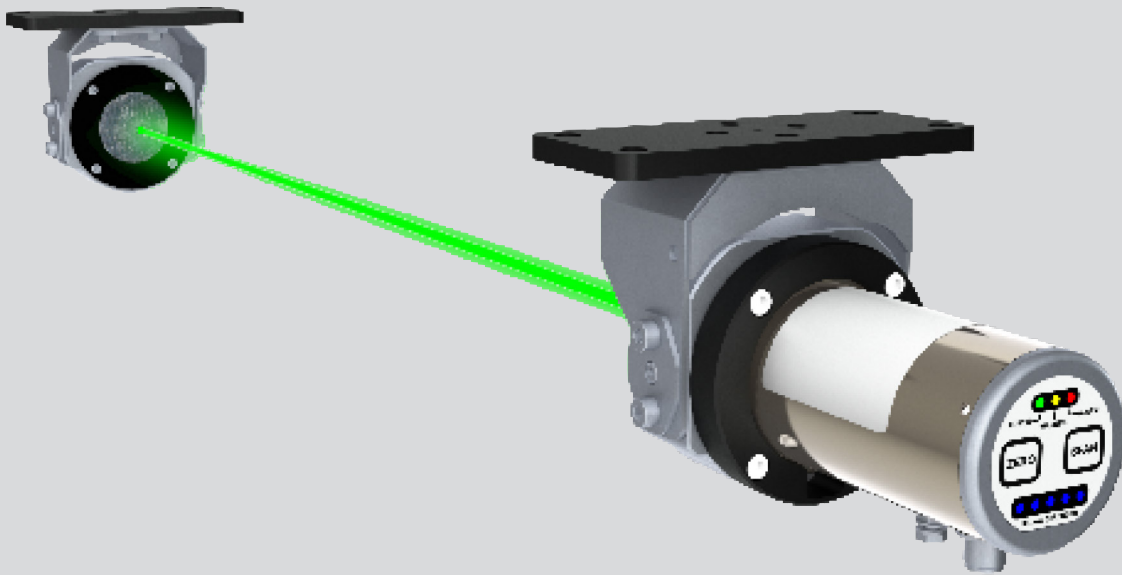


G26

Ex Opacity System

Instruction Manual



Document ID number.: 103520

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1 Introduction

1.1 About this Manual

This manual contains data and instructions for the installation, operation, and maintenance of the Ex Opacity G26 system.

The main sections of the manual describe the general specifications, usage, maintenance, installation and commissioning instructions, whereas the appendix in section 12 focuses on details concerning Ex Safety.

The instructions are given in general terms and do not take into consideration a specific installation. The figures used in the manual are only for general illustration purposes. This manual is designed for the Ex Opacity G26 system delivered by Green Instruments A/S.

Note that each Ex Opacity G26 system is delivered with a default configuration from the factory. Therefore, please study this manual and the Technical Drawings for each system in their entirety for the operation of the system.

This manual does not describe all possible situations, but only the most common and known situations. It cannot replace the necessary education and training of the personnel. Should situations not described in this manual occur the operator should contact Green Instruments A/S for instructions.

Attention

Before operation, read section 12 Appendix of Ex Opacity Transceiver , all instructions and warnings within this manual and associated documentation.

Improper use may cause personal injury and/or damage of equipment and may void the warranty. Green Instruments A/S disclaims any responsibility for damage and/or injury caused by improper installation, use or maintenance of the equipment.

Green Instruments A/S reserves the right to minor alterations and improvements owing to developments without being obliged to enter the corresponding changes in this manual.

Green Instruments A/S reserves the copyright of the manual. Without prior written permission of Green Instruments A/S, the manual may not be copied and given to unauthorized people.

1.2 Inquiries and Feedback

All claims and inquiries for spare parts shall be addressed to Green Instruments A/S or our distributors. In all correspondence, or when ordering spare parts, please carefully state the equipment type and serial number, which can be found on the label on the equipment.

Green Instruments A/S appreciates all feedback and suggestions for improvement. If any questions appear or any discrepancies are found in this manual, kindly contact Green Instruments:

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1.3 About the System

The Ex Opacity G26 system is designed to detect small concentrations of oil mist in open spaces and provide an early fire or explosion hazard warning.

The transceiver sends out a light beam with specific spectral characteristics that is projected across the space to be monitored for oil mist leakage. The transceiver emits light that passes through the space where it hits the reflector positioned opposite to the transceiver

The reflector returns the light to the transceiver and the transceiver detects the returned amount of light. The transceiver compares the returned light with a reference light intensity obtained during zero calibration. If the intensity of the returned light is reduced, then this is an indication of oil mist or other particulate matters in the detected space. Based on this, a warning or an alarm is given.

Please note that besides reacting to oil mist, the transceiver will also react to other obstructions intercepting the light beam e.g. smoke and water mist. Consequently, an alarm might be triggered and depending on the application, this might be perceived as "a false alarm". However, in this scenario, such an alarm will typically indicate another type of malfunction that would require attention.

1.3.1 System Components

As a standard configuration, the Ex Opacity G26 system consists of the following standard elements:

Control and Monitoring Unit

The control and monitoring unit is arranged with a touchscreen, connection terminals and cable glands. The control and monitoring unit can be configured to monitor up to 2 transceivers.

Transceiver/Reflector Unit

The transceiver contains the laser source, optical components, electronics and data processor capacity to control and shape the laser beam projected across to the reflector. The transceiver is mounted in the Ex Opacity Transceiver Mounting module G26 for easy installation.

The Ex Opacity G26 system is delivered with a standard 15m Ex connection cable. The reflector reflects the light back to the Transceiver where the light attenuation is measured. The reflector module contains a precision reflector to direct the light beam back to the transceiver.

1.3.2 Additional Components

- Ex Junction Box (JB) can be used in the Ex Zone to connect customer supplied cables with the cable used to connect to the transceiver.
- Ex Interface Cabinet with intrinsic safety barriers for power supply and communication between the monitor unit and the transceiver.

2 Specifications

Control and Monitoring Unit	
Power Supply Input	Option 1: 100...240 VAC – 50/60 Hz – 1.4 A Option 2: 20...30 VDC – 2 A
Ambient Temperature	0...55°C
Communication Options: (All included as Standard)	Analog output: 2 x 4...20 mA max. 500 Ω - (active & linearized)
	Digital output: 4 x Alarm Relays
	Bus: Modbus TCP/IP
Alarm Levels	Alarm level is configurable Warning level is default set at 50% of Alarm level
Alarm Delay	Default 0 s (Programmable 0...1800 s)
Display	Opacity level [%]
Accuracy	≤ 1 % of full scale for distance 0.5...9.0m ≤ 2 % of full scale for distance 9.0...15.0m
Dimensions/Weight	Refer to Installation Layout
Enclosure	IP 65 Steel box
Transceiver	
Measurements	Opacity
Measuring Principle	Transmission double pass
Measuring Range (FS)	0...100% Opacity
Accuracy	+/-1% of full scale (FS) for 0,5...9.0 m +/-2% of full scale (FS) for 9.0...15.0 m
Scanning Distance	Optimal: 2.0...9.0 m
	Possible: 1.0...15.0 m
Power Supply	24 VDC +/- 10%
Communication Interface	Modbus RTU server
Ambient Temperature	-25...55°C (For Ex-application according to IEC 60079-0)
	Class C -25...45°C (For Marine application)
Humidity	Above dew point
Vibration	Class B
EMC	Class A (EN 61326-1 Table 2)

Specifications

Enclosure	Class B/IP 54
Dimensions & Weight	Refer to Installation Layout
Materials	SS316

Reflector

Ambient Temperature	-25...55°C (For Ex-application according to IEC 60079-0) Class A 5...45°C (For Marine application)
Humidity	Above dew point
Vibration Class	Class B
Enclosure Class	Class B/IP 54
Dimensions & Weight	Refer to Installation Layout
Materials	EN-AW 6082, Acryl Reflector

Optional Equipment (refer to spare part)

Ex Interface Cabinet

Protection Method	Ex ib (connections to Ex Zone)
Material	Steel
Enclosure Class	IP 54
Intrinsic Safe Power Supply	U _o = 23.6V, I _o = 176.4 mA, P _o = 1038 mW, C _o = 0.97 uF, L _o = 4.5 mH
Intrinsic Safe Communication Interface	U _o = 3.7V, I _o = 93 mA, P _o = 85 mW

Ex Junction

Protection Method	Ex e
Cable to Transceiver	Ex Junction box is delivered with 15m pre-configured cable for easy connection to the Transceiver.
Materials	Fiberglass Reinforced Polyester (FRP)
Enclosure Class	IP 54

Audit Targets

100, 22 & 8 % Opacity (+/- 2% of full range)

Useable for field validation

Only use in Ex zone when Ex zone is safe.

Approvals and Certificates

Download all product certificates at <https://greeninstruments.com/>

3 Safety Aspects

Attention

Concerning the Ex-Safety refer to section 12.4 Safety Use.



WARNING!

Follow the installation and operating instructions. Please read the instructions carefully in its entirety before working on the system.



Warning!

Hazardous Voltage: Disconnect power before servicing the system. Ignoring this warning can result in severe personal injury or material damage. Observe the instructions carefully to ensure the correct connection of all power and signal leads.

Ensure that the correct power supply is connected to the control and monitoring unit (see the rating marked on the label of the equipment).

Circuit breaker!

The installation must include a means of switching off electrical power by a clearly marked switch or circuit breaker external to the control and monitoring unit. The external switch or circuit breaker must be placed in close proximity to the monitoring unit and within reach of the operator.

Overload protection!

To comply with safety requirements IEC 61010-1 (2003), the installation must include a means of overcurrent protection to protect against excessive energy being drawn from the power supply system in case of a fault in the equipment.

Protective earth!

The monitoring unit must be connected to protective earth.

Installation and fault finding!

Electrical installation and fault finding on the system should only be undertaken by a suitable trained and qualified engineer.



Warning Laser Hazard

Visible laser radiation! Avoid eye exposure to direct or scattered radiation.

Symbol Identification



Caution, risk of danger



Caution, risk of electrical shock



Warning Laser Hazard. Visible laser radiation! Avoid eye exposure to direct or scattered radiation.



Protective earth



The CE mark proves the compliance of the instrument with the requirements of the relevant EU directives

4 Control at Delivery

Upon receipt of the Ex Opacity G26 system, please control that the received items are in accordance with the packing list and not damaged. Any discrepancy should be reported to the supplier immediately.

If any of the received parts are damaged, the shipping company should be informed, and new parts made available before completing the installation.

5 Installation

Read this chapter in its entirety before installing the system.

Attention

Concerning installation requirements for Ex areas refer to section 12.5.

5.1 System Overview

Refer to Ex Opacity G26 System Component Overview drawing.

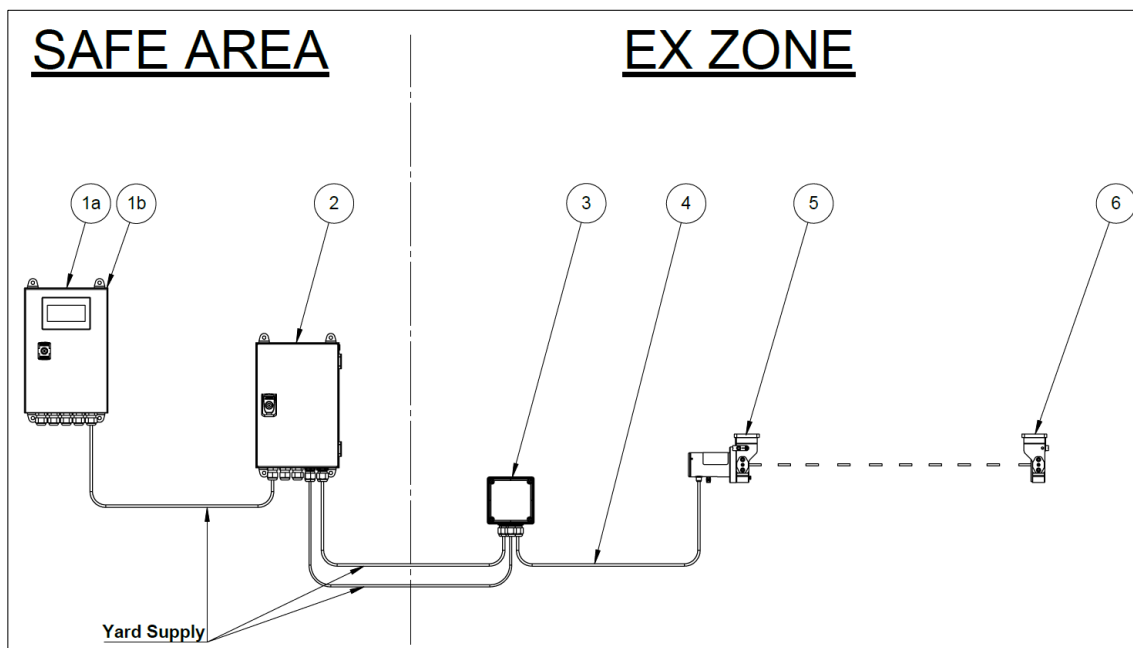


Figure 5-1: Ex Opacity G26 System Component Overview

Note

Ex Junction box in the position 3 is only required if the cable length between the position 2 and 5 exceeds 15m. To order the cable - refer to Spare Parts section 11 – part number 03457.

5.2 Control and Monitoring Unit

The control and monitoring unit can interface with up to 2 transceiver/reflector units. It is recommended to install the control and monitoring unit in an easily accessible location.

The control and monitoring unit is arranged with touch screen and connection terminals inside the unit.

Five (5) cable glands (M20) are arranged for incoming and outgoing power and data cables. The M20 cable glands are suitable for cable diameters between 7 mm to 13 mm.

Refer to Monitor Unit drawing.

5.3 Ex Interface Cabinet with Intrinsic Safety Barriers

Ex Interface Cabinet can interface with 1 transceiver and 1 reflector unit. The purpose of the cabinet is to interface between Safe zone and Ex zone. The cabinet includes intrinsic safe power supply and intrinsic safe communication barriers.

The Interface Cabinet with intrinsic safety barriers is an optional item offered by Green Instruments. Safety Barriers which correspond to the system is a necessity for Ex compliance, however it can be supplied by the customer, at the customers own risk. The safety barriers must respect Ex safety in all manners, when connected to the Ex Opacity G26 System. Refer to Ex Interface Cabinet drawing.

5.4 Ex Junction box

The Ex Junction box is an optional item used in cases where the cable between the Ex Interface Cabinet and the Transceiver exceeds 15 meters

If the scope of supply includes an Ex Junction box, the Ex Junction box is pre-mounted with a 15m pre-configured connection cable for easy connection to the transceiver.

The connection terminals are located in the Ex Junction box. 2 free cable glands (M20) are arranged for incoming power and communication. The M20 cable glands are suitable for cable diameters between 7mm to 13mm.

Refer to Ex Junction box drawing.

5.5 Transceiver and Reflector

The Ex Opacity Transceiver G26 system can consist of up to 2 transceivers (i.e. transceiver/reflector units). The transceiver and reflector must be properly aligned, mounted firmly and stable with a line of sight opposite each other.

The transceiver and reflector are mounted into the mounting brackets. Refer to Transceiver/Reflector Installation Layout drawing and section 5.5.1.

Attention

Make sure the transceiver and reflector are mounted precisely centered and directly opposite each other.

It is possible to adjust the direction of the transceiver and reflector to ensure alignment.

The transceiver and reflector must be protected from UV radiation e.g. from direct sunlight, since UV radiation can damage labels and operator interface. It is recommended to protect the transceiver and reflector from water e.g. rain. Both UV and water protection could be simply achieved by making weather cover above the transceiver and reflector.

5.5.1 Mounting Brackets

The equipment must be installed onto a solid structure to ensure stability due to local vibrations. If mounted onto structures thinner than 6 mm, it is recommended to reinforce such structures e.g. by fitting purpose-built brackets. A robust installation is vital for optimal system functionality. Refer to Transceiver/Reflector Installation Layout drawing.

In order to avoid false alarms caused by people walking in the monitoring area, it is recommended to mount the transceiver and reflector at a position higher than the normal height of people if possible (see Figure 5-2).

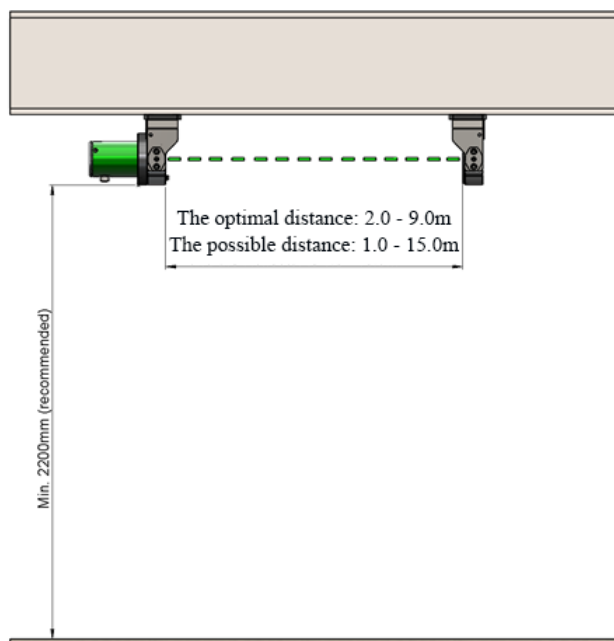


Figure 5-2: Mounting Position of the Transceiver and the Reflector

5.5.2 Choosing Installation Location

Installation location should be chosen based on the operator's knowhow regarding the process equipment to be monitored. A risk assessment could inform which equipment to monitor or protect as well as reveal the needed numbers of detectors. Pay consideration to factors, that could act as sources of e.g., an oil leak/mist and also pay attention to blowers, fans, ventilators etc. that could carry the mist from its source of generation to another location. Ensure good and safe accessibility to the equipment whilst avoiding accidental blocking of the light beam.

5.6 Electrical Connections

5.6.1 Connections

Before connecting the power supply, please make sure that the power supply rating for the control and monitoring unit corresponds with the power supply available.

Please see the electrical drawings relevant for installation attached to each system.

5.6.2 Cable

Always consult the electrical documentation.

- Cables must meet marine standards for marine application.
- Cables in Ex zone must meet EN 60079-14 for Ex intrinsic safe Ex application.
- Laying of cables must be done according to good workmanship. Special consideration must be taken to fixate the cable from the transceiver to avoid excessive stress on cable and connector.

Attention

For cables always consult relevant standards, including, but not limited to:

- EN 60079-14 section 16.2.2.2
- Special attention regarding EN 60079-14 section 16.2.4.3 and the Transceiver labelling section 12.1.1. The system will have a total inductance and capacitance that is greater than 1% of L_0 and C_0 , and thus the acceptable values for L_0 and C_0 shall be half and the allowable cable inductance and capacitance adjusted accordingly.

For assessment of a simple intrinsically safe system, please refer to EN 60079-25 Annex A. Other assessments could also be necessary.

5.7 Choosing the Right Alarm Levels – Opacity of Oil Mist

The alarm level must be adjusted to the lowest possible value without risk of generating false alarms. The setting must ensure that lower explosion level is not exceeded without generating an alarm.

The opacity of oil mist will depend on the concentration of oil mist, the size of oil droplets, and the path length of the actual oil-mist cloud which intersects the light beam.

Regarding the size of oil droplets, in general, smaller oil droplets have lower ignition temperatures due to the larger surface to volume ratios. Larger oil droplets are less dangerous due to higher ignition temperatures. This corresponds well with the fact that smaller droplets have a higher opacity effect and are thus easier to detect than larger droplets.

In order to understand the relationship between opacity, oil mist concentration and the path length of the oil mist, two fictive examples are given in Figure 5-3. The figure illustrates different oil mist opacity levels corresponding with different oil concentrations and path lengths for a fictive oil type with oil droplets ranging from 10...20 μm .

The figure shows that:

- An oil mist cloud with a concentration of only 0.2 mg/l and a path length of approximately 2 meters will generate an opacity of approximately 10 %.
- For the concentration of 2.5 mg/l, a mist cloud intersecting the line of sight by only 25 cm will generate an opacity of approximately 16%.

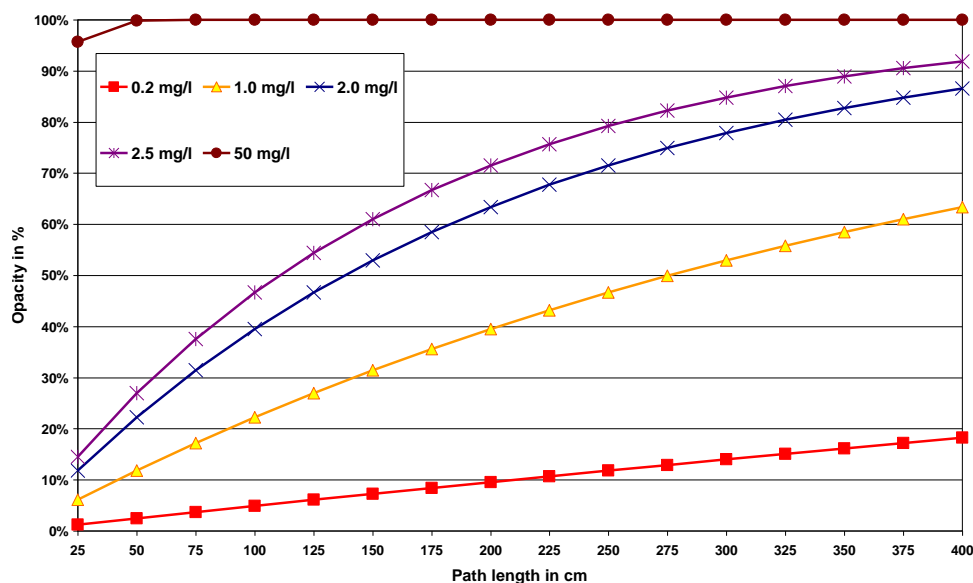


Figure 5-3: Opacity versus path length for different concentration (calculated for oil droplets of 10...20 μm).

6 Transceiver Menu Structure

Videos of Transceiver Setup and Transceiver Calibration can be found using the links below. Kindly note that the videos are made as general guidelines.

<https://greeninstruments.com/>

6.1 Transceiver Button Function



Figure 6-1: Transceiver Interface

The transceiver user interface consists of a green power LED, a yellow warning LED and a red alarm LED, a zero and a span button, and 5 signal strength LEDs.

- Power: Green illuminating LED means power ON
- Warning: Yellow illuminating LED means Transceiver issue or warning level exceeded
- Alarm: Red illuminating LED means suspected Oil Mist is present
- Signal Strength LEDs: Under normal operation, the signal strength LEDs indicate how close the transceiver is to triggering the alarm.
- When the signal strength LED on the right illuminates, it indicates the transceiver is far from triggering an alarm – refer to Figure 6-2.
- When the signal strength LED on the left illuminates, it indicates the transceiver is close to triggering/ already triggered an alarm. Please See Figure 6-3.



Figure 6-2: Illustration of the strongest signal → no obstructions to the light beam

- When the illumination changes to one of the LEDs to the left, it indicates that the reflected beam becomes weaker, i.e., the beam is scattered or blocked. The signal strength LEDs can thus be used as a quick indication of how far the transceiver is from triggering an alarm. Please See Figure 6-3.



Figure 6-3: Illustration of the weakest signal → obstructions to the light beam

- Besides the indication of signal strength, the blue LEDs are also used as an indication of correct initial alignment and address settings.
- Zero and Span: The Zero and Span buttons are used for calibration and initial settings of light beam strength and transceiver address. These buttons are also used to enter service mode.

6.2 Choose Transceiver Type

Attention

It is mandatory to select correct transceiver type on a new transceiver.

The transceiver can handle alarms based on an absolute opacity or based on sudden change in opacity. For this application, it is mandatory to set the transceiver type. Alarms are based on absolute opacity.

To select Config Menu press, hold the ZERO button until the 2 outer signal strength LEDs light up in each side. When this is noticed, please immediately release ZERO, then press and hold ZERO again until 2 outer signal strength LEDs light up in each side, then release once this is noticed – Figure 6-4.



Figure 6-4: Select Configure Menu



Figure 6-5: The Config Menu will have the right most signal strength LED turned on (Transceiver Type menu)

Press SPAN to select Transceiver Type menu. All signal strength LED's will turn on while SPAN is pressed - Figure 6-6.



Figure 6-6: Transceiver Type Menu turned on

Press ZERO until signal strength LED number 2 from the right is on (Transceiver Type where alarms are based on absolute opacity) - Figure 6-7.



Figure 6-7: Transceiver Type where alarms are based on absolute opacity

Press SPAN to save settings and return to normal operation mode. All signal strength LED's will turn on while SPAN is pressed -



Figure 6-8: Save Settings and Return to Normal Operation Mode

Once laser aligning function is started, section 6.3, it is necessary to continue with setting unit address, section 6.4, until the new settings are saved.

6.3 Set Laser Aligning Function

Attention



Visible laser radiation! When the transceiver operates in pulsed mode, the laser is classified as Class I, which is safe under all conditions of normal use. When it operates in the continuous mode (i.e. there is a steady light beam in the aligning mode), the laser is classified as Class IIIR. Thus, please avoid eye exposure to direct or scattered radiation when the transceiver operates in the continuous mode.

During the laser aligning step, all possible obstructions to the light beam (such as oil mist, smoke, and water mist) must be absent in the section between the transceiver and the reflector.

- To enter laser Alignment Mode, please press and hold SPAN and ZERO buttons and wait approximately 5 seconds until all signal strength LEDs are ON. Then, release SPAN and ZERO.
- The signal strength is indicated by means of one of the blue LEDs. Note that alarm and warning functions will be deactivated while the steady/continuous beam of light is ON.
- The light beam can now be adjusted to hit the centre of the reflector by adjusting the alignment bracket and the position of the reflector.
- For centring the light beam, it is recommended to place a paper or thin cardboard over the reflector. The beam will be projected onto the paper or cardboard and the position of the beam will be clearly indicated for fine adjustment of the centre of the reflector.

A cut-off shape which is not centred nicely onto the reflector indicates a poor alignment. A circular shape nicely centred onto the reflector indicates a good alignment – Figure 6-9.



Illustration of poor alignment



Illustration of good alignment

Figure 6-9: Illustration of Poor and Good Alignment

Go to the next step – set unit address.

6.4 Set Unit Address

- Section 6.3 Set Laser Aligning Function must precede this step. Alternatively: Press and hold SPAN and ZERO buttons and wait approximately 5 seconds until all signal strength LEDs are ON. Laser is ON.
- Press and hold SPAN and ZERO buttons and wait approximately 5 seconds until all signal strength LEDs are ON. Laser is OFF. The unit address is now shown on the signal strength LEDs as described in Figure 6-10.
- To step through the addresses, press and hold Zero and release when signal strengths LEDs shows the wanted address. Note, addresses can be set between 1 and 16 where only 1 – 2 is used in this standard application. Address will restart at address 1 if zero is kept pressed. Note the default address for all new transceivers is address 1. All transceivers in a system must be assigned a unique address in a system.

Videos of Set Unit Address can be found using the links below. Kindly note that the videos are made as general guidelines.

<https://greeninstruments.com/>

- To save the new address settings and return to normal operating mode, press and hold SPAN until all signal strength LEDs turn ON. While SPAN is pressed, press ZERO. Wait approximately 5 seconds until all signal strength LEDs turn ON again.
- Kindly note that the as standard Control Monitor Unit only supports up to 2 transceivers. Each Transceiver must have a unique address between address 1 and 2.

Address 1

Signal Strength LED



Address 2

OFF OFF OFF OFF ON



OFF OFF OFF ON OFF






Signal Strength LEDs					
Address					
1					ON
2				ON	
3				ON	ON
4			ON		
5			ON		ON
6			ON	ON	
7			ON	ON	ON
8		ON			
9		ON			ON
10		ON		ON	
11		ON		ON	ON
12		ON	ON		
13		ON	ON		ON
14		ON	ON	ON	
15		ON	ON	ON	ON
16	ON				

Figure 6-10: Transceiver Address Settings

6.5 Calibration

Note

ZERO and SPAN are used to set the endpoints.

ZERO: 0% Opacity = 100% Transmission = All light Transmitted (Clear)

SPAN: 100% Opacity = 0% Transmission = No light Transmitted (Dark)

During ZERO calibration, all possible obstructions to the light beam (such as oil mist, smoke or water mist) must be absent in the section between the transceiver and the reflector.

6.5.1 Zero Calibration

- First, ensure there are no obstructions to the light beam
- Then press and hold ZERO until all blue signal LEDs illuminate.
- After releasing ZERO, the first and last signal strength LEDs on the far left and far right will turn ON, which indicates the transceiver has entered Auto SPAN Calibration mode, see section 6.5.2.

To skip the Auto SPAN Calibration, press the ZERO button for minimum 0.5 seconds until all signal strength LEDs are OFF, or wait 60 seconds. This will bring the transceiver back to normal operation mode again.

6.5.2 Auto SPAN Calibration

- After successful ZERO calibration (see section 6.5.1), the transceiver will automatically enter Auto SPAN Calibration mode (see Figure 6-11). To complete the Auto SPAN calibration, the beam of light must be blocked for at least 1 second (within 60 seconds after Zero calibration is completed).



Figure 6-11: Auto span calibration ready to start after the zero calibration is complete

After the beam has been blocked, the 3 central signal strength LEDs will indicate a valid SPAN calibration (see Figure 6-12). The interface will continue to show this indication until the timeout period of 60 seconds has passed.

- To go into normal operation mode immediately and skip the 60 second timeout period, press the SPAN button for a minimum of 0.5 seconds until all signal strength LEDs turn OFF.



Figure 6-12: Signal Strength LEDs indicate successful Auto SPAN Calibration

Please note that the beam of light still needs to be blocked during an Auto SPAN Calibration. The Auto SPAN Calibration mode only eliminates the need of pressing the SPAN button, while simultaneously blocking the beam. This feature is intended to give the operator the possibility to block the beam in installations, where this is not possible, while also standing beside the transceiver. Another advantage is that the alarm is switched OFF during Auto SPAN Calibration, thus no false alarms.

It is also possible to perform a manual Span Calibration. Please check the next section.

6.5.3 Manual Span Calibration

Videos of Transceiver Setup and Transceiver Calibration can be found using the links below. Kindly note that the videos are made as general guidelines.

<https://greeninstruments.com/>

Auto SPAN Calibration will normally be preferred; however, a Manual SPAN calibration can be used as another possibility.

- First, block the light beam after the transceiver. Note, an alarm will probably be triggered. Then press and hold SPAN until all blue signal LEDs illuminate.

After releasing SPAN, unblock the light beam. The transceiver will now return to normal operating mode, as shown in Figure 6-13.



Figure 6-13: Transceiver in normal Operation Mode

- If the warning LED is ON after you unblock the light beam, this indicates that the unit has not been calibrated successfully. Thus, the calibration must be carried out again, starting with ZERO, then SPAN calibration. Refer to the alarm log if the cause of the failed calibration is not obvious.

6.6 Enabling Service Mode

Note

The light beam can be turned off and transceiver alarms can be ignored by putting the transceiver into Service Mode.

During service on, in and around the installation, the light beam can accidentally be blocked causing a false alarm. To avoid this, a Service Mode function has been created, which can be enabled before service of the installation is carried out.

Service Mode is enabled by pressing and holding the ZERO button for less than a second until the 2 outer signal strength LEDs light up. When this is noticed, please immediately release ZERO for less than a second, then press and hold ZERO again until 2 outer signal strength LEDs light up, then release once this is noticed - Figure 6-14.



Figure 6-14: Signal Strength LEDs showing when to release ZERO to enter Service Mode

Please note, the ZERO button must be released before the 2 outer signal strength LEDs turn OFF in order for Service Mode to be entered. (i.e. do not press ZERO button too long).

The unit will now be in Service Mode which is indicated by a flashing warning LED. In Service Mode, the laser and alarms will turn OFF and the reported opacity will be 0%. The default timer sets the Service Mode to 10 minutes (no Signal Strength LEDs illuminated, as seen in Figure 6-15).



Figure 6-15: Service Mode (flashing warning LED)

Pressing SPAN will add 10 minutes to the default timer - Figure 6-16. The Service Mode can last up to 60 minutes (10 mins. per. LED) - Figure 6-17. The remaining time can be seen on signal Strength LEDs.



Figure 6-16: Service Mode (1 Signal Strength LED represents 10 minutes added to default Service Mode)



Figure 6-17: The Service Mode Timer indication max 60 minutes

Service Mode can be cancelled in the same way as it is entered i.e. by pressing and holding ZERO for less than a second until the 2 outer signal strength LEDs light up - Figure 6-14, immediately releasing ZERO, for less than a second and pressing and holding ZERO again until 2 outer signal strength LEDs light up once more, then releasing once again.

7 Control and Monitoring Unit

The control and monitoring unit use an HMI for the configuration, monitoring and visualization. The description of the menu and system configuration can be found in this section.

7.1 Home Menu



Figure 7-1: Home Menu with 1 configured Transceiver

Home menu is the first screen when the system is turned on. The display depends on the number of transceivers configured in the system.

If the system is configured with 1 transceiver, the home menu will be as shown in Figure 7-1.

Figure 7-2 shows the Home Menu with 2 configured transceivers. To change the name of the transceiver (e.g. from S_1 to Eng 1), please see the instruction in section 7.5.



Figure 7-2: Home Menu with 2 configured Transceivers

The square box indicates the transceiver status. Green color means no alarm and/or warning. Yellow color means active warning and red color means active alarm. Black means the transceiver is not configured or no data is yet received from the transceiver.

7.2 Transceiver Menu

If only one transceiver is configured, the transceiver menu will be the same as the home menu. If two transceivers are configured, pressing the transceiver name (e.g. S_1) will give access to the transceiver menu of that transceiver (Figure 7-3). The transceiver menu displays the following information:

- Transceiver name: S_1 as default setting for transceiver 1
- Global alarm condition (to the right of Setup):
- Green light: No warning and alarm
- Yellow light: Warning
- Red light: Alarm
- Alarm condition of the selected transceiver (to the right of the transceiver name):
- Black: Transceiver not configured, or no data received.
- Alarm level: 2% opacity as default setting
- Software version of the transceiver: e.g. FW 001.001
- Current opacity level: e.g. 10%. When the current opacity level is within the green area, it means no alarm and/or no warning. Yellow area means warning. Red area means alarm.

The transceiver menu has also 4 functions buttons:

- Setup: to access the transceiver setup menu
- Alarm: to access alarm list
- Trend: to access trend menu
- Home: to go back to the home menu



Figure 7-3: Sensor Menu

7.3 Alarm List Menu

By pressing Alarm on the Sensor Menu of a specific sensor, the Alarm list menu shown on Figure 7-4 will appear.

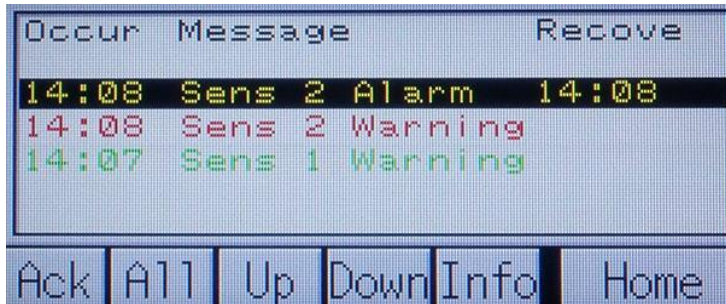


Figure 7-4: Alarm list menu

The alarm list menu has 6 function buttons:

- Ack: Acknowledge the current selected alarm
- All: Acknowledge all alarms
- Up: Select alarm above
- Down: Select alarm below
- Info: Show info screen with description of the current selected alarm
- Home: to go back to the home menu

The red alarms mean the alarms are currently active. The green alarm means the alarm is currently active and acknowledged. When an alarm is recovered, the recovered time will be indicated at the Recove column on the screen (as the yellow alarm) (see Figure 7-4).

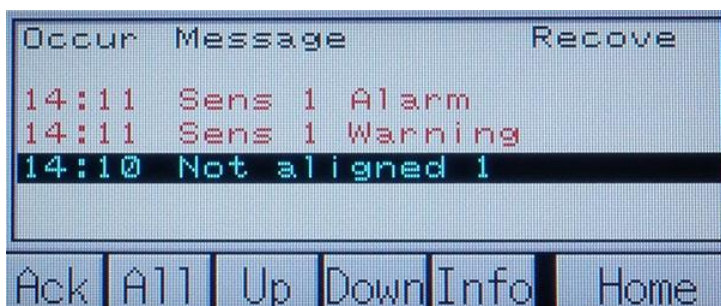


Figure 7-5: Select an Alarm in the Alarm List Menu

Select an alarm and press Info. An alarm info screen with information about the current selected alarm and suggestion to solve the alarm condition as shown in Figure 7-5 & Figure 7-6 will appear.

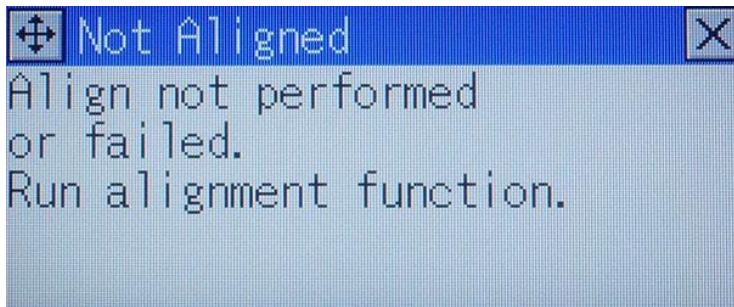


Figure 7-6: Alarm Info Screen - e.g. Not aligned Alarm

The full alarm list is as follow:

Alarm	Description	Information
Sens 1 Error	Error at Transceiver 1	General error on sensor. Check if a more specific error is present on the same sensor. If not replace the transceiver.
Sens 1 Warning	Warning at Transceiver 1	Opacity warning level threshold reached. Note this alarm will be set as soon as the sensor detect the high level.
Sens 1 Alarm	Alarm at Transceiver 1	Opacity alarm level threshold reached. Note this alarm will be set as soon as the sensor detect the high level.
Ret 1 L Warning	Warning for Low Returned Light Intensity	Returned light low. Run align function again to adjust light intensity and make sure the beam is aligned with reflector. Reduce distance to reflector if possible. Clean optical windows
Ret 1 L Alarm	Alarm for Low Returned Light Intensity	Returned light to low. Run align function to adjust light intensity again and make sure the beam is aligned with reflector. Reduce distance to reflector if possible. Clean optical windows
Ret 1 H Warning	Warning for High Returned Light Intensity	Returned light high. Run align function again to adjust light intensity. Increase reflector distance or use filter.
Ret 1 H Alarm	Alarm for High Returned Light Intensity	Returned light to high. Run align function again to adjust light intensity. Increase reflector distance or use filter.

Alarm	Description	Information
Ref 1 L Warning	Warning for Low Reference Light Intensity	Reference light low. Run align function to adjust light intensity. Increase reflector distance.
Ref 1 L Alarm	Alarm for Low Reference Light Intensity	Reference light to low. Run align function to adjust light intensity. Increase reflector distance. Replace the transceiver.
Ref 1 H Warning	Warning for Low Reference Light Intensity	Reference light high. Run align function.
Ref 1 H Alarm	Alarm for Low Reference Light Intensity	Reference light to high. Run align function to adjust light intensity. Replace transceiver.
Neg Opa 1 Warn	Negative Opacity Warning	< -2.5% negative opacity measured. Calibrate sensor. Note it's very important that calibration is done without smoke / oil / dust present.
Neg Opa 1 Alarm	Negative Opacity Alarm	< -5.0% negative opacity measured. Calibrate sensor. Note it's very important that calibration is done without smoke / oil / dust present.
Not aligned 1	Alignment not OK	Align not performed or failed. Run alignment function.
Zero 1 cal Err	Zero Calibration Error	Zero calibration not performed or failed. Press ZERO to calibrate. Note: Smoke / oil / dust must not be present.
Span 1 cal Err	Span Calibration Error	Span calibration not performed or failed. Press SPAN to calibrate. Note: Block light during SPAN calibration.

7.4 Trend Menu

Press Trend on the Sensor Menu, the opacity trends of all sensors will be displayed as Figure 7-7.

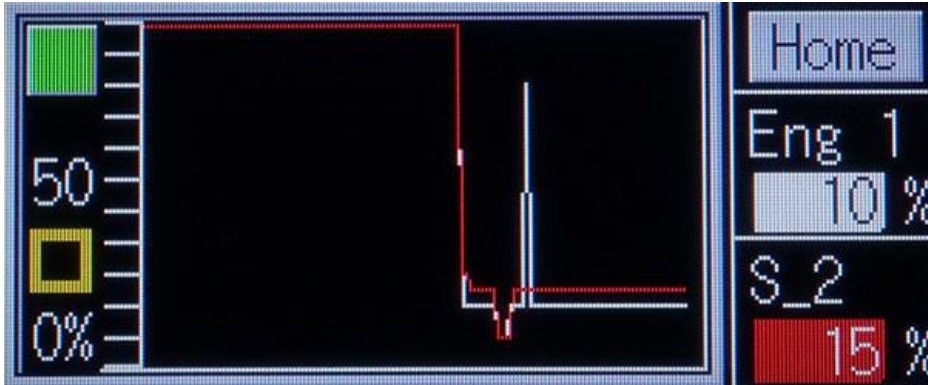


Figure 7-7: Trend Menu

The opacity values (vertical axis) are shown on a time scale (horizontal axis). The scale of vertical axis is -10...100% opacity. The scale of the horizontal axis is the last 30 minutes.

7.5 Transceiver Setup

Press Setup on the Transceiver Menu to access its Transceiver Setup Menu.

It will require a password to enter the menu (see Figure 7-8). The password can be found on the Test and Configuration Sheet delivered to each system. Use the popup keyboard to enter the password (password = “AAAA”). Choose OK by using up/down/right/left buttons on the keyboard then press ENT. The Sensor Setup Menu shown in Figure 7-9 will appear.

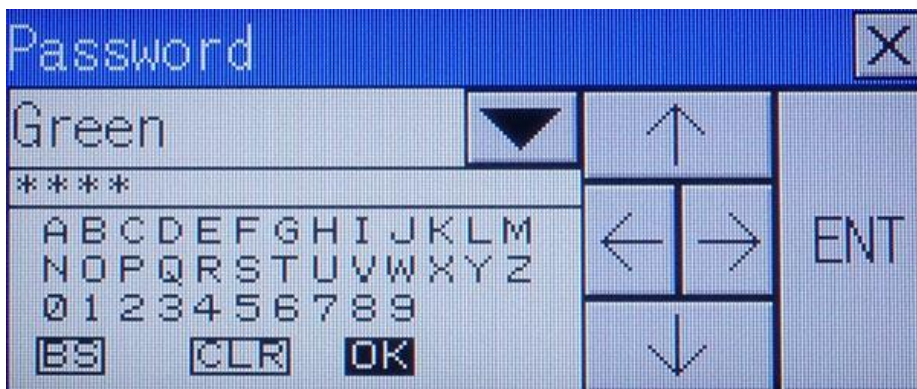


Figure 7-8: Password popup window

The Transceiver Setup Menu has two function buttons:

- System Setup: to access to the general System Setup menu
- Home: to go back to the home menu

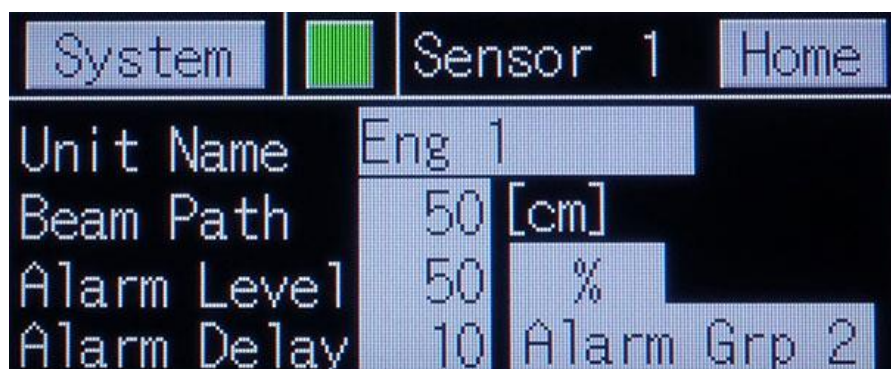


Figure 7-9: Transceiver Setup

- The light on top of the screen shows the alarm condition. Green/Yellow/Red light means no alarm and/or warning/active warning/active alarm.

The below parameters of each sensor can be configured in its sensor menu:

Unit Name

The default names set up at the factory is S_1, S_2..., S_8. However, the name of each transceiver can be changed if it gives more meaning for the operator, e.g. S_1 can be changed to Pump_1 (i.e. transceiver 1 monitors the pump room 1), S_2 to Main Engine (i.e. transceiver 2 monitors the main engine room), etc...

To change the name of the unit, press on the grey box beside Unit Name, a pop-up keyboard will appear for you to enter the designed texts and numbers.

Beam Path

The beam path is the distance between the transceiver and the reflector in cm. This data input is only relevant, if the user wishes to convert the opacity signal [%] to [mg/m³]. As default this function is deactivated. Activation requires a software change.

Alarm Level

Alarm level is default set at 2 % opacity. The alarm level can be freely configured upon the requirement of each application.

Note that the monitor and control unit will always provide a warning alarm which is 50% of the Alarm level. During a normal operation, this warning can be interpreted as a lens cleaning warning.

Alarm Delay

Alarm delay is the delay time in second for the alarm to be activated.

Alarm Group

The system has two alarm groups: Group 1 and Group 2. The alarm outputs are configured as follows:

Alarm Output	Alarm Group	Alarm level
Alarm relay 1	Group 1	Warning level
Alarm relay 2	Group 1	Alarm level
Alarm relay 3	Group 2	Warning level
Alarm relay 4	Group 2	Alarm level

Setting Alarm Group for each sensor enables configure which alarm outputs are connected to that sensor.

7.6 System Setup

By pressing System on the Sensor Setup Menu of any sensor, the general System Setup Menu shown in Figure 7-10 will appear.

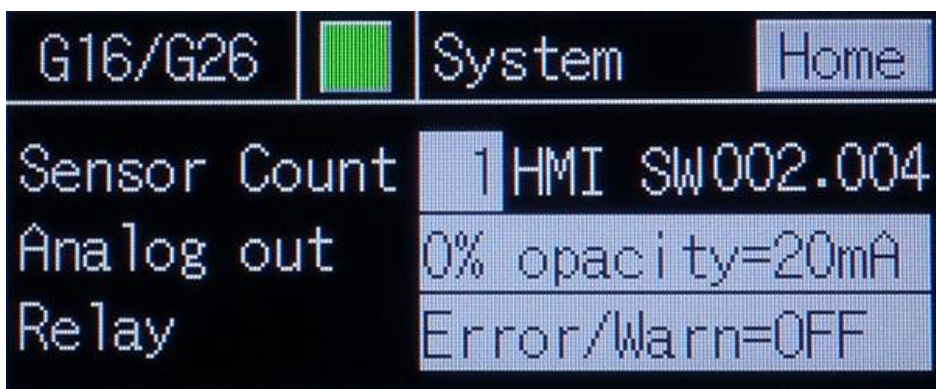


Figure 7-10: System Setup

The menu displays the software version of the control and monitoring unit.

- **Home** – function button: to go back to the Home menu

The following parameters of the system can be configured in this menu:

Sensor Count

The sensor count is the total number of the monitoring points, i.e. to total number of the transceiver/reflector units to be controlled.

Analog Out

Analog output signals can be configured as follows:

Range	Setting
0% opacity = 4 mA 100% opacity = 20 mA	0% opacity=4 mA
0% opacity = 20 mA 100% opacity = 4 mA	0% opacity=20 mA (default)

Relay

The alarm / warning relays have dry contact outputs, and each contact set can be wired as NC or NO. The relay functions can be configured as follows:

Relay at Active Warning or Alarm	Setting
Relay-not energized (OFF) (Alarm active when system is unpowered)	Error/Warn=OFF (default)
Relay energized (ON)	Error/Warn=ON

8 Commissioning

Before starting the system for the first time after completing the installation, please check and confirm that all parts are installed correctly and according to the instructions, and that all the connections are secured. Check and confirm all the electrical connections are correct according to the instructions.

Attention

See section 12.6 concerning commissioning with Ex requirements.

8.1 Start of the System

Now you can switch on the power supply, configure, and finally align the transceiver/reflector.

Following actions should be carried out to configure each transceiver:

Align the transceiver and reflector: refer to section 6.3.

Set unit address: refer to section 6.4.

8.2 Calibration

Now you can calibrate the system following the instructions in section 6.5.

8.3 Setting of Alarm Levels

Alarm level shall be set up following the requirement of each application. Please follow the instruction to configure alarm level for each transceiver in section 7.5 Transceiver Setup.

8.4 Setting of Signal Outputs

Signal outputs (analog and digital) shall be set up following the requirement of each application. Please follow the instruction to configure signal output for the system in section 7.6 System Setup.

9 Maintenance

Attention

Concerning for Ex maintenance requirements see section 12.7.

9.1 General

Attention

- Never open the transceiver!
- Carefully check the integrity of the seal between the optical window and transceiver housing.
- Check the transceiver for signs of ingress water or dust by looking into the optical window at an angle, while taking care not to stare into the light beam.
- Remove accumulated dust on the transceiver immediately using a damp cloth.
- Use a damp cloth to wipe the keypad and label of the transceiver.

Never reuse a transceiver that has been dropper or damaged in any way – regardless the type of damage (mechanical, electrical, corrosion etc.). Defective equipment must always be replaced with new equipment

Besides normal cleaning of the lenses, the system does not require any maintenance.

The lenses must be carefully cleaned with a cleaning pad (part no. 02398).


It is strongly recommended to calibrate the system after cleaning the transceiver lens and the reflector (see section 6.5). Please note that any kind of mist must not be present in the section between the transceiver and reflector during calibration.

It is possible, but not required, to test the linearity of the transceiver by means of the optional audit targets. The audit targets can be placed on the transceiver or reflector bracket in the beam path.

Cleaning intervals depend on the usual amount of oil, smoke and dust that contaminate the lenses. The accumulation of dirt on the transceiver lens /reflector will result in higher opacity readings and might therefore give false alarms.

The warning alarm can be interpreted as a lens cleaning alarm. When the warning alarm is ON, please clean the transceiver lens and the reflector.

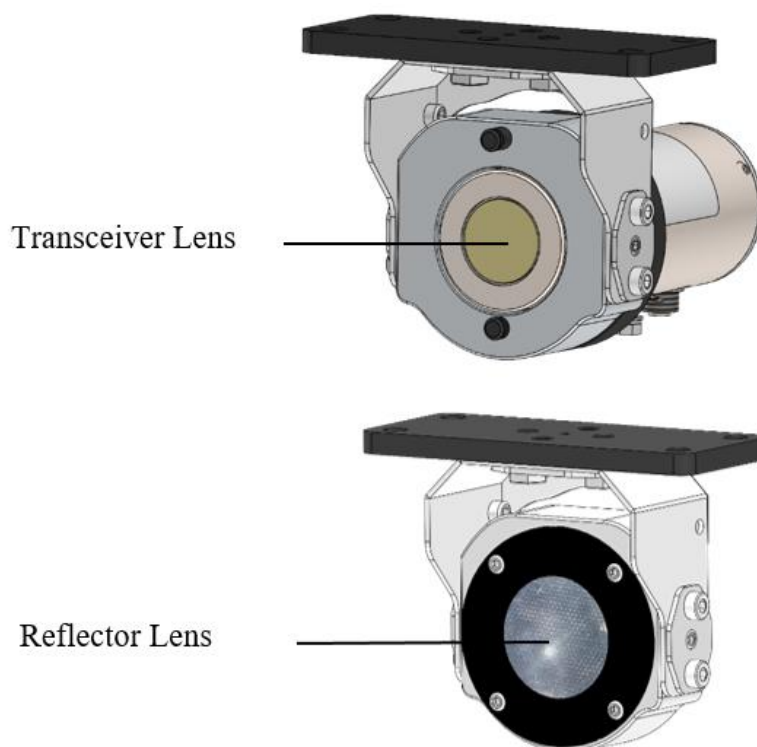
9.2 Maintenance Instruction

System Type	Ex Opacity G26 System		MI26-0001
Task:	Cleaning of Optical Lenses		
Task description:	This instruction identifies the locations of cleaning optical lenses. Cleaning of optical lenses must be carried out by a trained technician.		
Difficulty 1-5	Overhaul Interval	Estimated Time Consumption	
	See note in the bottom of the page		5 min
Spare Parts			Tools
Part no:	Description:	Qty.	Item:
02398	Cleaning Pads	2	None

Instructions

Procedure

Cleaning the lenses with the cleaning pads



Notes: Cleaning intervals depend on the usual amount of oil, smoke and dust that contaminate the lenses. The accumulation of dirt on the transceiver lens/reflector will result in higher opacity readings and might therefore, give false alarms.

10 Troubleshooting

Trouble shooting should always be carried out by skilled personnel. The Ex-Opacity G26 system is connected to hazardous electric voltages, which can cause personal injury if not handled correctly.



Trouble	Possible Cause → Action
No display at all	<p>Incorrect power supply → Check the power supply & fuse – the power supply needs to be connected to the correct voltage.</p> <p>Check power to HMI screen.</p> <p>If equipment is exposed to over current or voltage contact the supplier.</p>
Compromised equipment	<p>If any of the transceiver or barriers has been exposed to abnormal stress e.g. mechanical impact, over voltage etc., then the system safety will be compromised, and replacement of parts are needed – please turn off the power and contact the supplier.</p>
Incorrect indication of opacity level	<p>The alignment has changed (e.g. due to vibration or impact) → realign the transceiver and the reflector – this can be checked by following the instruction in section 6.2.</p> <p>Lens contaminated with dirt → clean the transceiver lens and the reflector with a damp cloth.</p> <p>The transceiver/reflector might have been damaged → replace the defect part</p> <p>Zero and/or span have drifted → recalibrate.</p> <p>Scanning range out of range → Please see the system specification</p>
Incorrect alarm level	<p>Incorrect alarm level settings → change at the control and monitoring unit (see section 7.3).</p>
No alarm despite high opacity between the transceiver & reflector	<p>Incorrect alarm level settings → change at the control and monitoring unit (see section 7.3).</p> <p>Damaged/faulty parts → replace the respective part.</p>
False alarm	<p>Opacity is not only caused by oil mist but also by dust and smoke → check there is no contamination in the environment</p>






Trouble	Possible Cause → Action
Alarm despite no opacity between the lenses (multiple transceiver)	More than 1 transceiver with the same unit address → check all unit address are unique (see section 6.4).

11 Spare Parts

Spare parts are not included in the standard delivery. Spare parts can be ordered when necessary. When ordering spare parts, please mention the serial number of the equipment, which you can find on the label of the equipment.

Part No.	Part Description	The specific appearance of the parts list is subject change without notice; the function however will not change
02907	G26 Control & Monitoring Unit 110-240 VAC	
02974	G26 Control & Monitoring Unit 24 VDC	
03456	Ex G26 Transceiver	
03472	Ex G26 Transceiver Mounting Module	
103382	Ex G26 Transceiver Module As- sembly	

Part No.	Part Description	The specific appearance of the parts list is subject change without notice; the function however will not change
03455	Ex G26 Reflector Module	
03457	Ex 15m Connection Cable G16/26	
103301	Ex-Junction Box	
103302	Ex-Interface Cabinet	
103578	G26 Transceiver/Reflector Bracket	
02981	HMI Display G16/26	
03121	Alarm Relay	

Part No.	Part Description	The specific appearance of the parts list is subject change without notice; the function however will not change
103579	Ex Power Supply for Transceiver	
103303	Ex Isolation Repeater for Transceiver	
00493	Fuse (package with 10 pcs)	
103520	This manual	
02398	Cleaning pads	
02947	Audit Target 100% Opacity (+/- 2% of full range) - G26	
02949	Audit Target 22% Opacity (+/- 2% of full range) - G26	
02950	Audit Target 8% Opacity (+/- 2% of full range) - G26	

12 Appendix of Ex-Opacity Transceiver G16/G26

12.1 About this Appendix

This Appendix provides specific information about installation and operation of the Ex-Opacity Transceiver G16/G26 in Ex areas.

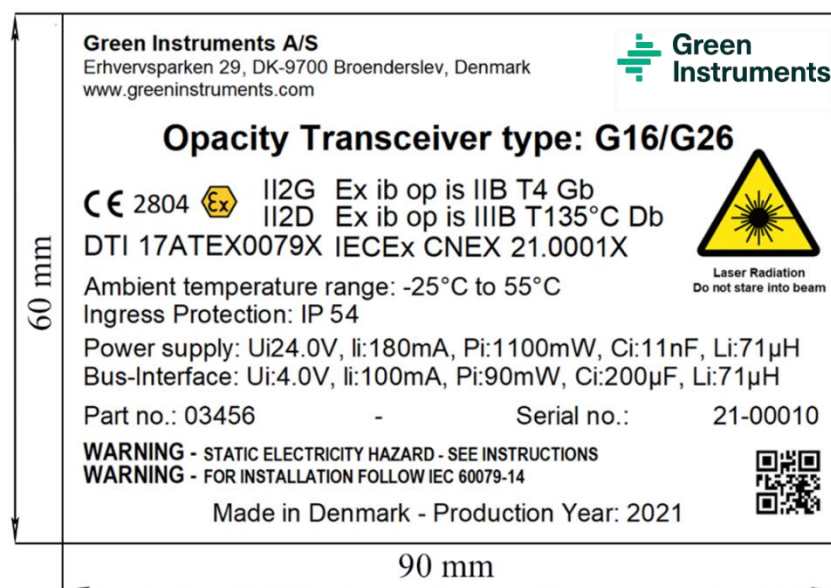
The installation of the Ex-Opacity Transceiver G16/G26 for Ex areas must be in accordance with any local requirements that may apply and should only be carried out by competent electrical engineers who has the necessary training.

Attention

The Ex-Opacity Transceiver G16/G26 for Ex areas must be connected to a power supply certified EX [ia] or [ib] fulfilling the requirements.

12.1.1 Labeling

Green Instruments G16 and G26 Transceivers that have the following label attached have been certified in compliance with the ATEX Directive 2014/34/EU and the IECEx product certification.



The following information's are provided as part of the labeling of the G16/G26 Transceiver:

Name and address of the manufacturer:

Green Instruments A/S, Erhversparken 29

DK-9700 Broenderslev, Denmark

Phone: +45 96454500 Fax.: +45 96454501

Type of Instrument: Ex Opacity Transceiver - G16/G26

CE marking and marking for explosion protection: Gas: II 2 G Ex ib op is IIB T4 Gb Dust: II 2 D Ex ib op is IIIB T4 Gb (Suitable for Use in Zone 1 Gas and Dust applications zone 21) ATEX and IECEx certification numbers: ATEX: DTI 17ATEX0079X and IECEx: CNEX 21.0001X.

The meanings of the ATEX and IECEx code are as follows:

II: Group for surface areas (not mines)

2: ATEX Category (2 suitable for gas zone 1 and dust zone 21)

G: Gas (dangerous media)

D: Dust (dangerous media)

Ex ib: Intrinsic safety, protection level [b]

op is: Inherently safe optical radiation

IIB: Gas group (a typical gas is ethylene)

IIIB: Non-conductive Dust group

T6: Temperature of the Transceiver class

Gb/Db: Equipment Protection Level (EPL)

X: Specific condition for installation

Operating ambient temperature range -25°C to 55°C

Housing protection level: IP54 rating

Intrinsic Safety (IS) data for the G16/G26 Transceiver and requirements to the barrier:

IS-Data G16/G26 unit:

Power Supply: Ui:24 V, li:180 mA, Pi:1100 mW, Ci: 11 nF, Li 71µH

Bus-Interface: Ui:4.0 V, li:100 mA, Pi:90 mW, Ci: 200 µF, Li 71µH

Part no. of the device.

The serial number of the device.

Production year of the device.

Warning note to the installation

12.2 Type Approval Standards

The Green Instruments G16 and G26 Opacity Meters for Ex areas have an EC Type examination certificate issued by DTI and an IECEx product certificate issued by CNEX. To find statement of compliance please visit Green Instruments website

<https://greeninstruments.com/>

Symbol Identification



Caution, risk of danger



Protective earth



Caution, risk of electrical shock



The CE mark proves the compliance of the instrument with the requirements of the relevant EU directives



Chemical burns and etching



Caution, hot surface

12.3 Warning

The electronics for Ex unit contain special Ex dedicated electronics. No customer modifications are available and are strictly forbidden. Any modification or adjustment to the electronics can be performed at the factory only.



The G16/G26 Transceiver must only be connected to a power supply certified Ex [ia] or [ib] with a max. output voltage of 24 VDC. The Ex-power supply secure over-voltages protection according to category I/II.



The G16/G26 is intended for fixed installation. Static Electricity Hazard – clean only with damp cloth.

12.4 Safety Use

12.4.1 Notes on Safe Use of the ATEX and IECEx Approved Equipment

Approved usage of the Ex-Opacity Transceiver G16/G26 is restricted to gas and dust for which the device is approved to be use in and within the restrictions defined in the product manual.

12.5 Installation

12.5.1 Installation Requirements

The Ex-Opacity Transceiver G16/G26 for Ex areas must only be installed by suitable qualified personnel in accordance with latest issues of relevant standards:

The installation of the Ex-Opacity Transceiver G16/G26 must be in accordance with any local requirements that may apply and should only be carried out by competent electrical engineers who has the necessary training.

All relevant standard in regard to the Ex area must be complied with.

Attention

- The Ex-Opacity Transceiver G16/G26 must be connected to a power supply certified EX [ia] or [ib] with a max. output voltage of 24 VDC. The I.S. Power supply shall be installed according to makers recommendation.
- The Ex-Opacity Transceiver G16/G26 must be installed and secured in a fixed position with no other parts touching or coming near to the surface of the G16/G26 opacity meter in order to minimize the risk of electrostatic discharge.

12.5.2 Protective Earth

The Ex-Opacity Transceiver G16 and G26 must be connected to earth. The units are provided with external earth terminal located on the outside of the housing and consist of an 316SS screw (M5 thread), seal spring washer and cable shoe/crimp lug suited for maximum 4 mm² Ground cable connection. When using the external earth terminal, a cable shoe/crimp lug with a seal spring washer must be used to ensure that the cable lug is secured against loosening and twisting.

12.5.3 Installation Examples

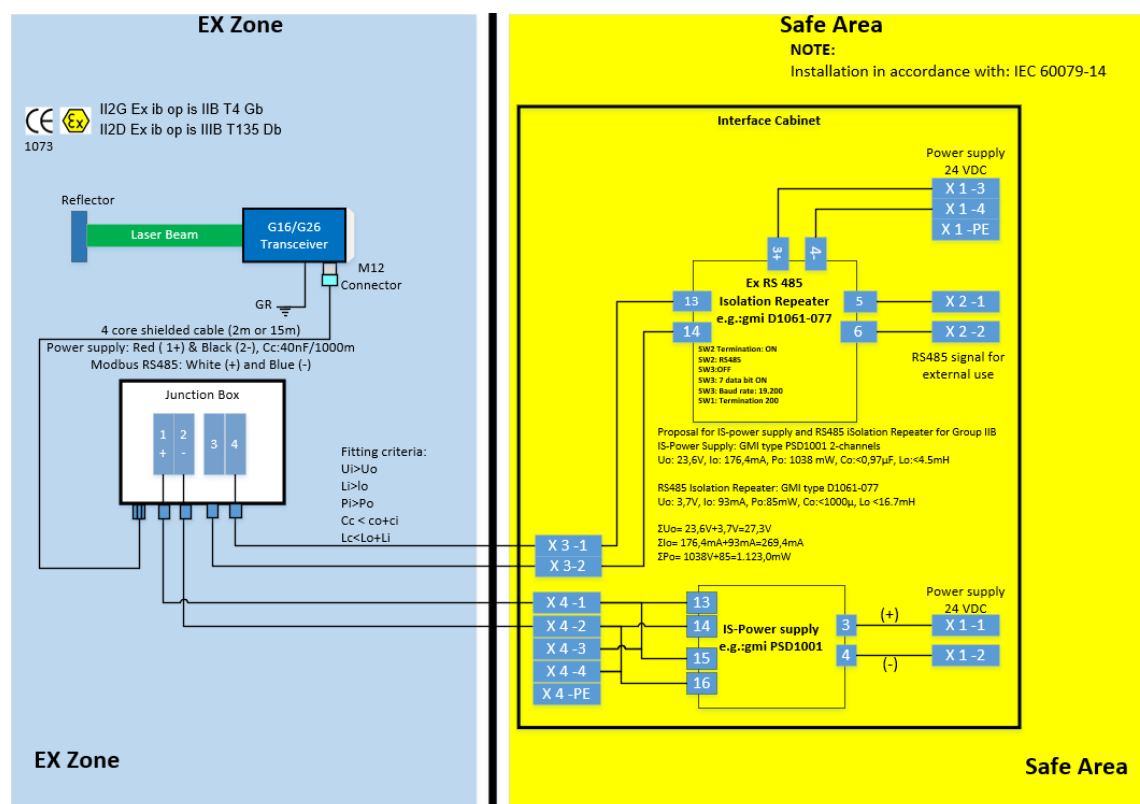


Figure 12-1: Installation Examples

12.6 Mounting, Commissioning, and Operation

The device has been designed to operate safely in accordance with the current international technical and safety regulations. i.e. ATEX and IECEx. If installed incorrectly or used for applications for which it is not intended, it is possible that application related changes may arise. For this reason, the instrument must be installed, connected, operated, and maintained according to the instructions in this and the specific product instruction manual.

Attention

Person's handling/installing or commissioning this equipment must be authorized and qualified. The manual must be read, understood, and the instructions must be followed. Modifications and repairs to the device are only permissible when they are expressly approved in this manual.

12.6.1 Explosive Hazardous Area



If the device is to be installed in an explosive hazardous area, then the specifications in the certificate as well as all national and local regulations must be observed.

The instrument can be delivered with the certificate ATEX/IECEX for gas and dust. Please find certificate in Green Instruments website

<https://greeninstruments.com/>

The instruments are supplied with M12 connector and shielded cable with M-12 connector and flying leads at the opposite cable end.

12.6.2 Special Conditions for a Safe Use

The ambient temperature range is limited to -25°C...55°C.

When installing and using the equipment, ensure overvoltage category I/II according to IEC60664 - 1 is fulfilled.

When installing and using in combustible dust environment, measures should be taken to prevent dust accumulation on the surface of the enclosure.

When installing and using the equipment, measures should be taken to protected from UV light.

Static Electricity Hazard – clean only with damp cloth.

12.7 Maintenance

12.7.1 External Maintenance

The Ex-Opacity Transceiver G16/G26 for Ex areas can be externally cleaned with a damp clean cloth. For cleaning of the optical parts including reflector and windows always use a damp cleaning pad.

12.7.2 Overhaul and Repair

Repair and overhaul of the G16 and G26 Opacity Transceiver for Ex areas must only be carried out by Green Instruments personnel.

12.8 Classification

The Green Instruments G16 and G26 Opacity Meter for Ex areas have been ATEX and IECEx certified for both gas and dust as follows:

Gas: II 2 G Ex ib op is IIB T5 Gb

Dust: II 2 D Ex ib op is IIIB T135°C Db

This means that the units can be installed in locations with the following conditions.

12.8.1 Zone Classification

Substance: Gas ATEX Category 2G Zone 1	Area in which an explosive gas atmosphere is likely to occur in normal operation occasionally
Substance: Gas ATEX Category 3G Zone 2	Area in which an explosive gas atmosphere is not likely to occur in normal operation and if it does occur, is likely to do so only infrequently and will exist for a short period only
Substance: Dust ATEX Category 2D Zone 21	Place in which an explosive atmosphere in the form of a cloud of combustible dust in air is likely to occur in normal operation occasionally
Substance: Dust ATEX Category 3D Zone 22	Place in which an explosive atmosphere in the form of a cloud of combustible dust in air is not likely to occur in normal operation but, if it does, will persist for a short period only

12.8.2 Gas Grouping

Group IIB	Refer to EN60079-10-2
Group IIA	Refer to EN60079-10-2

12.8.3 Dust Grouping

Group IIIB	Not conducting dust
Group IIIA	Combustible flying dust

12.8.4 Temperature Classification

Temperature Class - Gas	Temperature Class - Dust	Ambient Temperature (°C)	Maximum Surface Temperature (°C)
T4	T135 °C	-25...55 °C	135 °C

12.9 Accessories

Accessories specified in Certificate DTI 17ATEX0079X and IECEx CNEX 21.0001X

12.9.1 Connection Cable

The 5P shielded connection cables comes in 2m (part #: 03453) and a 15m (part #: 03457) options complete with M12 straight socket.

12.9.2 Transceiver Mounting Module G26

The G26 transceiver is arranged with a transceiver mounting module G26 (part #03472). For further see drawing no. 07319.

12.9.3 Reflector Module G16

The reflector module G16 (part #:03454) is arranged as complete unit with reflector and housing. For further see drawing no. 07025.

12.9.4 Reflector Module G26

The reflector module G26 (part #:03455) is arranged as complete unit with reflector, housing, and bracket. Refer to drawing no. 07026.

12.9.5 Air Module G16/G26

The Air module G16/G26 (part #:03458) is arranged as complete unit with, housing, ring nut and air connection. Refer to drawing no. 7027.

12.9.6 Junction Box

The junction Box (JB) is suitable for Zone 1 and 2 as well as 21 and 22 with temperature classes T4 to T6. The junction box is not covered by the Certificate DTI 17ATEX0079X and IECEx CNEX 21.0001X.

12.10 Spare Parts

Spare parts are not included in the standard delivery. Spare parts can be ordered when necessary. When ordering spare parts, please mention the serial number of the equipment, which can be found on the label of the equipment.

Refer to Spare Parts section 11.

Attention

Repair, overhaul or maintain inside of the Ex Opacity G26 Transceiver must only be carried out by Green Instruments personnel.

Spareparts must only be applied as specified in this manual.

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