XMF-11k User Manual

SUBMERSIBLE LED FLASHER

Shipped From

Xeos Technologies Inc.
36 Topple Drive
Dartmouth, Nova Scotia
Canada
B3B 1L6
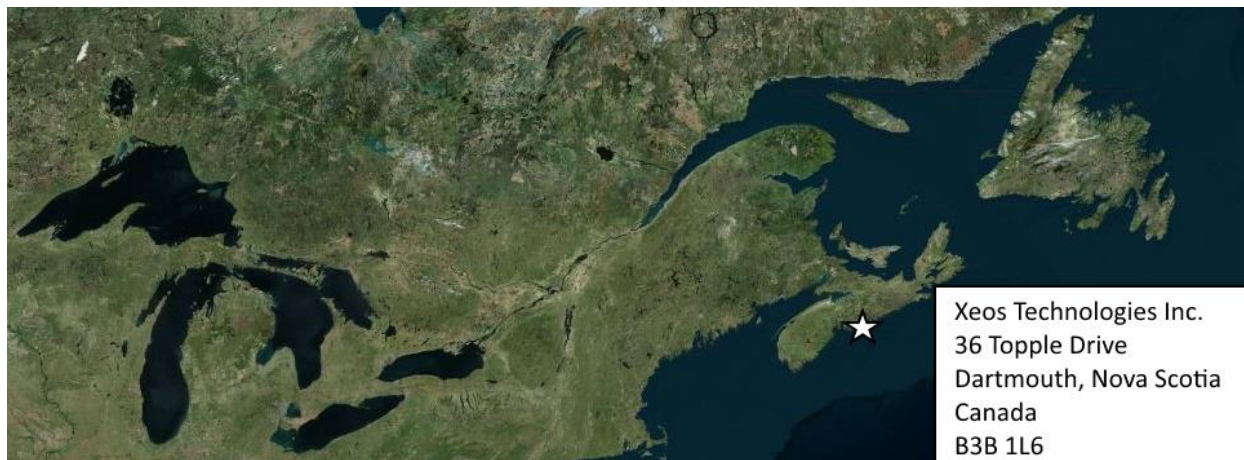
Contact Us

Email	support@xeostech.com
Phone	(902) 444-7650
Fax	(902) 444-7651
Website	https://xeostech.com/

Version History

Version No.	Date	Description
1.0	Jan 2013	Base Document
1.1	Mar 2013	Minor changes for specifications
1.2	Oct 2013	Change address for Xeos, review specifications
1.3	Mar 2014	Update O-ring & lube recommendations, formatting
2.0	Nov 2017	Document Overhaul
2.1	Dec 2017	Adjusted Technical Specs.
2.2	Aug 2018	Expanded XMF-RH, Added XMF-Mini
2.3	Feb 2019	Added XMF-RH picture, hyperlinks
2.4	Apr 2019	Added Motion Only Firmware variant, XMF-Mini Magnet
2.5	Jan 2020	Added XMF Flare
2.6	Jan 2020	Edit XMF Mini
2.7	Mar 2020	Drawing edits, depth rating additions
2.8	Mar 2024	Added Li XMF Mass to standard model. Motion-only firmware small re-write.

Regular checks for the latest manual are suggested. Be sure to check Xeos Technologies' manuals page to compare versions and download the latest version.

Table of Contents

Overview

General Description

The XMF-11k is an independently powered, self-contained surface flasher that is fully submersible up to 11,000m (36,089 ft.). The super-bright LED provides unparalleled visibility in even the worst conditions and the reliability provided by our solid-state surface sensor is a significant improvement over mechanical methods.

The XMF-11k features a miniaturized design in an all Grade 9 Titanium enclosure designed to meet or exceed your operational requirements for an ultra-deep water submersible flasher. The XMF-11k is backed by a comprehensive warranty and excellent support.

The XMF-11k features microprocessor controlled, ultra-bright LED available in multiple colour options. The XMF-11k has a long-lasting operational life of and features multiple activation options.

XMF-11k is intended for subsurface deployments. Xeos Technologies Inc. (Xeos) manufactures other specific products for surface and subsurface applications.

See xeostech.com for details or call (902) 444-7650.

Theory of Operation

The XMF-11k is intended for locating and recovering high value, free drifting assets at sea. After being activated, the XMF-11k is submerged, where it enters an Underwater Mode. Here, it monitors water conductivity between the top disk and the bulkhead for up to 2 years. The LED will not flash while the XMF-11k is submerged.

Once it reaches the surface, the XMF-11k will begin to flash. If the daylight off, or tilt options are enabled, the device will not flash during daytime, and/or it is oriented upside down. The XMF-11k will continue to flash until it is manually turned off, the battery pack drops below the minimum voltage requirement of 7V, the XMF-11k is re-submerged, or if the daylight off, and/or tilt option prohibits.

Operating Instructions

On/Off Modes and Configuration

Below is the operation of the XMF in its standard configuration. **Motion-Only firmware** operates notably differently from standard, see below.

On/Off Operation

The XMF-11k beacon has 4 ways of turning ON and OFF. The first way is through the use of an external magnet near an internal magnetic reed switch (if the reed switch is activated).

The second way is through the use of an internal tilt sensor (if the tilt sensor is activated). Turn off the XMF-11k by turning the device upside-down for a minute. Holding the XMF-11k upright will enable the device again.

The third way is through the use of an internal Light sensor (if the light sensor is activated) The XMF-11k will turn off during daylight hours, and it will resume flashing at dusk.
The fourth way is through the use of a capacitive water sensor (if the water sensor is enabled) Turn the device off by submerging it in water. The device will begin flashing again once it surfaces.

To turn XMF-11k ON using the magnet method, wipe the magnet back-and-forth quickly across the area directly below the glass portion of the lens. A flashing sequence of a dim flash, followed by a bright flash indicates that the device is powering up. Once the device is turned on, it will flash depending on the dip switch and rotary switch settings.

To turn the XMF-11k OFF using the magnet method, repeat the above procedure with the magnet swiped on the area below the glass portion of the lens. A flashing sequence of a bright flash, followed by a dim flash indicates that the device is powering down. Once the unit is turned off, it will no longer flash.

Note: If the reed switch is used to turn the unit off and then manually cycle the power by removing the batteries, the unit will begin to flash.
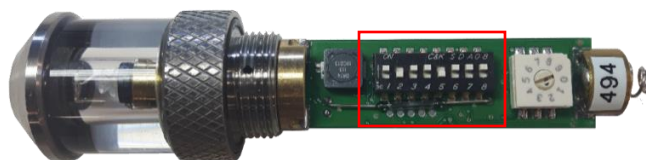
Rotary Switch
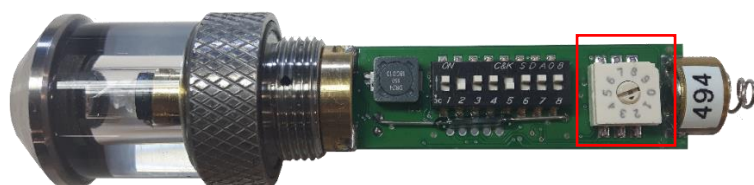
Switch Position	Delay (Seconds)
1	1
2	2
3	3
4	4
5	5
6	6
7	10
8	15
9	20
0	30

The table above outlines the operation of the rotary switch. The switch position sets the delay in seconds between flashes.

For example, if the rotary switch is set to '7', the time between LED flashes will be ten seconds.

DIP Switch

Note: when viewing with rotary switch at the bottom and the DIP switch at the top:

L = Left position   **R = Right position**

DIP Switch Pos	0 Flashes	1 Flash	2 Flashes	3 Flashes
1	L	R	L	R
2	L	L	R	R

The Flashing Sequence is determined by the position of **BOTH DIP switches**. To set the flashing sequence, make sure the 1 and 2 DIP switches match the setting for the sequence desired.

For instance, to flash 3 times per cycle, set both **DIP 1** and **DIP 2** to the **R** or right position.

Please note that the sequence does not change the time *between* flashes; the below settings:

- Rotary Dial 7
- DIP 1 Left
- DIP 2 Right

would result in a 2-flash sequence with 10 seconds between each pair of flashes.

Sensor Options

The XMF-11k contains a number of sensors which can affect the behavior of the XMF-11k. In order for the XMF to begin its flashing sequence, ALL the sensor criteria must be met. The configuration for the sensors is on the remaining DIP switch positions, 3-6. The table below describes their function and how to use them:

Sensor	Function	DIP Switch	Left Position	Right Position
Reed Switch	Controls the ability to turn On/Off with magnet. DO NOT CHANGE.[1]	3	Enabled	Disabled
Light Sensor	Controls whether flashes during daylight – Enabled PREVENTS flashing in lit conditions	4	Enabled	Disabled
Accelerometer	Controls flashing based on orientation. If Enabled PREVENTS flashing when upside down. [2]	5	Enabled	Disabled
Fresh water sensor	Senses salinity of the water. If salinity does not meet the threshold, it won't Flash. Setting to Fresh Water will meet the threshold for all salinity levels. [2]	6	Fresh Water Threshold	Salt Water Threshold
Water sensor	Senses whether or not XMF is submerged. If set to Enabled, will prevent flashing when submerged. [2]	7	Enabled	Disabled

Switch 8 is not used.

The default settings for all sensors are in the LEFT position. In this configuration, the environment will have to meet **ALL** the following conditions in order to begin the flashing sequence:

- Reed Switch/Magnet sensor is ENABLED (and the unit is turned on)
- There is no light detected
- The XMF-11k is in an upright position
- The salinity level meets the threshold (all water should meet the default)
- The XMF-11k is NOT submerged.

[1] The ability to disable the reed switch is available for repair purposes only. Do not change this position or you will be unable to use the flasher under any condition.

[2] **In Motion-only firmware, these switches do not play a factor in functionality in any position.**

Maintenance

Changing the Batteries

The chassis can easily be taken apart by unscrewing the top lens end off of the unit. This must be done carefully as the circuit board is attached to the lens, and will come out of the unit when then top is taken off the chassis. The batteries are inserted into the chassis with the positive end facing the circuit board, and the negative end facing the bottom of the chassis.

The XMF-11k accepts 6 AA 1.5 Volt Alkaline batteries in the standard chassis. A shorter Chassis that accepts 7 CR123A 3 Volt Lithium batteries is also available.

Ensure that all batteries are inserted into the chassis with the correct polarity. The negative terminal of the battery should be facing the bottom of the chassis. The positive terminal of the battery should be facing the antenna and the circuit board.

The batteries inside the chassis are protected by a plastic tube. When replacing batteries, ensure that the plastic tube is still intact inside the chassis.

When unscrewing the top ALWAYS grasp the top by the knurl and rotate counter-clockwise.

Changing the O-rings

O-rings are critical to the waterproof nature of the XMF-11k. The O-ring should be visually inspected to make sure that it is properly seated in the groove and to ensure there is no visible damage to the O-ring. If the O-ring fails visual inspection or the XMF-11k has been deployed for longer than 2 months, the O-ring should be replaced prior to the next deployment.

- Remove the old O-ring and clean all dirt away from the O-ring groove and battery tube using a lint free cloth, cleaning alcohol, and a soft-brush
- Thoroughly inspect the O-ring groove as well as the point of contact on the inside of the battery tube; any scratches or dirt could compromise the O-ring seal
- Apply a thin layer of O-ring lube (Molykote 111 from Dow Corning) to the new O-ring and gently slide the new O-Ring down over the threads of the screw-cap and into the O-ring groove
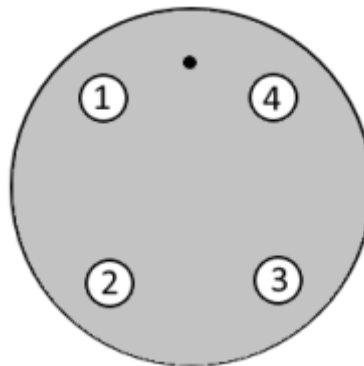
Additional Models

XMF Remote Head

The XMF has a remote head option to allow for better load balancing by separating the locations of the electronics package from the battery pack. The XMF Remote Head features all of the capabilities of the standard XMF and is supplied power via a waterproof cable to a 4-Pin female bulkhead connector.

The Y-Cable version of the XMF Remote Head is supplied with steering diodes to allow for battery back-up, should the connected vehicle lose power.

Depth rating of the XMF-RH is 7500 meters, though 11,000-meter connectors are available.

Connector Pinout

4-Pin, Female, MCBH-4-FS-TI	
Pin Number	Name
1	Ground
2	No Connection
3	+V Battery (7VDC – 36VDC)
4	+V Vehicle (7VDC – 36VDC, Y-Cable version ONLY)
Guide pin for proper orientation is shown as black dot.	

XMF Mini

The XMF Mini is a compact version of the XMF, supplied with power using 3 CR123A Lithium batteries. The XMF Mini retains all the operational characteristics of the regular XMF, but designed for near-shore, short deployments.

The depth rating of the XMF-Mini is 1000 meters.

XMF Flare

A specialized version of the XMF, the XMF flare comes equipped with a bottom-mounted, normally closed relay. When power is applied to the correct pins, the relay remains open, cutting the power to the XMF. When the power is no longer present, the relay is closed, and the XMF is allowed to operate.

The XMF Flare is employed in situations where a user wishes to be alerted and operate the flasher when vehicle power is lost. When not using this feature, a plug and locking sleeve should be added to protect the bottom connector.

Due to its application, the XMF Flare's water sensor DIP switch is moved to the **DISABLED** position at the factory.

Depth rating of the XMF-RH is 7500 meters, though 11,000-meter connectors are available.

Connector Pinout
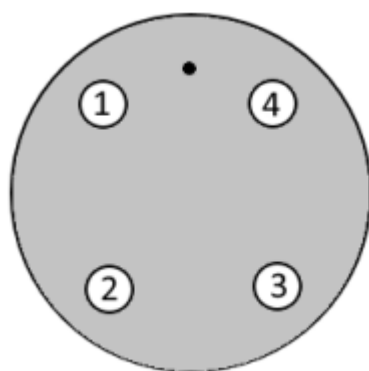
4-Pin, MCBH-4-FS-TI	
Pin Number	Name
1	-V Relay
2	No Connection
3	+V Relay (12VDC)
4	No Connection
Guide pin for proper orientation is shown as black dot.	

XMF Motion-Only Firmware

As a modification **requested on order**, the XMF can be modified to enter a lower power state when stationary for five minutes instead of submergence reading, regardless of orientation.
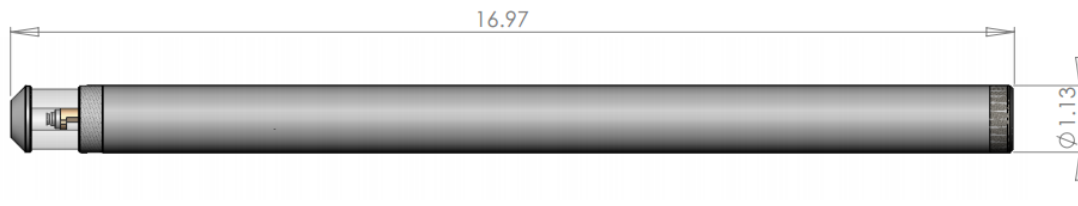
When in this lower state, the XMF does not flash, in identical behavior to a normal XMF. This version of the device continuously monitors its orientation until enough of a change is registered to return to an active state.

With this version of the XMF, the water sensor is **disabled**. The Accelerometer reading as it is used on the standard XMF is also **disabled.** As such, the water sense, water sense threshold and accelerometer DIP switches do not play a factor in operation.

Appendix A: Technical Specifications

XMF Long Tube

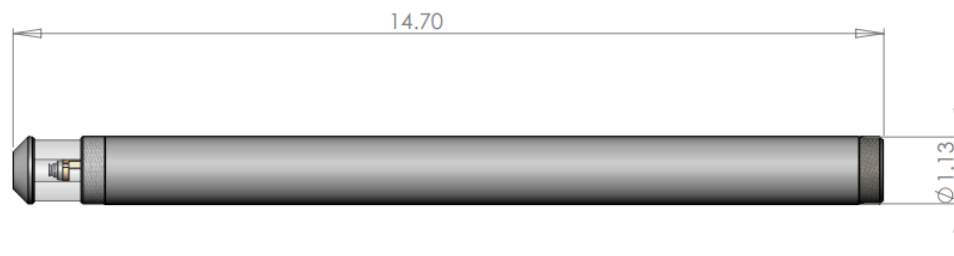| Material	Chassis: Grade 9 Titanium Lens: Glass
Dimensions	44.17cm L x 2.87cm D (17.39" L x 1.13" D)
Mass (Alkaline)	Out of Water – 918g In Water – 637g
Mass (Lithium)	Out of Water – 912g In Water – 635g
O-rings	568-020 70A DURO BUNA
Seal Lubrication	Dow Corning Compound 111
O-ring Material	Buna-N Nitrile Rubber
O-ring Dimensions	0.875 X 1.000 x 0.070"
Depth Rating	11,000 meters

XMF Short Tube

Material	Chassis - Grade 9 Titanium Lens - Glass
Dimensions	37.34cm L x 2.87 cm D (14.7" L x 1.13" D)
Mass (Lithium)	Out of water – 644g In water – 431g
O-rings	568-020 70A DURO BUNA
Seal Lubrication	Dow Corning Compound 111
O-ring Material	Buna-N Nitrile Rubber
O-ring Dimensions	0.875 X 1.000 x 0.070"
Depth Rating	11,000 meters

XMF Remote Head

Material	Chassis - Grade 9 Titanium Lens - Glass
Dimensions	19.50cm L x 2.87 cm D (7.68" L x 1.13" D) - Head 45.41cm L x 2.87 cm D (17.88" L x 1.13" D) - Tube
Mass (Alkaline)	Out of water – 1525g In water – 1010g
Mass (Lithium)	Out of water – 1470g In water – 955g
O-rings	568-020 70A DURO BUNA
Seal Lubrication	Dow Corning Compound 111
O-ring Material	Buna-N Nitrile Rubber
O-ring Dimensions	0.875 X 1.000 x 0.070"
Depth Rating	7500 meters (11,000-meter option available on request)
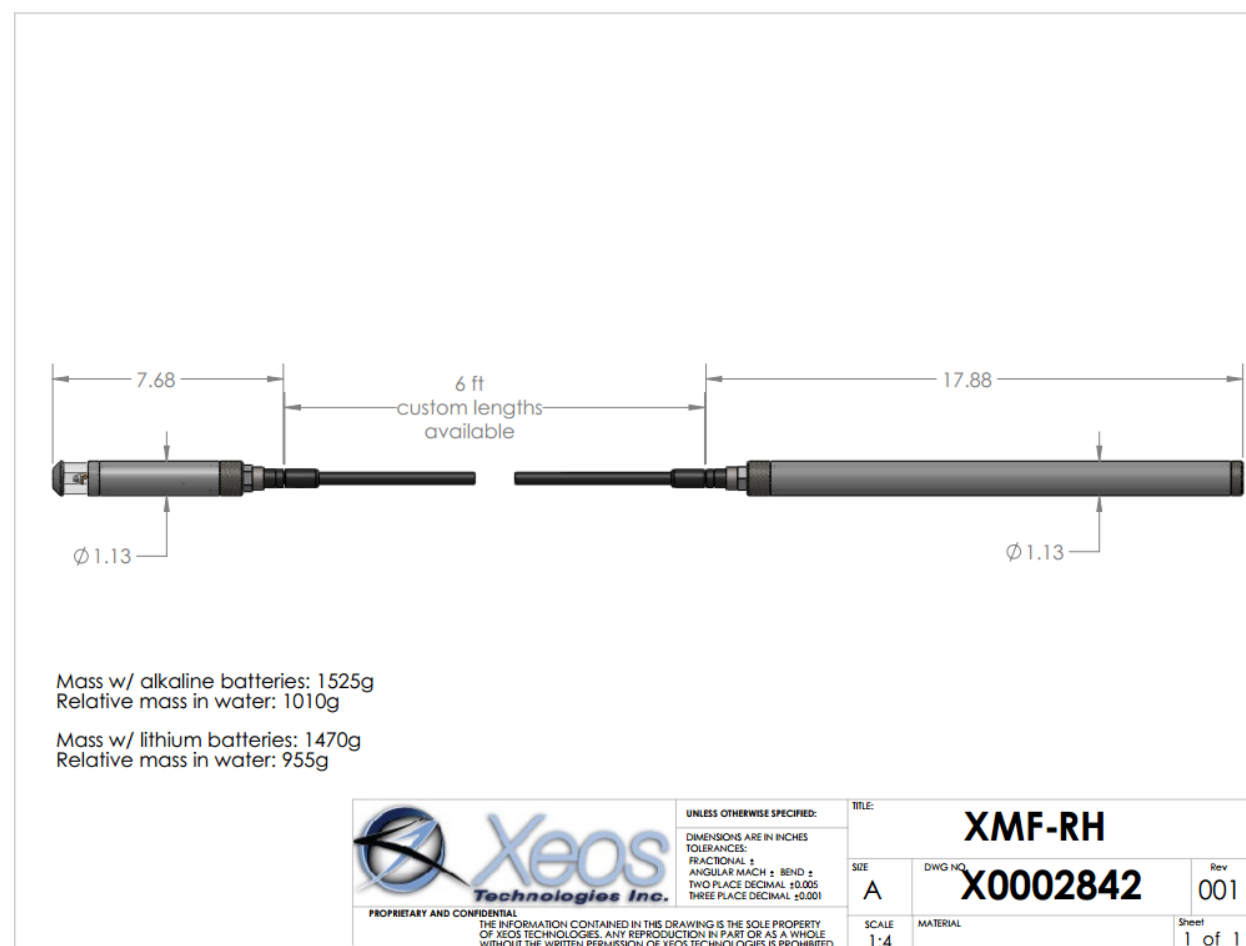
XMF Mini

Material	Chassis - Grade 9 Titanium
	Lens - Glass
Dimensions	23.06cm L x 2.87 cm D (9.08" L x 1.13" D) – Head/ Tube ends
	2.36 cm D (0.93" D) – Inner Tube
Mass (Lithium)	Out of water – 380g
	In water – 270g
O-rings	568-020 70A DURO BUNA
Seal Lubrication	Dow Corning Compound 111
O-ring Material	Buna-N Nitrile Rubber
O-ring Dimensions	0.875 X 1.000 x 0.070"
Depth Rating	1000 meters

Mass in Air : 380g
Mass in Water: 270g

3x CR123A Batteries

| UNLESS OTHERWISE SPECIFIED: Physical Properties	TITLE:			
DIMENSIONS ARE IN INCHES TOLERANCES: ONE PLACE DECIMAL ±0.05 TWO PLACE DECIMAL ±0.005 THREE PLACE DECIMAL ±0.001	**XMF Mini**			
PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF XEOS TECHNOLOGIES. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF XEOS TECHNOLOGIES IS PROHIBITED	SIZE A	Rev 001	SCALE 1:1	Sheet 1 of 1

Appendix B: Electrical

Power Supply

AA EN91 Alkaline (Standard Tube)	
Internal Battery Supply	6 x 1.5 Volt AA Energizer EN91 batteries
Voltage	9 Volts nominal
Capacity	Varies by manufacturer (1.8Ah – 2.8Ah)
Life expectancy	13 Days single burst every 2 seconds daylight off 44 Days single burst every 10 seconds daylight off (Approximate values based on 2Ah alkaline)

AA Energizer L91 Ultimate Lithium (Standard Tube)	
Internal Battery Supply	6 x 1.5 Volt AA Energizer Ultimate Lithium batteries
Voltage	9 Volts nominal
Capacity	3.0 Ah
Life expectancy	16 Days Single Burst Every 2 seconds, daylight off 56 Days Single Burst every 10 seconds, daylight off

CR123A (Standard Tube)	
Internal Battery Supply	9 x CR123A 3 Volt Lithium batteries
Voltage	27 Volts nominal
Capacity	1.4 Amp-hours
Life expectancy	25 Days single burst every 2 seconds, daylight off 82 Days single burst every 10 seconds daylight off

CR123A (Short Tube)	
Internal Battery Supply	7 x CR123A 3 Volt Lithium batteries
Voltage	21 Volts nominal
Capacity	1.4 Amp-hours
Life expectancy	19 Days single burst every 2 seconds, daylight off 63 Days single burst every 10 seconds, daylight off

CR123A (XMF Mini, XMF Flare)	
Internal Battery Supply	3 x CR123A 3 Volt Lithium batteries
Voltage	9 Volts nominal
Capacity	1.4 Amp-hours
Life expectancy	7 Days single burst every 2 seconds, daylight off 24 Days single burst every 10 seconds, daylight off

Remote Head	
Input Voltage	7VDC – 36VDC Maximum

NOTE: All Life expectancy ratings are based on a 1 year below surface time

Electronics

Digital Controller	Xeos LED Flasher
ON/OFF Controls	Reed Switch for activating without opening the case Solid State tilt switch for upright activation and deactivation Light sensor for daylight deactivation and night time activation
Pulse Options	1, 2, or 3 flashes/cycle
Luminous Flux	White – 70 lumens (70lm) Cyan – 110 lumens (110lm) Amber – 100 Lumens (100lm)
LED	3.9W, single emitter type

Environmental

Operating Temperature	-40° C to +60° C (-40° F to +140° F)
Storage Temperature	-40° C to +85° C (-40° F to +185° F)

Warranty, Support and Limited Liability

Xeos Technologies Inc. warranties the XMF-11k to be free of defects in material or manufacturing for a period of one year following delivery. Liability is limited to repair or replacement of the defective part and will be done free of charge.

LIMITED WARRANTY: Xeos Technologies Inc. warrants that the product will perform substantially in accordance with the accompanying written materials for a period of one year from the date of receipt.

CUSTOMER REMEDIES: Xeos Technologies Inc. entire liability and your exclusive remedy shall be at Xeos Technologies Inc. option, either (a) return of the price paid or (b) repair or replacement of the product that does not meet Xeos Technologies Inc. Limited Warranty and that is returned to Xeos Technologies Inc. with a copy of your receipt. This Limited Warranty is void if failure of the product has resulted from accident, abuse, or misapplication. Any replacement product will be warranted for the remainder of the original warranty period or ninety (90) days, whichever is longer.

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