



# GENERAL USER GUIDE

PowerMir TKS

MIRSENSE

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## Revisions

Version	Date	Author	Modification
<b>1.0</b>	2019-07-30	G. Aoust	Document Creation
<b>1.1</b>	2020-03-12	G. Aoust	Version Update
<b>1.2</b>	2022-12-20	M. Carras	Version Update (CE marking and interlock)
<b>02</b>	2023-12-20	G. Aoust	Mechanical design update

## Hardware Version

Name	Version	Release Date
<b>PowerMir TKS</b>	V2.2	2022-12-20

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## I. Introduction

MirSense PowerMir TurnKey System (PTKS) is an agile pulsed and continuous wave current driver operating one or two Quantum Cascade Lasers (QCL). It is compact, powerful and controlled by a user-friendly graphical interface. It has been designed and manufactured in France to provide the highest quality and reliability.

This manual is an important part of your purchase as it will help familiarize with the system and explain its numerous features. Please read this manual thoroughly before starting the installation and using your instrument.

Don't hesitate to contact MirSense or your authorized MirSense distributor should you have additional technical or application questions. We provide web-based as well as direct e-mail and telephone support. Thank you for purchasing a MirSense product.

### Contact Information

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## II. Conventions

Throughout the manual you will see graphic icons representing important information in the text. The purpose of these icons is to provide a visual convention to alert you of a stop in the flow of the manual, where an important note or safety hazard alert is posted.



**NOTE** is an important procedure of which you should be aware of before proceeding. Failure to observe one of these notes might impair the performance of the PTKS.



**WARNING** indicates that improper handling of the PTKS without observing these cautions could lead to personal injury to the user or damage to the property.

### III. Applicable Documents

#### A. Characteristics

Generic characteristics of your PTKS will be given in the present General User Guide document. Additional specific characteristics are contained in the **PTKS Test Report**.

#### B. Software

The **PTKS Software User Guide** details how to use the graphical user interface (GUI) to control the PTKS. It contains details on how to interpret the information displayed on the GUI.

#### C. Modulations

Modulation techniques are the subject of the **PowerMir Application Note**. Please refer to this note if you want in-depth details on the different optical power modulation techniques.

## IV. Content of the PTKS

### A. Presentation of the parts

We present here a typical setup of the PTKS, illustrating and naming different part of the PTKS. Your PTKS may have a slightly different look and display slightly different parts depending on options.

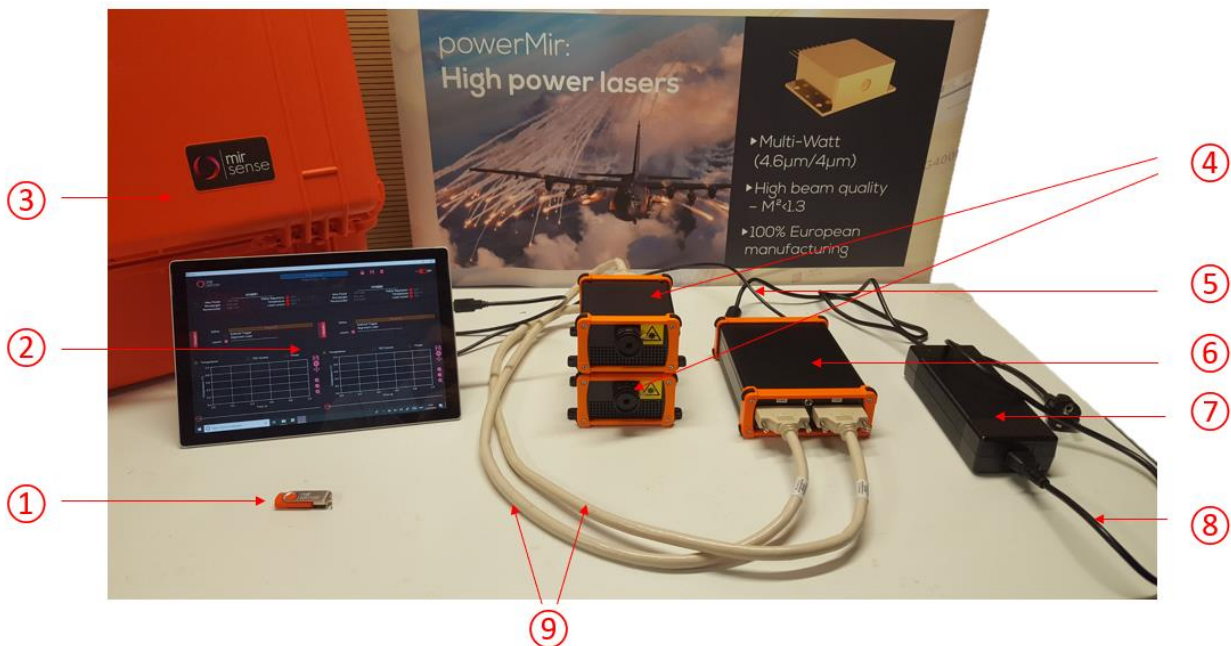


Figure 1 – Presentation of the parts composing a typical PTKS, in its double channel configuration. In this setup, both PTKS Heads are air cooled and plugged on the PTKS Master.

Number on Figure 1	Designation
①	USB key containing the GUI Control Software and documents
②	PTKSDriver GUI Control Software
③	PTKS carrying case
④	PTKS Heads
⑤	USB cable for PC connection
⑥	PTKS Master
⑦	AC-DC adapter
⑧	Power supply cord for AC-DC adapter
⑨	3M Master to Head connector

## B. Check the content of the package

All MirSense products and prototypes are inspected and tested prior to shipment from the factory. In addition, the instruments are packed in a robust case with protective foam.

When you open the package, check that the following items are included before use. If the contents do not match this packing list or are damaged in any way, contact your local dealer without attempting to operate the PTKS. Photograph the damages and contact mirSense (please email pictures if possible) for consultation on best course of action. Most of the items in the following list are showed in Figure 1.

Item	Quantity	Description
①	1	A USB key containing <ul style="list-style-type: none"> <li>- the PTKS "PTKSDriver" GUI software</li> <li>- the CDM21228_Setup PC driver</li> <li>- the PTKS User Guides and documentation</li> <li>- the PTKS Test Report.</li> </ul>
②	-	The PC displaying the GUI Software is not included
③	1	The PTKS carrying case
④	1 or 2	The PTKS Head(s) containing the QCL laser and proximity electronics. Its exact shape may vary depending on cooling options.
⑤	1	Connection between the PC and the PTKS Master.
⑥	1	The PTKS Master, containing the control boards used for the QCL pulsed or continuous current generator as well as temperature regulations.
⑦	1	Supply power to the PTKS Master.
⑧	1	Supply power to the AC-DC adapter.
⑨	1 or 2	Connection between the PTKS Master and the PTKS Head, used to transmit signals to control and supply current.

It is recommended that you keep the shipping packages. These shipping packages are also a very good way to ship the system to other labs or field stations, otherwise they will get wet. Please contact MirSense for options on transporting systems to remote labs.



## V. Characteristics

### A. Mechanical interface

The technical dimensions of the PTKS Master and PTKS Head are given in Figure 2 and Figure 3 respectively. The PTKS Heads and the PTKS Master are connected by the 3M Master to Head connector, with dimensions shown in Figure 4.

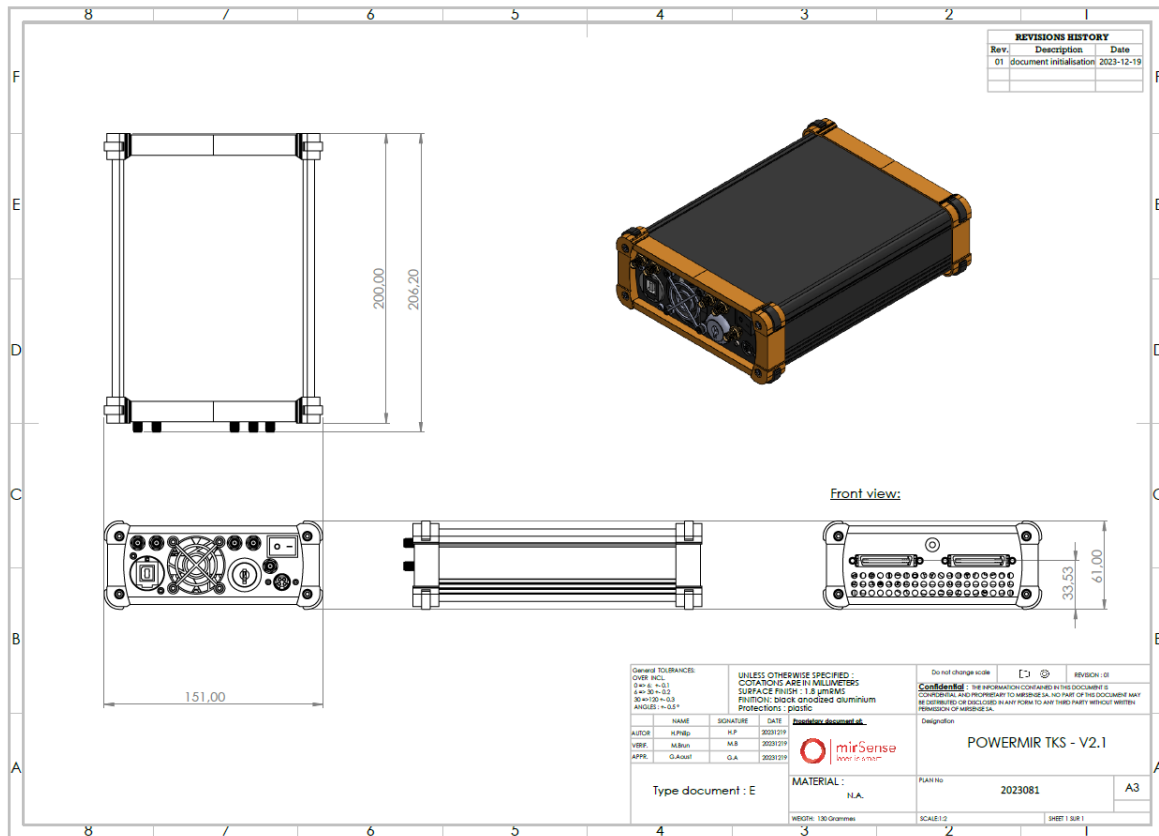


Figure 2 – Mechanical specifications of the PTKS Master Driver

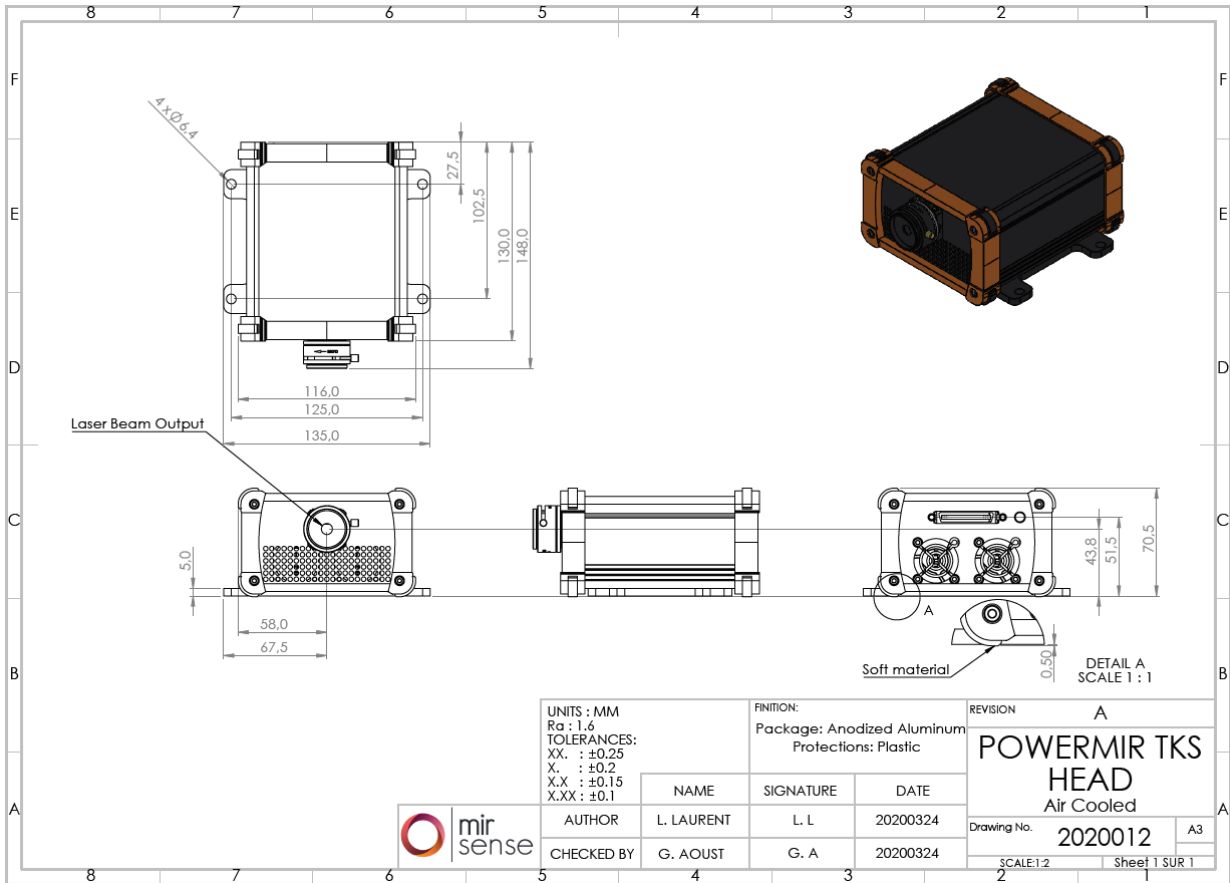


Figure 3 – Mechanical specifications of the Air Cooled PTKS Head.

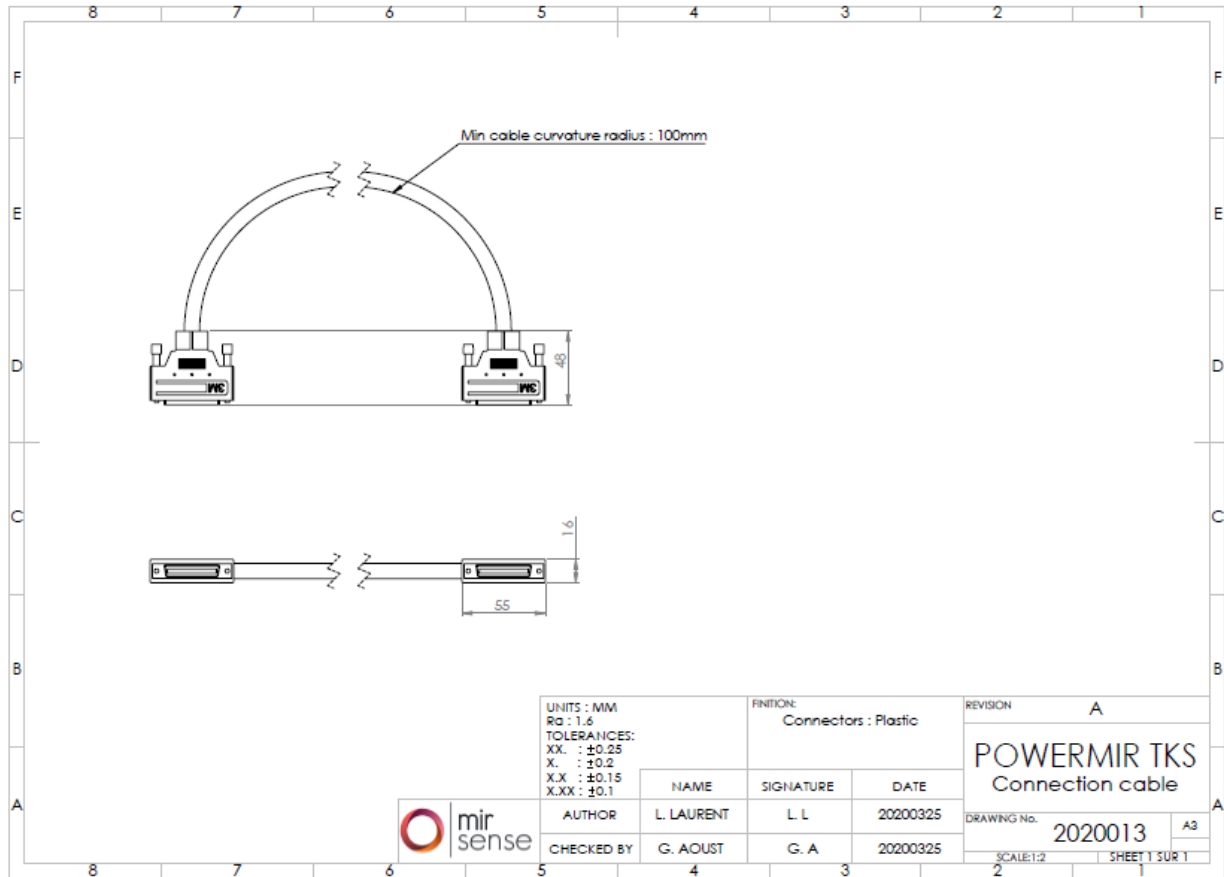


Figure 4 – Mechanical specifications of the 3M Master to Head connector.

The PTKS Heads can be fixed to a table using the screw holes displayed in Figure 5. Also, a manual shutter is mounted at the front to block the laser beam if necessary.

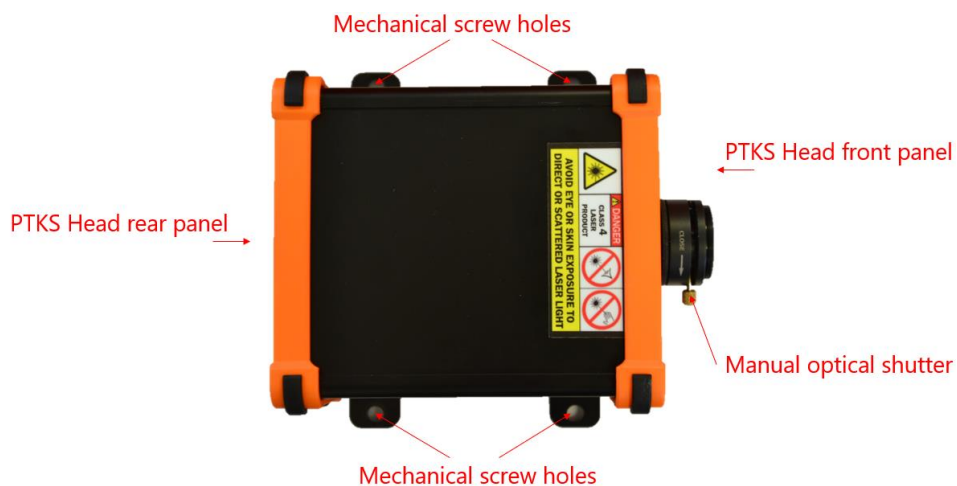


Figure 5 – Description of the PTKS Heads fix elements and features.

### 1. Weight

The weights of the PTKS sub-systems are given in the table below:

Designation	Weight (g)	Tolerance (g)
PTKS Head	1160	±10
PTKS Master	980	±10
3M Master to Head connector	275	±10
PTKS carrying case	1930	±10
AC-DC adapter	1050	±10

## B. Electrical characteristics

The following electrical characteristics apply for the trigger signals available at the rear of the PTKS Master (see Figure 8).

Item nb	Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>External Trigger</b>							
101	Vih	Voltage input high		2		3.4	V
102	Vil	Voltage input low		-0.2		0.8	V
103	li	Current Input				1	mA
<b>Output Trigger</b>							
201	Voh	Voltage output high		2.9	3.3		V
202	Vol	Voltage output low			0	0.4	V
203	lo	Current pin output				2	mA
<b>Interlock Connector</b>							
301	Vith	Voltage input high		2		3.4	V
302	Vitl	Voltage input low		-0.2		0.8	V
303	lit	Current Input				1	mA

**Power supply:** Only use the Power Supply of the PTKS Master provided by mirSense, with the following characteristics (Reference: GST220A24-R7B):

Symbol	Parameter	Min	Typ	Max	Unit
Vin	Input Voltage (AC)	85		264	V
Fin	Input Frequency	47		63	Hz
Imax	Maximum Current			9.2	A

## C. Environment characteristics

### 1. Condensation

Care must be taken on the PTKS surrounding temperature in order to avoid any condensation. Indeed, this condensation could lead to potential short-circuits and eventually to damages. It can also lead to laser degraded performances if the condensing occurs on the HHL laser package fastened inside the PTKS Head. It is hence very important to ensure the humidity maximum ratings below.

Symbol	Parameter	Min.	Typ	. Max.	Unit
<b>Ambient air conditions</b>					
$H_{00}$	Outside air operating humidity	0	50	95	% R.H., non-condensing
$H_{0s}$	Outside air storage humidity	0	50	95	% R.H., non-condensing

### 2. Surrounding temperature

The temperature around the PTKS should satisfy the following table, provided that the air respect the condensing table in section V.C.1.

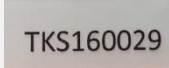
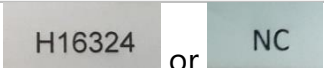
Symbol	Parameter	Min.	Typ	. Max.	Unit
<b>Ambient air conditions</b>					
$T_{00}$	Outside air operating temperature, static air.	10	25	40	°C
$T_{0s}$	Outside air storage temperature	0	25	50	°C

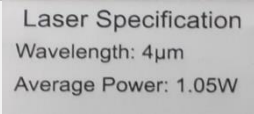



## D. Specific characteristics

Specific characteristics of your PTKS are contained in the **PTKS Test Report**. For example, you will find all relevant information about the laser(s).

## E. Markings

We show in the following the various markings that can be found on the system and their meaning.

Marking Name	Photo (not contractual)	Description
<b>PTKS serial number</b>		Turnkey system serial number, written as "TKSXXXXXX" where XXXXXX is a number. It is located on the PTKS Master Unit.
<b>HHL serial number</b>		The HHL serial number is the serial number of the HHL package contained within the PTKS Head. It is written as HXXXXX, "XXXXX" being a


		number. "NC" is used instead on the PTKS Master end if your PTKS is only able to control a single head.
<b>Laser specification label</b>		This marking is located on each PTKS Head. It indicates the central wavelength of the laser contained within the head, as well as its maximum average power.
<b>Safety label</b>		This is a mandatory marking to provide a warning to indicate the laser class. This marking depends on the class of your laser.
<b>Laser hazard pictogram</b>		This is a mandatory marking to indicate that laser light can be emitted. It is located on each PTKS head next to the beam output location.
<b>CE Marking</b>		This marking shows that the PTKS product have been assessed to meet high safety, health, and environmental protection requirements. It is located on the PTKS Master unit.



## VI. Safety

### A. Safety precautions

There are no user serviceable components within the PTKS enclosures and so you should not open any of these enclosures within the PTKS.

	<p><b>AC-DC adapter</b></p> <p>When unplugging the AC-DC adapter, do not pull on the cord, but remove the plug from the outlet to avoid causing electric shock or fire.</p>
	<p><b>Storage</b></p> <p>When the PTKS is not used for a long period of time, unplug the power supply cord from the outlet to avoid damaging the cord or causing electric shock or fire.</p>
	<p><b>Connecting and disconnecting cables</b></p> <p>Be sure that the power supply is disabled before connecting and disconnecting the connectors (AC-DC connector to the PTKS Master, and 3M Master to Head connector).</p>
	<p><b>Power supply</b></p> <p>Use the input voltage indicated on the reading sticker of the AC-DC adapter. Using a different voltage can damage the PTKS and lead to fire or electric shock.</p>
	<p><b>Cables</b></p> <p>Be careful not to place heavy objects on cables or bend them excessively. Doing so can damage cables and lead to fire, electric shock or hardware damage.</p>
	<p><b>AC-DC adapter</b></p> <p>Use the accessory AC-DC adapter provided with the PTKS.</p>
	<p><b>Humidity</b></p> <p>Do not touch the plug with wet hands. Doing so can lead to electric shock.</p>
	<p><b>Do not attempt to dismantle or modify the PTKS</b></p> <p>Doing so can also lead to damage and even injury, as some internal components become very hot and electrical wires are exposed. Only touch parts as indicated in the manual.</p>
	<p><b>Fixing the PTKS</b></p> <p>Be sure that the PTKS Head and Master are properly screwed and that the D-Sub Master to Head connector is not too tight.</p>
	<p><b>Shipping precautions</b></p> <p>When transporting the PTKS by truck, ship, airplane, etc., wrap it securely in packaging material and place it inside its original protective case or something similar.</p>
<p><b>Strong impact</b></p>	



	Do not subject the PTKS to strong shocks by dropping it, for example. Doing so can damage the PTKS.
	<p><b>Electro-magnetic interference</b></p> <p>This PTKS is designed and tested for use in an environment without strong electro-magnetic interferences. If this PTKS is used in uncontrolled areas such as residential areas, electro-magnetic interference may occur.</p>
	<p><b>If an abnormality occurs</b></p> <p>Such as a strange noise, smell or smoke coming out of the PTKS, stop the power supply immediately and contact mirSense subsidiary or local distributor. Never attempt to repair the PTKS yourself.</p>
	<p><b>Disposal</b></p> <p>When disposing of the PTKS, take appropriate measures in compliance with applicable regulations regarding waste disposal and correctly dispose of it yourself, or entrust disposal to a licensed industrial waste disposal company. In any case, be sure to comply with the regulations in your country, state, region or province to ensure the PTKS is disposed of legally and correctly.</p>
	<p><b>Eye safety</b></p> <p>Your laser may be classified (class 4 laser for example) and therefore have attached standards safety rules to follow. Remember that the laser beam is in the mid-infrared and cannot be seen with a naked eye.</p>

## B. System security

### 1. Safety key

A physical safety key must be inserted and turned on to allow the system to operate. The safety key allows power supply to the PTKS when it is horizontal. It is recommended to turn the key ON before using the power button. It is a bad habit to leave the power button on and use the safety switch as a power switch. Do not leave the power switch on all the time and use the safety key to turn on and off the system.

### 2. Software security

Primary operating safety is ensured by the firmware of the PTKS directly into the PTKS Master.

For example, the laser system needs some cooling because of self-heating. Firmware on-board securities on the PTKS will ensure that the system emission duration does not exceed the allowed limits which depends on laser power and on external temperatures.

Some of these limitations may be explicitly given in the **PTKS Test Report** (for instance the maximum operation time before cooling requirement at full laser power for given external temperatures).

Additional safety is handled by the control software when a PC is actively controlling the PTKS. Please refer to software section IX for more details.

### **3. Manual shutter**

Your PTKS Head is supplied with a manual shutter to physically stop the laser beam. Close the shutter when the laser is not used and open the shutter before operating the laser.

### **4. Interlock**

#### **a) Description**

The PowerMir products features an interlock system primarily intended to protect personnel from accidental exposure to hazardous lasers. It is compatible with the monitoring of several doors, windows, curtains, or roller blinds fitted with safety Interlock switches and disable the laser if any are open.

This interlock system enables your organization to comply with best practice when providing laser users with a safe environment in which to operate hazardous lasers.

#### **b) How it operates**

In PowerMir products, a dedicated bipolar electrical connector on the product and an electronic system behind it detects when the interlock line is open or close (see Figure 8). An electrical line should be drawn by the user from that connector, and interlock switches should be placed on that line. All the switches should be placed in series, for the interlock to form a single loop.

When the loop opens, the impedance of the interlock connector is pulled up and triggers an internal ERROR is detected by the product's firmware and displayed on the software. In that case, any restart of the laser will need a manual intervention on the software. Please refer to the **Software User Guide** to know how to handle the error mechanism.

#### **c) Example**

We show in Figure 6 an example of an interlock loop with two buttons: one is an emergency stop button named EMERGENCY\_STOP and the other is a proximity switch placed on a door named PROXIMITY SWITCH.

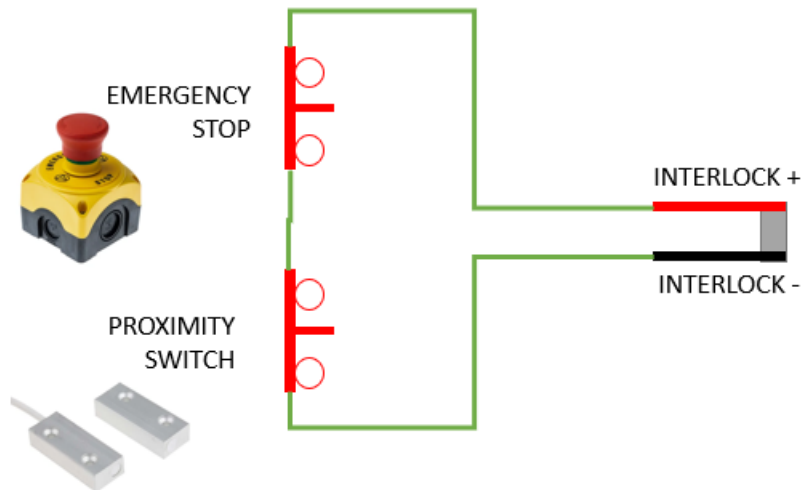




Figure 6 – Example of an interlock loop with two switches, linked to the interlock connector.

- If the door is open, the PROXIMITY SWITCH contact is open, and the Interlock connector is not shorted anymore. The interlock security is hence triggered regardless of the EMERGENCY STOP switch status.
- If the EMERGENCY STOP button is pushed, the loop becomes opens and the interlock security is triggered regardless of the status of the PROXIMITY SWITCH.

#### d) Accessories


The following accessories can be used and are compatible with the interlock system. Their use is optional and might help the user to setup the system.

Part	Description	Recommended references
	<b>Emergency STOP pushbutton</b> This button is normally closed.	LOVATO S1PY91
	<b>Proximity Switch</b> RS Pro Grade 2 Surface mount alarm contact.	RS PRO 9182671


## VII. Installation and connections


### A. Installation

This section describes the setup and installation of the PTKS. Please read and understand this section thoroughly before proceeding with the installation. Please avoid using or storing the PTKS in the following places:


	<ul style="list-style-type: none"> <li>• Where it can be out of the specifications of operating temperature.</li> <li>• Where it can be out of the specifications of the storage temperature.</li> <li>• Where the temperature varies extremely in a short amount of time.</li> <li>• In direct sunlight or near a heater.</li> <li>• Where it can be out of the specifications of the operating humidity and can be dripped by liquid.</li> <li>• Where it can be out of the specifications of the storage humidity and can be dripped with liquid.</li> <li>• Close to a strong source of electro-magnetic waves</li> <li>• Where there are excessive vibrations.</li> <li>• Where it might come into contact with corrosive gases (such as chlorine or fluorine).</li> <li>• Where there is a lot of dust.</li> </ul>
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Make sure the mount on which the PTKS Head is fixed does not disturb heat dissipation.

	<p>To prevent overheating in the PTKS's interior, do not wrap the PTKS in cloth or material. The PTKS is equipped with fans that will extract the heat of the inside electronics. Therefore, it is very important for the correct operation of the PTKS that the fan outputs are cleared. Make sure that no elements come to obstruct the corresponding air vents.</p>
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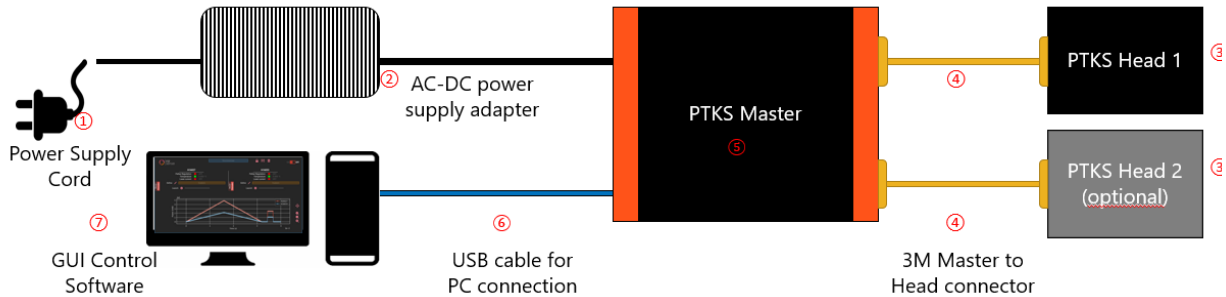
	<p>During installation, the safety of everything system incorporating the device is the responsibility of the system assembler</p>
---	--

### B. General connection



	<p>Follow the safety precautions in order to avoid personal injury and damage to property when using this PTKS. The manual describes the correct method of handling the PTKS and provides cautions in order to avoid accidents.</p> <p>After reading, keep the manual where it can be referred to at any time.</p>
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	<p>When you connect cables, make sure that the power supply of the PTKS is OFF.</p>
---	---

Refer to Figure 7 when connecting the elements contained in the PTKS.



**Figure 7 - Connection schematic of the PTKS elements.**

	<p>When you connect the PTKS Head to the PTKS Master using the 3M Master to Head connector, make sure that the PTKS Head serial number matches the channel label on the PTKS Master.</p>
	<p>Substitution of the power cord or power supply device with one with inappropriate ratings may create unforeseen risks.</p>

When the user plugs the PTKS Head to the PTKS Master, it is imperative to check that the serial numbers marked on both items matches. The serial numbers can be found on the items as depicted in Figure 9 and Figure 10.

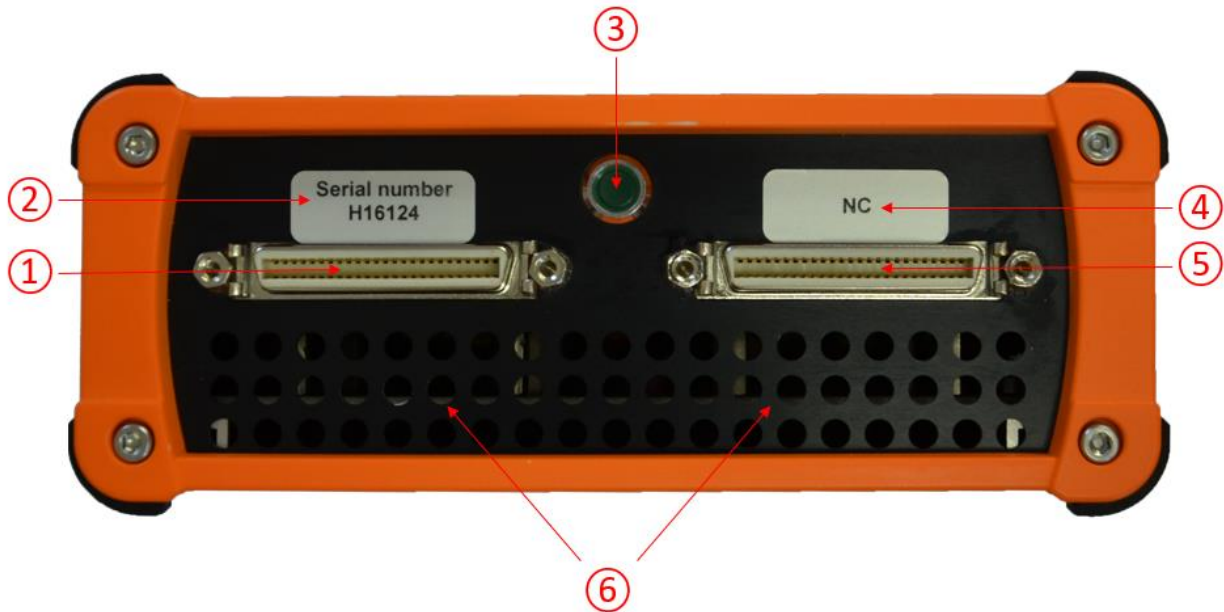
### C. PTKS Master connectivity

The rear and front panels of the PTKS Master are represented respectively in Figure 8 and Figure 9. The electrical characteristics of the external trigger and output trigger can be found in V.B.



Number on Figure 8	Designation
①	Type B USB connector for PC connection.
②	PTKS Head 1 <b>external trigger</b>
③	PTKS Head 1 <b>output trigger</b>
④	PTKS Head 2 <b>external trigger</b>
⑤	PTKS Head 2 <b>output trigger</b>
⑥	General ON/OFF power switch
⑦	Power cord plug coming from the AC-DC convertor.
⑧	Enabling security key
⑨	Grid of the fan extracting heat from the PTKS Master's interior.
⑩	PTKS Master <b>interlock connector</b>

**Figure 8 - Rear view of the PTKS Master.**



Number on Figure 9	Designation
①	Channel 2 3M Master to Head connector to PTKS Head 2
②	Channel 2 HHL serial number to identify the head to connect
③	Power LED indicating if the PTKS Master is power supplied
④	Channel 1 HHL serial number to identify the head to connect
⑤	Channel 1 3M Master to Head connector to PTKS Head 1
⑥	Air flow ventilation holes

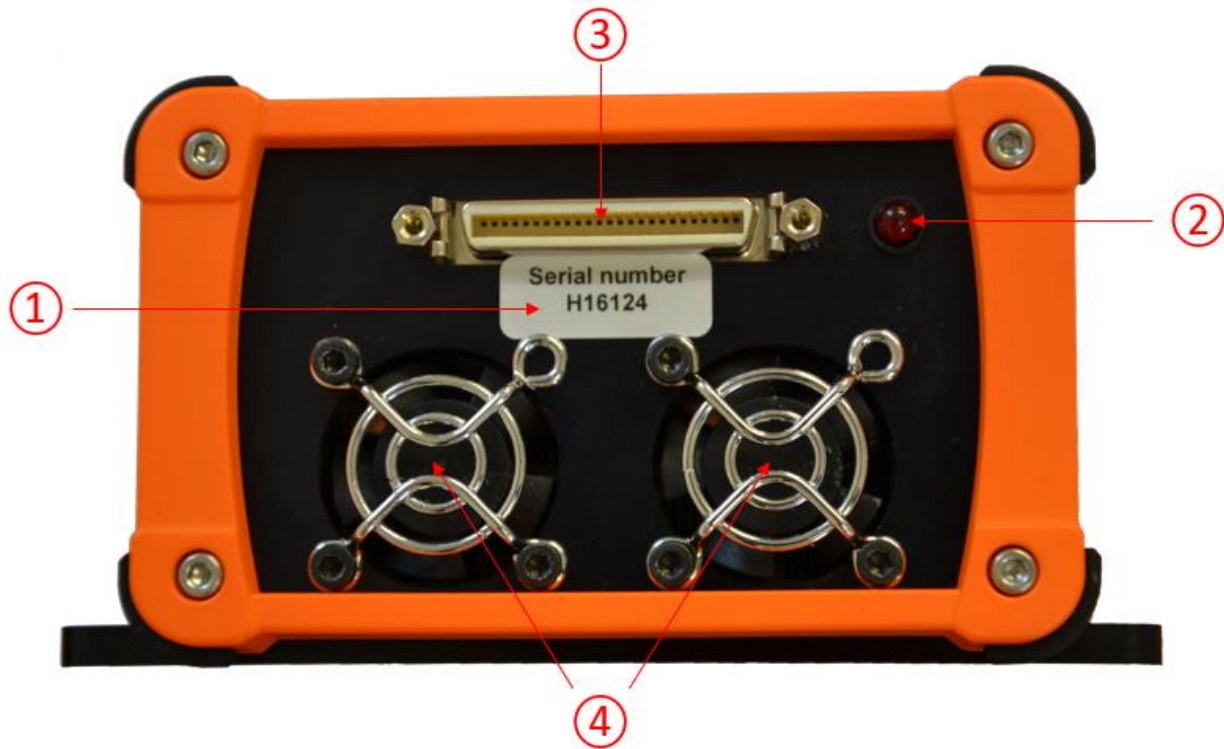
**Figure 9 - Front view of the PTKS Master.**

When the marking “NC” is present instead of the HHL serial number to identify a channel, this means that the channel is not available.

#### D. Air Cooled PTKS Head connectivity

The rear and front panels of the Air Cooled PTKS Head are represented respectively in Figure 10 and Figure 11.

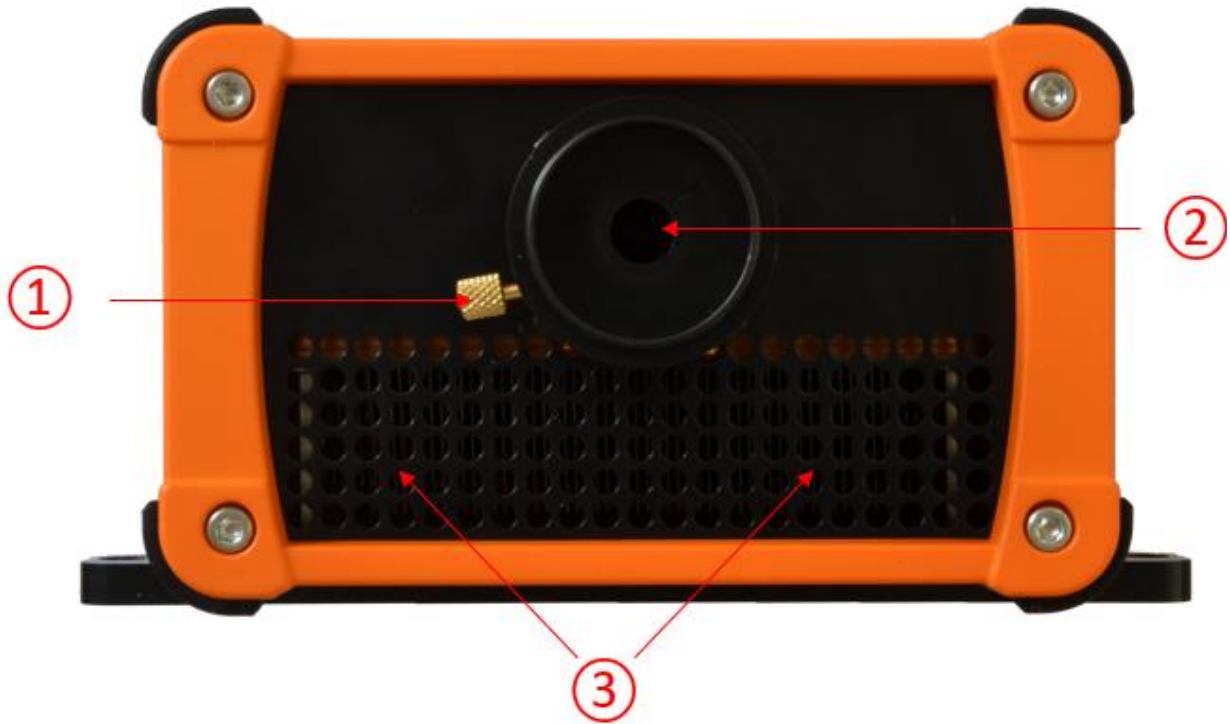




Number on Figure 8	Designation
①	HHL serial number to identify the master port to connect
②	LED indicating if the laser is powered
③	3M Master to Head connector for input signals
④	Grid of the fan extracting heat from the PTKS Head's interior

**Figure 10 - Rear view of the Air Cooled PTKS Head.**





Number on Figure 8	Designation
①	Switch to control the aperture.
②	Shutter aperture, output for both the QCL and the red alignment laser lights.
③	Air flow ventilation holes

**Figure 11 - Front view of the Air Cooled PTKS Head.**

## IX. Software

The **PTKS Software User Guide** details how to use the graphical user interface (GUI) user interface to control the PTKS.

## X. Operation

### A. Precautions

Be careful of the following when you operate the PTKS.

- The ambient temperature is within the specifications (see section V.C).
- the PTKS Head serial number matches the channel labels on the PTKS Master.

### B. Startup procedure

Use the following procedure when starting to operate the PTKS.

- (1) Connect the equipment as explained in section VII.
- (2) Make sure that the manual shutter is correctly set and opened.
- (3) Enable the security key and turn on the PTKS Master using the “ON/OFF” button at the rear of the PTKS Master. Fans of both inside the PTKS Master and the PTKS Head(s) should turn ON, as well as the LED power indicator on the front panel of the PTKS Master.
- (4) Launch the GUI software and follow the software startup procedure. The LED indicator on the laser heads should emit a red light when the laser is powered. Remember that the laser can be powered without emitting any light, for example when the external modulation is used and that the instruction voltage is below threshold.

### C. Internal modulation

It is possible to generate user defined modulation waveforms to be applied to the laser output.

The output trigger SMA connector is depicted in Figure 8, and is used to visualize the internal modulation pattern period start. This connector outputs a TTL signal, whose electrical characteristics are given in section V.B.

Please refer to the **PTKS Software User Guide** and to the **PowerMir Application Note** for more information and examples on how to use the internal modulation patterns.

### D. External modulation

External triggering of the laser involves imposing a TTL signal on the external trigger SMA connector as depicted in Figure 8. Make sure to respect the voltage limits and characteristics given in section V.B.

The laser output will be enabled when this imposed voltage is in high state, and disabled if the imposed voltage is in low state.

It is important to note that the external trigger is applied on the laser on top of the internal modulation. If you don't want this superposition, make sure that no internal modulation

is active if you do not want this superposition. Please refer to the **PowerMir Application Note** for more information and examples on the external modulation.

## XI. APPENDIX A – LIMITED WARRANTY

*MirSense SA warrants its Products to be free from defects in material and workmanship and to perform in the manner and under the conditions specified in the Product specifications for twelve (12) months from shipment.*

This warranty is the only warranty made by MirSense with respect to its Products and no person is authorized to bind MirSense for any obligations or liabilities beyond this warranty in connection with its Products. This warranty is made to the original Purchaser only, is nontransferable and may only be modified or amended by a written instrument signed by a duly authorized officer of MirSense. Sub-systems manufactured by other firms, but integrated into MirSense Products, are covered by the original manufacturer's warranty and MirSense makes no warranty, express or implied, regarding such sub-systems. Products or parts thereof which are replaced or repaired under this warranty are warranted only for the remaining, un-expired portion of the original warranty period applicable to the specific Product replaced or repaired.

### **NOTE: DISCLAIMER**

**THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES WHETHER WRITTEN, ORAL OR IMPLIED, AND SHALL BE THE PURCHASER'S SOLE REMEDY AND MIRSENSE'S SOLE LIABILITY IN CONTRACT OR OTHERWISE FOR THE PRODUCT. MIRSENSE EXPRESSLY DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

The Purchaser's exclusive remedy with respect to any defective Product shall be to have MirSense repair or replace such defective Product or credit the Purchaser's account, whichever MirSense may elect in its sole discretion. If it is found that any Product has been returned which is not defective, the Purchaser will be notified and such Product returned at the Purchaser's expense. In addition, a charge for testing and examination may, at MirSense's sole discretion, be made on any Product so returned.

These remedies are available only if: i) MirSense is notified in writing by the Purchaser promptly upon discovery of a Product defect, and in any event within the warranty period; ii) MirSense's examination of such Product discloses to MirSense's satisfaction that such defects actually exist and the Product has not been repaired, worked on, altered by persons not authorized by MirSense, subject to misuse, negligence or accident, or connected, installed, used or adjusted otherwise than in accordance with the instructions furnished by MirSense.

The following warranty conditions shall apply to all MirSense, Inc. products unless amended by a written instrument signed by a duly authorized officer of MirSense:

**ADJUSTMENT** – No electrical, mechanical or optical adjustments to the product(s) are permitted.

**PARTS AND LABOR** - New or factory-built replacements for defective parts will be supplied for twelve (12) months from date of shipment of the product. Replacement parts are warranted for the remaining portion of the original warranty period. There will be no

charge for repair of products under warranty where the repair work is done by MirSense, Inc.

**CLEANING** - Damp cloth on outer cover only.

**NOT COVERED BY THE WARRANTY** – Damage to any optical surface from improper handling or cleaning procedures. This applies specifically to those items subjected to excess laser radiation, contaminated environments, extreme temperature or abrasive cleaning. Damage due to ESD, abuse, misuse, improper installation or application, alteration, accident, negligence in use, improper storage, transportation or handling.

No warranty shall apply where the original equipment identifications have been removed, defaced, altered or where there is any evidence of alterations, adjustments, removal of protective outer enclosure, any attempt to repair the product by unauthorized personnel or with parts other

than those provided by MirSense, Inc.

**DAMAGE IN SHIPMENT** - Your PTKS should be inspected and tested as soon as it is received. The product is packaged for safe delivery. If the product is damaged in any way, you should immediately file a claim with the carrier or, if insured separately, with the insurance company. MirSense,

Inc. will not be responsible for damage sustained in shipment. All MirSense products are F.O.B. origin, shipped from the MirSense factory or MirSense distributor. The price of all Products, unless otherwise specifically stated, is Ex- Works, Palaiseau, France, as defined by Incoterms, 2001. The cost of normal packaging for shipment is included in the invoiced price. Where Buyer specifies special packaging, a charge will be made to cover any extra expense.

**CLAIMS ASSISTANCE** - Call MirSense, Inc. Customer Service or your local distributor for assistance. Give our representative the full details of the problem. Helpful information or shipping instructions will be provided. If requested, estimates of the charges for non-warranty or other service work will be supplied before work begins.