

MAN01-06 – CRYO LINEAR DRIVE (CLD) USER MANUAL

## CRYO & NANO PRODUCTS

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### RELEVANT DOCUMENTATION

Ref	Title, Author
[1]	CNP_MAN00_Rxx_Getting-Started.pdf (JPE)
[2]	CNP_MAN02_Rxx_Software-User-Manual.pdf (JPE)
[3]	CNP_APNo1_Rxx_Connection_Overview.pdf (JPE)
[4]	CLD_Interface-drawings.pdf (JPE)
[5]	CLD_Brochure.pdf (JPE)
[6]	COE_Brochure.pdf (JPE)

### DOCUMENT HISTORY

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JPE	2021-02-01	R02. Update.
JPE	2021-08-09	R03. Update.

### DEFINITIONS



### ABBREVIATIONS

## 1. INTRODUCTION

Thank you for using JPE's Cryo & Nano Products!

This *User Manual* describes the handling and use of Cryo Linear Drive (CLD), from here on described as *positioner*).



*Please read this document carefully prior to installation and (initial) operation of the controller, (stand-alone) positioners, actuators and stages. Failure to observe the safety regulations results in a risk of electric shock and/or damage to the controller(s), positioner(s), actuator(s) and/or stage(s)!*

*JPE shall not be liable for damage or injury resulting from misuse of the controller(s), positioner(s), actuator(s) and/or stage(s) or unauthorized alterations to either of those.*

**All products mentioned in this manual are intended for use in a laboratory and/or scientific research environment only** and may only be installed, maintained and used by higher educated, technical skilled personnel (from here on described as *operators*).

Please note that all content in this document is superseded by any new versions of this document. Visit the JPE website ([www.jpe-innovations.com](http://www.jpe-innovations.com)) to obtain the most recent version. All images in this document are for illustrative purposes only.

### 1.1 Prerequisites

*Before continuing with this user manual, please make sure to read and understand the contents of the (latest version of the) Cryo & Nano Positioning Products Getting Started Guide (MAN00).*

## 2. INSIDE THE BOX

### 2.1 Positioners with or without -RLS or without -COE sensor

Positioners will be delivered in a white-colored (membrane) polypropylene box. The inner part of the polypropylene box can be taken out and bend in such way that the positioner(s) can be easily unpacked.

Positioner(s) will be fixed onto the inner part of the polypropylene box using fasteners instead of being locked underneath the membrane plastic. However, in case of the Resistive Linear Sensor (product type option -RLS) the attached Kapton FPC (flexible PCB) will be tucked underneath the membrane (see figure below).

*Do not cut the membrane plastic. Keep the box in case products need to be returned.*



Figure 1: Example packaging with 2x CLD1-RLS

### 2.2 Positioners with -COE

Positioners equipped with a Cryo Optical Encoder (product type option –COE) are mounted in a dedicated *Transport Tool PCB* to guard the encoder grid and optical fiber. The Transport Tool PCB (TTPCB) will be fixed onto the inner part of the polypropylene box using fasteners instead of being locked underneath the membrane plastic.

*Unpacking these positioners require a bit more attention as it is easy to damage the optical fiber and/or encoder grid.*

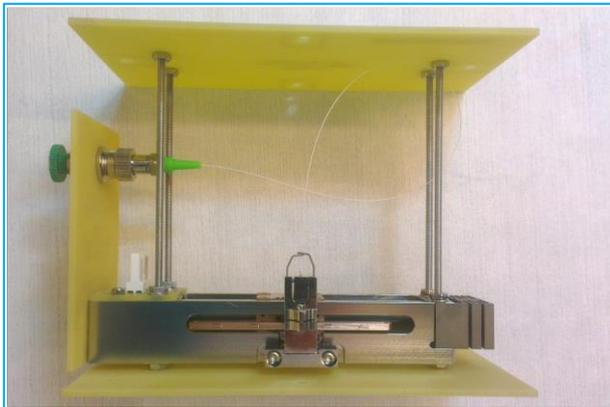
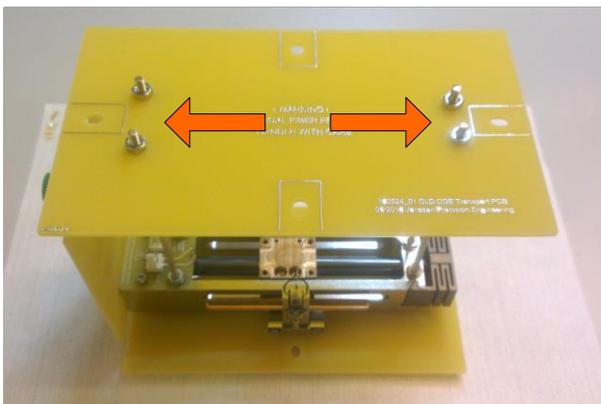
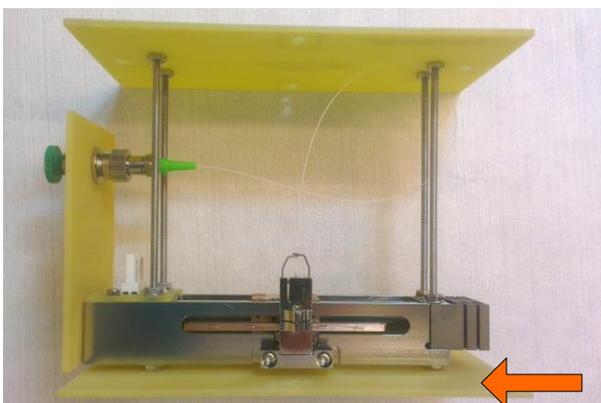


Figure 2: Transport Tool PCB for CLD1-COE

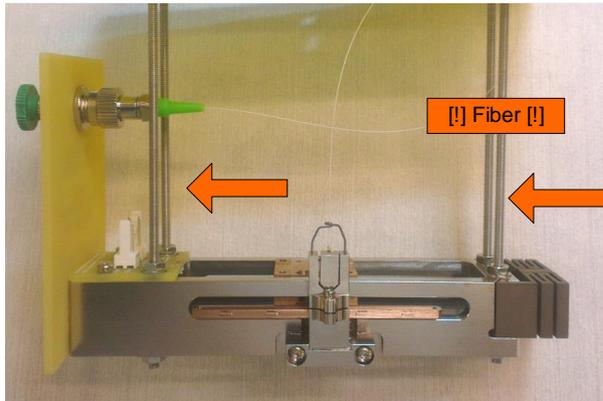
- 1 Open the box and take out the TTPCB **with CLD1-COE** and place the tool upright.
- 2 Remove the **top** Transport PCB by unscrewing the nuts on top. Notice the fiber underneath this PCB! Lift the PCB carefully.



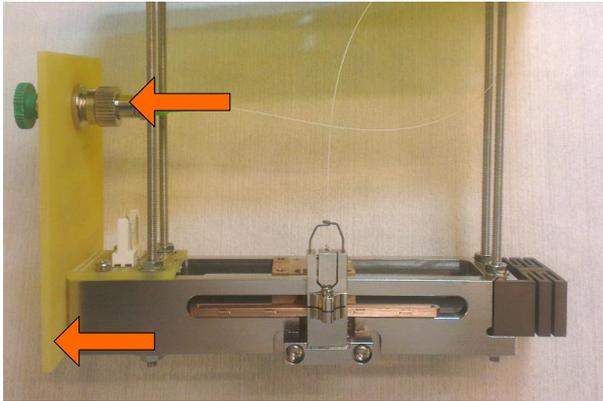
- 3 Remove the **bottom** Transport PCB and place the CLD on a flat surface.



- 4 Remove the **4 threaded bars**. Again, take care not to damage the fiber while using handtools to remove the bars.



- 5 (When installing system in customer setup) Unscrew the **optical fiber connector** from the **feedthrough** that is mounted in the **feedthrough PCB**. Remove the feedthrough PBC from the CLD.



- 6 Always put (metal) caps to cover fiber outputs and feedthroughs when not in use. Keep the TTPCB for positioner storage.

### 3. MOUNTING INSTRUCTIONS

*Consult the Interface Drawing for detailed dimensions and mounting interfaces.*

Make sure the wiring to the Connector Interface PCB and/or Resistive Linear Sensor (product type option -RLS) does not get damaged or stuck in the setup when mounting the positioner in the customer setup. All connectors must be mounted properly prior to connecting the positioner to the electronics!

If the positioner is equipped with a Cryo Optical Encoder (product type option -COE) make sure that the optical fiber does not get damaged or stuck in the setup when mounting the positioner.

## 4. CONNECTING TO THE CONTROLLER

*Consult the Connection Overview application note for a simple and clear overview on how to connect positioners to the controller.*

### 4.1 Drive signal

The positioner is assembled with a Connector Interface PCB with a 2-pin 2.54mm pitch header (*Molex KK 22-27-2021*) mounted onto the device.

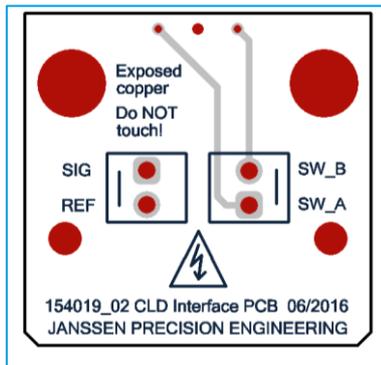


Figure 3: CLD Interface PCB

Pin configuration	
Pin	Name
SIG	(Piezo) Signal (SIG)
REF	(Piezo) Reference (REF)
SW_A	Reserved for future functionality.
SW_B	Reserved for future functionality.

The Ambient Cable (ACL) or Cryostat Cable (CCL) can be connected directly to the Connector Interface PCB. If any custom cabling is required, please consult the Getting Started Guide (MAN00).

*Please note that (Piezo) REF is NOT the same as (system) GND or PE, so do not connect these to each other and do not use standard oscilloscope probes!*

*Because of design constraints, open voltage contacts are present!*

### 4.2 Position sensor signal

#### 4.2.1 Resistive Linear Sensor (RLS)

If the positioner is equipped with a Resistive Linear Sensor (product type option –RLS), the positioner will be assembled with an additional ~150[mm] Kapton FPC (flexible PCB) that can connect directly to the Cryostat Cable for RLS (CCR) or Ambient Connector Kit for RSM (I1-RSM).

If any custom cabling is required, please consult the Getting Started Guide (MAN00) or the Connection Overview application note (APN01).

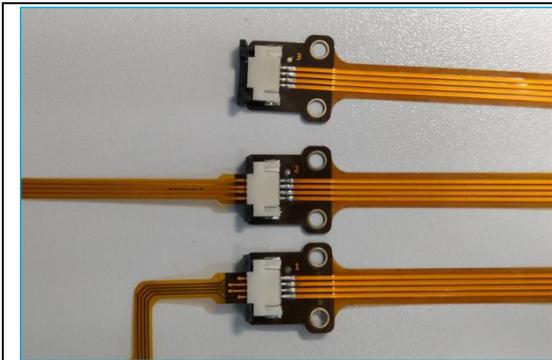


Figure 4: FPC (left) connected to ZIF connectors on the CCR



Figure 5: CLD<sub>1</sub>-RLS FPC can be seen at the back

Pin configuration		
Pin	Name	RLS PCB Reference
1	Wiper Negative	A
2	Excitation Positive	B
3	Wiper Positive	C
4	Excitation Negative	D

*Make sure that there is no force applied to the FPC connected to the sensor! The FPC is designed for easy connection at (re-)installation; however, it's recommended to disconnect or reconnect only when required.*

#### 4.2.2 Cryo Optical Encoder (COE)

If the positioner is equipped with a Cryo Optical Encoder (product type option –COE) an optical fiber with a length of ~200[mm] is fixed to the encoder bracket. On the end of the fiber is an *FC/APC narrow key (male)* connector.

*The fiber cable and COE are delicate components that need to be handled very carefully. Take great care not to damage the encoder grid. Make sure that no force is applied to the fiber and fixate the FC/APC connector. Please read the Unpacking Instructions manual (see above) as a guide / reference*

The Ambient Fiber (AF<sub>5</sub>) cable can be connected to the FC/APC narrow key (male) connector only by using the supplied *FC/APC female/female adapter (Molex 106152-3000)*. If not in use, always keep the (metal) screw-on cap on connector and/or adapter.

If any custom cabling is required, please consult the Getting Started Guide (MAN00).



Figure 6: FC/APC female/female adapter

### 4.3 Connecting to Controller

Controller with Plug-in Modules <sup>1</sup>		
	Module	Slot #
CLDx(-RLS or -COE)	CADM2 Output	1
CLDx-RLS	RSM Input A	2 <sup>2</sup>
CLDx-COE	OEM2 Input A	

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<sup>1</sup> For available Modules see CNP-Products MAN01-09 (CPSC).

<sup>2</sup> Typically either CLDx-RLS or CLDx-COE will be ordered, so the controller will either have a RSM or OEM2 installed.

## 5. SENSOR CALIBRATION

### 5.1 Resistive Linear Sensor (RLS)

If the positioner is equipped with a Resistive Linear Sensor (product type option –RLS), the device will be delivered pre-calibrated. This calibration is done to determine the (maximum) stroke the sensor can measure as well as the center (nominal) position.

*Calibration is done in cooperation with the Resistive Sensor Module (RSM). This means that the calibration settings for a specific RLS will be stored for a specific input channel of the RSM.*

For that reason, or for a re-calibration, it is also possible to do a (manual) calibration. This involves moving the positioner through its range (free movement required) and storing measurement calibration values. This can all be done with the user software, please read the Software User Manual (MAN02) on how to do this.

### 5.2 Cryo Optical Encoder (COE)

If the positioner is equipped with a Cryo Optical Encoder (product type option –COE), the device will be delivered pre-calibrated. This calibration is done to determine the correct optical signal levels for the encoder.

*Calibration is done in cooperation with the Optical Encoder Module (OEM2). This means that the calibration settings for a specific COE will be stored for a specific input channel of the OEM2.*

For that reason, or for a re-calibration, it is also possible to do a (manual) calibration. For this the positioner must be able to move freely. Re-calibration can be done with the user software, please read the Software User Manual (MAN02) on how to do this.

## 6. DECLARATION OF CONFORMITY CLD

Manufacturer : JPE B.V.  
Address : Aziëlaan 12  
6199 AG Maastricht-Airport  
The Netherlands

The manufacturer hereby declares that the product:

Product Name : **Cryo Linear Drive (CLD)**  
Product Description : **Long stroke linear stage for cryogenic applications.**  
Product Number : **C181054**

Complies with the following European directives:

**2014/35/EU Low Voltage Directive**  
**2014/30/EU EMC Directive**  
**2011/65/EU RoHS**

A copy of the Technical file for this equipment is available at JPE.

Maastricht-Airport, 29 June 2018



Ir. H. Janssen  
Founder & CEO  
JPE B.V.  
The Netherlands

## 7. DECLARATION OF CONFORMITY COE

Manufacturer : JPE B.V.  
Address : Aziëlaan 12  
6199 AG Maastricht-Airport  
The Netherlands

The manufacturer hereby declares that the product:

Product Name : **Cryo Optical Encoder (COE)**  
Product Description : **Cryogenic Optical Encoder for the CLA.**  
Product Number : **C181045**

Complies with the following European directives:

**2006/25/EC Artificial Optical Radiation**  
**2011/65/EU RoHS**

A copy of the Technical file for this equipment is available at JPE.

Maastricht-Airport, 29 June 2018



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