detection device). As provided, the connections to the changeover switch is of a solder made to the tags, suitable for the security industry i.e. when the lid is secured a closed circuit is present at the terminal block, going open circuit when the lid is removed. Should this operation require to be reversed, then an alternative solder tag is provided on the switch.

Note: the tamper switch operation should be tested prior to final commissioning, and the switch adjusted as necessary to ensure false alarm free operation. Adjustment can be made by applying gentle pressure to the arm of the switch just above the switch contact point, and bending slightly outwards as may be necessary.

To obtain the benefits of beam synchronisation as described previously, the facility will only be in full operation when a hard-wired cable connection is made between each beam set TX and its associated RX unit.

If the TX and RX of each set are powered from the same 12V DC power supply, then only a single core cable / conductor is required between terminal 3 (Sync. O/P) of the Transmitter (TX) and terminal 3 (Sync. I/P) of its associated Receiver (RX).

Where the TX & RX units are powered via separate power supply units, it is necessary to common the negative supply line of the PSU's, or install an additional core cable / conductor between the TX terminal 1 and its associated RX terminal 1 (negative supply of TX & RX units).

If on a single beam set installation the synchronisation system is not desired, then no interconnect between the TX and RX should be made, other than possibly the 12VDC supply (TX & RX Term. 1 - & 2 +).

Note: In an unsynchronised system, the beam sets will operate even with the TX and RX units powered from separate 12V DC power supply units (PSU's), and the 230 / 110 V input to the PSU's powered via different mains phases.

The 'synchronous' type synchronisation system is not covered within the instructions. It is to be used under guidance from our tech. dept, who will be pleased to discuss the connection requirements if in our view we deem it applicable for the type of installation. Terminals applicable are:- TX term. 4 & 5 and RX term. 4. These terminals should not be used for any other connections.

FINAL ALIGNMENT

This process aligns the beam path between the TX & RX for optimum performance in all weather conditions.

The use of a standard voltmeter with 0 – 10VDC range is adequate in most instances.

Where a voltmeter and a drum of cable is available, the alignment voltage information that is only available at the receiver (RX) unit, can now be observed by the voltmeter at the transmitter unit, via connection to the temp. run cable, that in turn is to be connected to the RX voltage alignment O/P. In this manner the process can be carried out by a single man operation.

Set the voltmeter, to 10V DC range and connect negative probe to terminal 1 on the receiver (RX) unit (negative supply). Connect the positive probe to terminal 5 on the receiver (RX) unit (Align O/P).

In addition to these terminals, alignment information is mimicked via the test pins to the right of the termination block, and identified by 'ALIGN + / 0v'.

If initial alignment has been carried out, the alarm LED (far right of RX termination block) may be extinguished, and / or an alignment O/P voltage may be present on the alignment O/P terminals. Even at this point, the beam sets should be aligned for optimum performance.

With the meter connected, both the TX & RX optical heads must be adjusted in both 'pan' & 'tilt' directions of movement, to achieve maximum alignment voltage.

The actual alignment voltage achieved will depend on the distance between the TX and RX unit, and as to whether the beam sets have been synchronised via an interconnection cable.

For non- synchronised systems the maximum alignment voltage achievable is generally 5 - 6V DC, whilst with a synchronised system, the voltage is approximately halved to 2.5 – 3.0V DC max.

The beam sets are best aligned methodically, starting with trying to achieve some alignment voltage whilst adjusting the receiver optics firstly in the pan mode, and then in the tilt mode.

Repeat this procedure with the transmitter (TX) optics, until optimum voltage O/P is achieved, and then back to the RX optics to see if any further improvement can be made.

It is critical that alignment of the optical heads are carried out at each end of the detection zone, i.e. both TX & RX optical heads are adjusted, and not just the RX optical heads where the alignment voltage is made available.

The most critical optical head is that of the transmitter, as unless the projected cone of energy is adjusted to fall on the receiver optics, no adjustment at the receiver optics will produce an alignment O/P (receiver will never pick up its associated transmitter signal).

Checking that a clear line of sight can be obtained, between the TX & RX units and that the beam path is not ‘bouncing off’ any adjacent/reflective surfaces.

Once the optimum alignment voltage has been achieved, the operation of the units should be tested at intervals along the detection zone length.

As the beam path is interrupted / blocked, the associated RX should trip to an alarm condition (relay change state), and the alarm LED should indicate accordingly.

BASIC TROUBLE SHOOTING

At certain points along the beam path, the beam can be blocked/interrupted without generating an alarm condition.

Check for a bounced beam path from an adjacent object / reflective surfaces and realign.

Receiver is in an alarm condition and ‘Alarm LED’ is permanently ‘ON’ although alignment voltage is good.

Check position of receiver (RX) switch ‘S1’. For a synchronised system the switch should be ‘ON’, for an unsynchronised system the switch should be ‘OFF’.

Check synchronisation cable /connections (if applicable).

No alignment voltage can be obtained at the receiver (RX), LED is ‘ON’

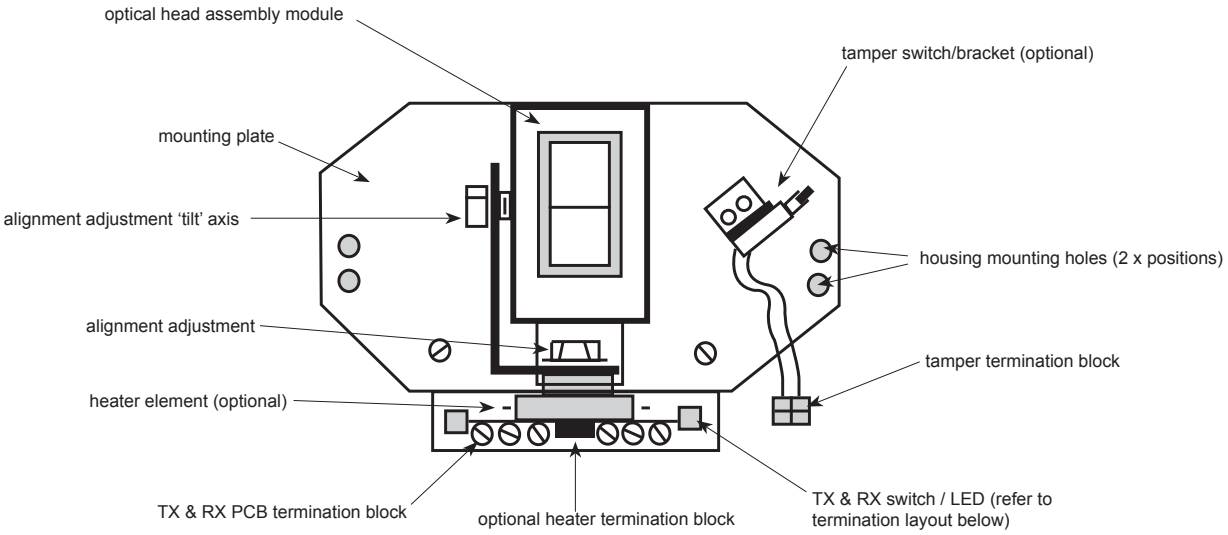
Check that the transmitter is switched ‘on’ via switch ‘S1’ to right of TX terminal block.

Check supply voltage at TX and RX terminal 1 & 2 are within tolerances of spec.

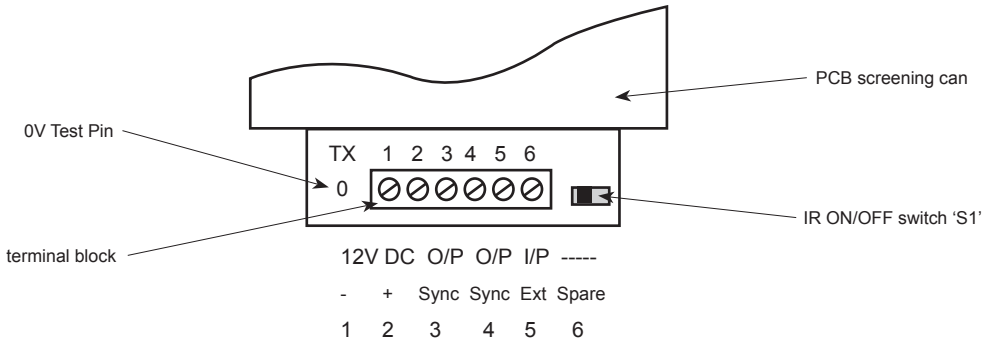
Check alignment operation and if still no alignment voltage, remove TX and introduce in front of RX to test beam set operation (a battery may be used to temp. power the TX).

Check operational distance is within specification and that glass aperture in housing is clean.

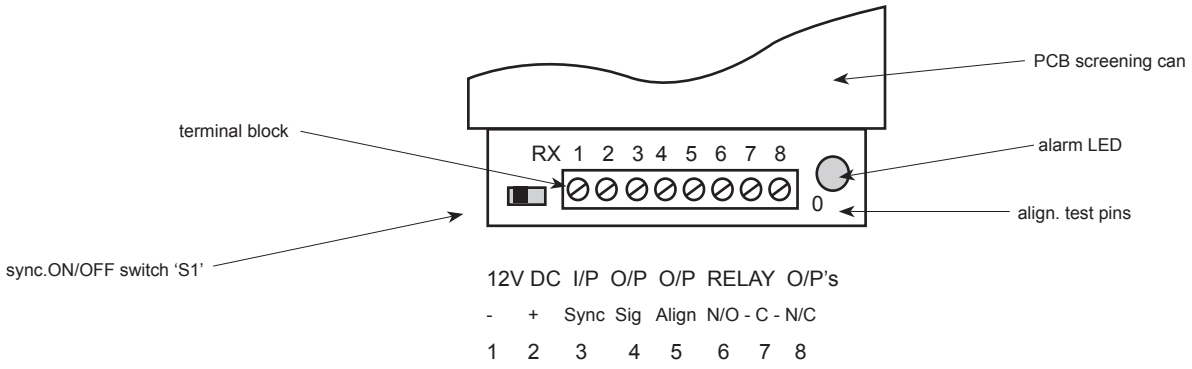
GS100 TX & RX Assembly (Out of housing)



GS100 Transmitter (TX) PCB Termination Block



GS100 Receiver (RX) PCB Termination Block



ENGINEER NOTES

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