TELEMARK

MODEL 397
ELECTRON BEAM SOURCE
LINEAR CRUCIBLE INDEXER

INSTRUCTION MANUAL

Software version 3.10.18030

February 2018

telemark.com

Current version of this manual can be found at

https://telemark.com/electron-beam-sources/e-beam-accessories-and-upgrades/indexers/

WARRANTY

The 397 Electron Beam Source Crucible Indexer is guaranteed against faulty materials, function and workmanship for a period of 12 months after delivery from Telemark. Components which are purchased by Telemark from other manufacturers will be guaranteed for any lesser time that such manufacturer warrants its products to Telemark. This warranty is valid only for normal use where regular maintenance is performed as instructed. This warranty shall not apply if repair has been performed or an alteration made by anyone other than an authorized Telemark representative or if a malfunction occurs through abuse, misuse, negligence or accident. No charge will be made for repairs made under warranty at Telemark's facilities. Freight costs both ways will be at customer's expense. Telemark reserves the right for final warranty adjustment.

USER RESPONSIBILITY

The user is responsible for proper operation and ordinary maintenance of the equipment, following procedures described in this manual, including reference documents. Proper operation includes timely replacement of parts that are missing, broken or plainly worn. If the user has a reasonable doubt about understanding the use or installation of a component, Telemark Technical Service should be called.

It is vitally important that the user properly install the equipment as described in Chapter 3 (Installation) of this manual. The warranty will be void if the equipment is improperly installed.

Alteration of the design or any function of the equipment voids the warranty and is entirely the responsibility of the user.

SAFETY WARNING

General Precautions: Human contact with the voltages present within the power supply and vacuum system can be fatal. Make sure that the input power is turned off before opening the doors or removing panels. Short all HV feedthroughs connections with a grounding hook before accessing the indexer main body.

CHANGE LOG

3.10.18030

Changed

Improved signal processing.

3.0.17280

Changed

- Motor is now permanently braked when stopped.
- Motor speed minimum is 5.

1.19.16319

Added

- Added one second debounce on remote pocket selection.

TABLE OF CONTENTS

1

UNPACKING

Your Model 397 electron beam source crucible indexer is packed into a specially designed double strength box surrounded with rigid foam padding.

Since packaging the indexer for safe shipment is otherwise difficult, please save the box in the event that the indexer may ever need to be returned for servicing.

We cannot be held liable and may not be able to fix without charge indexers which are damaged in transit as a result of improper packaging.

Contents of shipping box:

- Indexer mechanism
- Controller
- Power cord
- Indexer motor cable
- Indexer control cable

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DESCRIPTION

The indexer positions the crucibles of a Telemark linear type source (models 568, 575 and 578). It also has a position-indicating function. The indexer features a high torque motor.

The electron beam source crucible indexer's most notable features are the following:

- Color LCD touch screen for graphical and numerical display, providing an intuitive and user-friendly operator interface
- Material names can be displayed on the screen
- It can index up to 9 pockets
- No clutch needed for pocket jams due to automatic motor current sensing
- Remote pocket selected by optically isolated inputs, up to 6 direct and up to 9 binary (software selectable active or passive)
- Relay isolated outputs In-position up to 6 pockets directly and up to 9 pockets using binary, Mode signal and General In position signal

Specifications

Number of pockets: 2 to 9

Controller dimensions: 19-inch rack 2U, 3 1/2" high x 9 3/8" deep

Motor Assembly Dimensions: 5.83" (148mm) x 4.60" (117mm) x 2.50" (64mm)

Inputs: 8 optically isolated, active (4 to 24V DC or AC), or passive (contact closure)

Outputs: 8 relay contacts NO/NC @ max 1A, 24 DC or AC

Power Input: 90-260VAC, 50-60 Hz

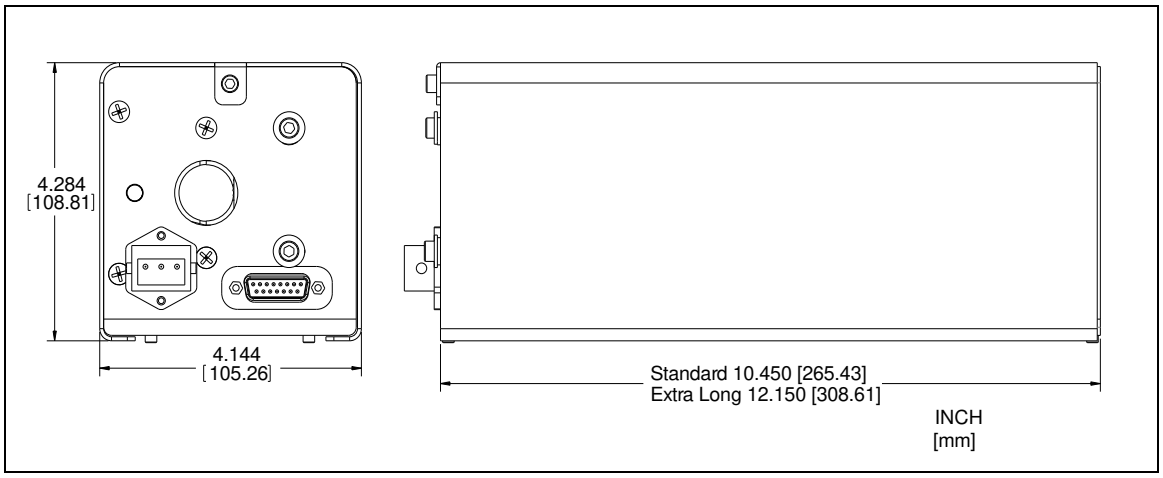

Figure 2-A Motor Assembly Reference Dimensions

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INSTALLATION

Required components

The following is the minimum list of components required for setting up the indexer for safe operation.

- Electron beam source. Source rotation must be in working order.
- Vacuum system with adequate external room for indexer mounting.
- 19-inch rack with 115/230VAC, 50/60 Hz power to house the controller.
- Cable from ground on chamber to ground stud indexer controller.

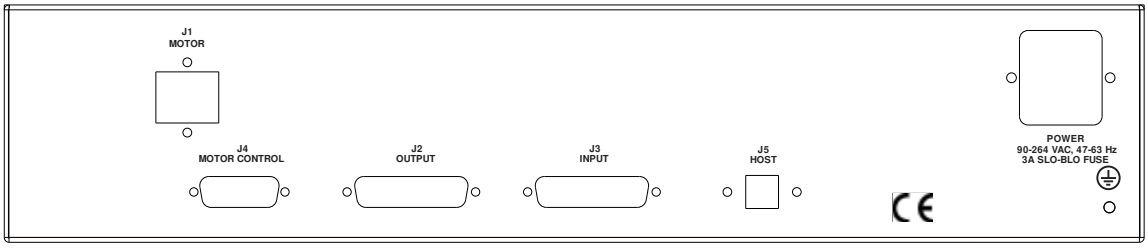

Figure 3-A Rear Chassis

Motor Cables

J1 (Motor) on the chassis goes to J1 on the Motor Assembly.

J4 (Motor Control) on the chassis goes to J2 on the Motor Assembly.

Inputs - J3

Inputs are software selectable to be active or passive from the configuration screen.

Passive TTL level inputs activated by a short across input pins.

Active inputs activated by 12 to 24 volts DC across the input pins.

The optically isolated input 25 pin female connector on the back of 397 indexer controls the remote pocket selection, up to 6 pockets directly and up to 9 pockets using binary code.

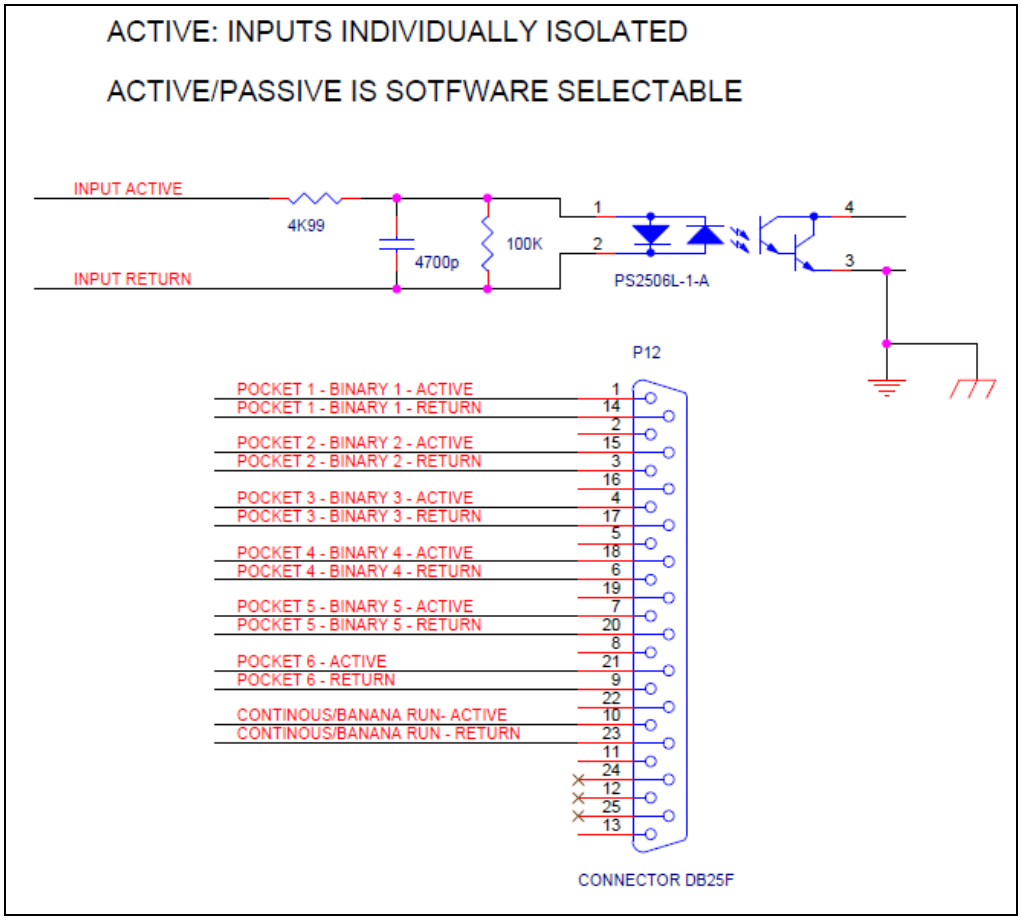

Figure 3-B Active Input Connections

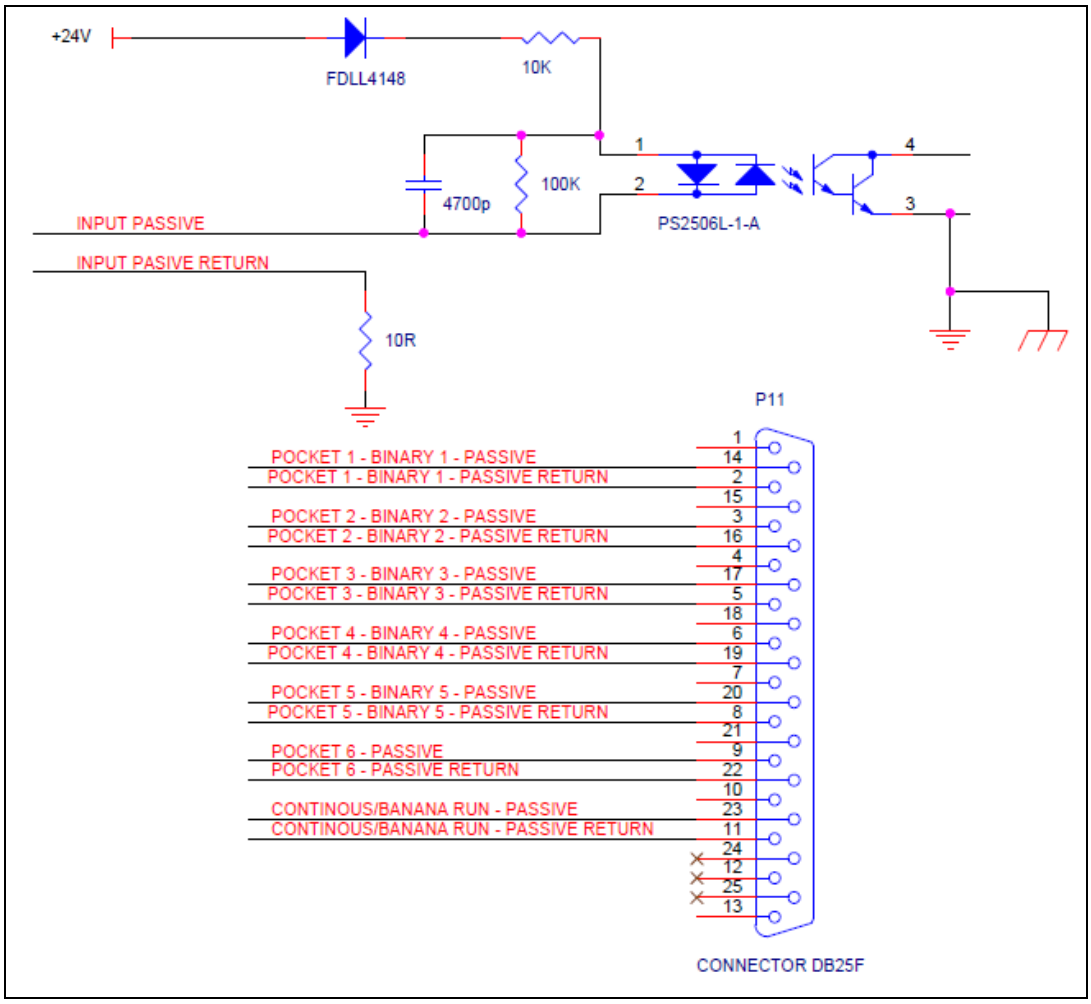

Figure 3-C Passive Input Connections

Outputs – J2

The outputs are on a 25-pin male connector on the back of 397, isolated SPST relays, 50VDC max, 2A max.

Outputs are:

1. **Pocket signal,** up to 6 pockets directly and up to 9 pockets using binary. These signals can be used in conjunction with XY sweeper to select a sweep pattern.
2. **Remote Mode signal**, signal when the indexer is in remote mode.
3. **In position signal**, when the motor has stopped when the pocket is in position.
4. **Error signal,** when there is an error such as a motor jam.

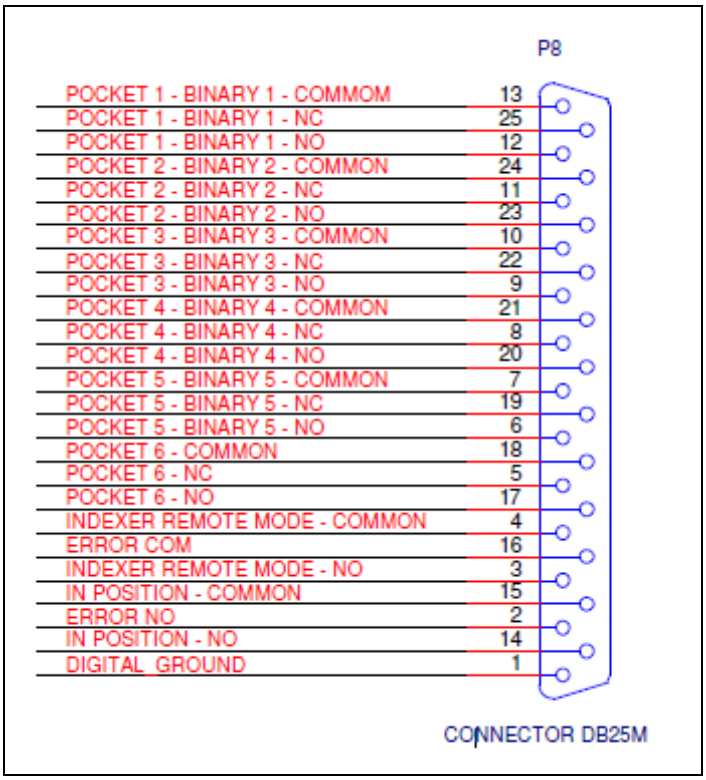

Figure 3-D Output Connections

Host - J5

The host port is for upgrading the indexer software.

Motor Assembly

Connectors J1 and J2 connect to the chassis with the supplied cables.

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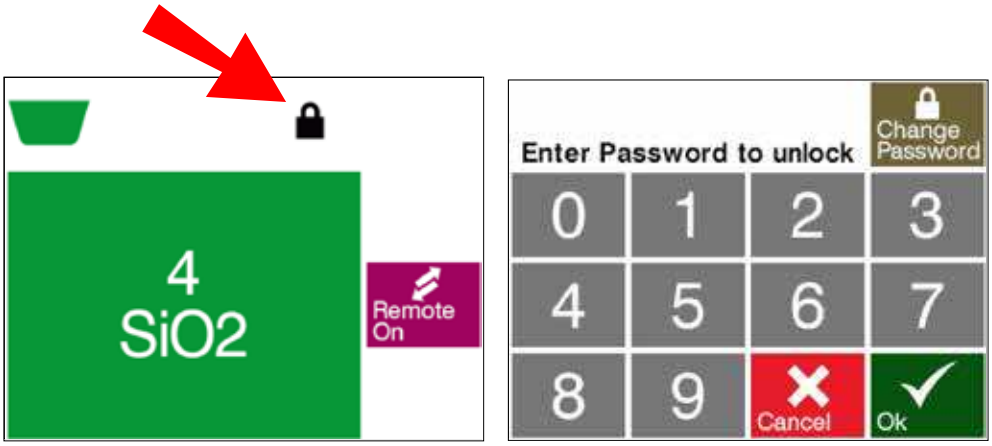
CONFIGURATION

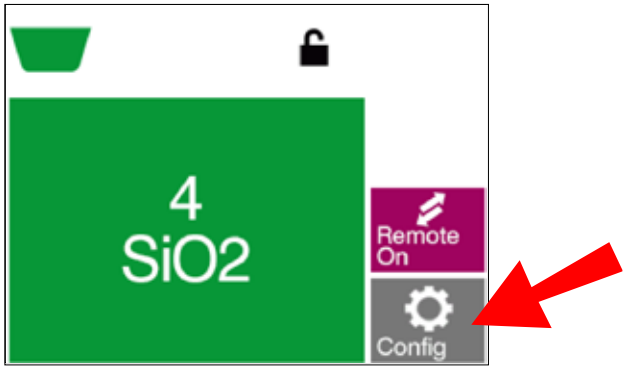
Unlocking



To configure the indexer first it must be unlocked. Press the lock to unlock the sweep and enter the password.

The default password is “1234”. The password can be changed at this time by pressing the **Change Password** button. Once the sweep is unlocked it will stay unlocked until it is locked by pressing the **lock** or by turning the power off.

Configuration



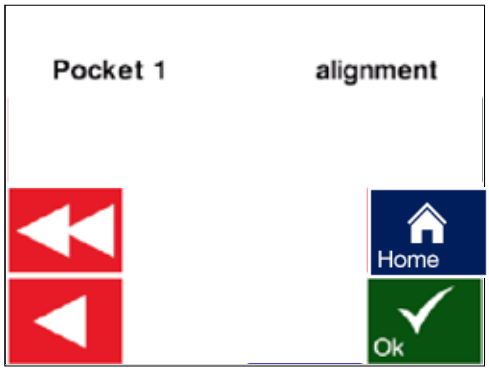
Once the indexer is unlocked then the **Config** (Configure) button can be pressed.

Alignment

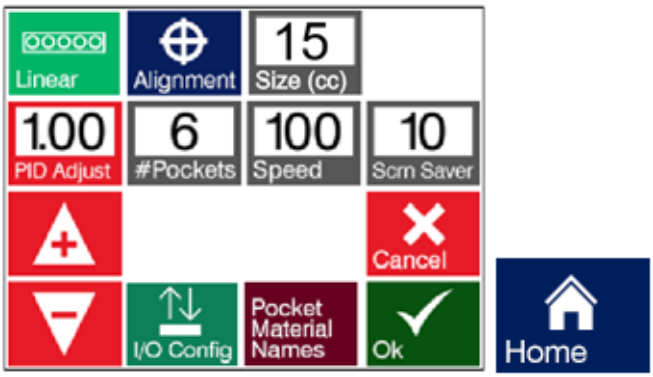
Alignment sets pocket one center. Alignment needs to be set so that any gear backlash in the gear train is accounted for. Press the buttons to move the crucible till it is aligned. It must be moved a minimum amount till the “TOO CLOSE TO HOME SWITCH” message disappears.

There are two speed buttons, **Slow** and **Fast**. They are used so that pocket one is approached with the gear train tight. Use the **Fast** speed till pocket one is almost in position, and then use **Slow** speed to finish the alignment. If you over shot it press **Home** to try again.

After you press the **Ok** button the indexer will move full travel, then return to pocket one.



Config



First press the setting to adjust, it will turn red, then press the “+” and “-“ to adjust the numeric value.

Size – First adjust the pocket size.

PID Adjust – Adjustment for motor, default 1.00 (0.01-2.00)

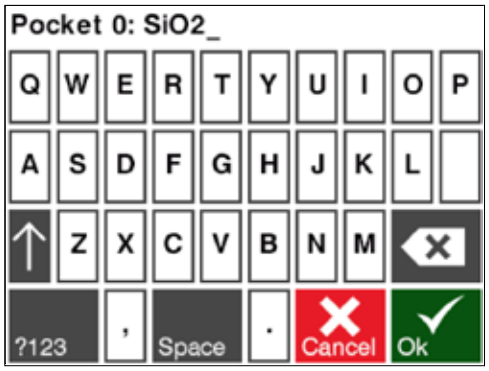
#Pockets – Total number of pockets in crucible (2-9, the number depends on crucible size selected.)

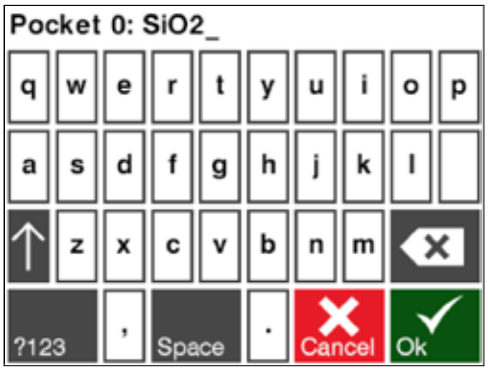
Speed – Maximum rotational speed (0-100%)

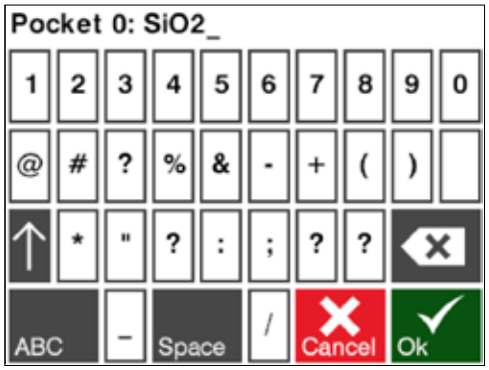
Scrn Saver (Screen Saver) - Time till indexer goes into screen saver mode and blanks the screen (0-300). Touch the screen to wake screen up. The indexer is always operational if the power is on.

I/O Config – goes to the I/O configuration sub menu.

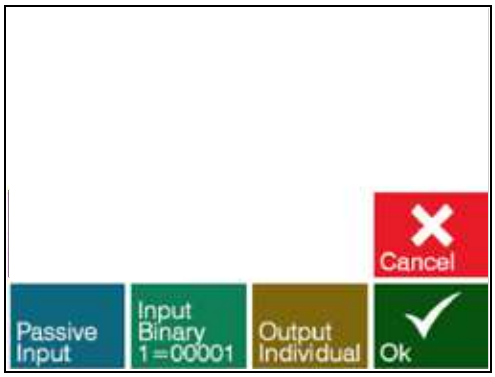
Pocket Material Names – Material names can be added for each pocket. If no name is entered then “Pocket” will be displayed.







I/O Config



Passive/Active Input – Input can be configured two ways

1. **Passive** TTL level inputs are activated by a short across the input pins. All passive inputs use earth as a common and there for are not isolated. For full isolation drive inputs with relays.
2. **Active** inputs activated by 12 to 24 volts DC across the input pins. (Optically Isolated)

Input Binary 1=00000/1=00001/ Individual – Input to select a pocket from a PLC or other device can be selected by optically isolated inputs, up to 6 direct or up to 9 pockets using binary (see table below).

Output Binary 1=00000/1=00001/ Individual - Relay isolated outputs up to 6 pockets directly and up to 9 pockets using binary, these signals can be used to connect to a XY sweep to select a sweep pattern.

"Binary 1=00000" **Pocket Number**	"Binary 1=00001" **Pocket Number**	**Binary Bit 3**	**Binary Bit 2**	**Binary Bit 1**	**Binary Bit 0**
1	1*	0	0	0	0
2	1*	0	0	0	1
3	2	0	0	1	0
4	3	0	0	1	1
5	4	0	1	0	0
6	5	0	1	0	1
7	6	0	1	1	0
8	7	0	1	1	1
9	8	1	0	0	0
Not used	9	1	0	0	1

* Note 00001 and 00000 both equal one.

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OPERATION

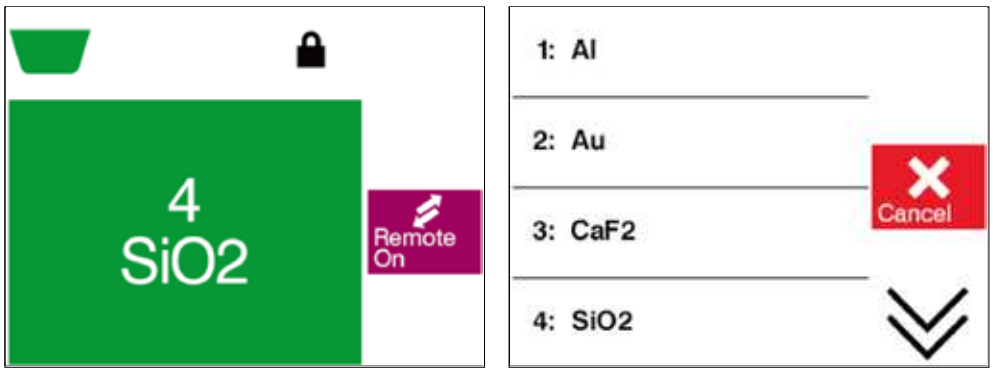
Power Up

Once alignment has be performed as described in the Configuration chapter 4, the indexer will remember where the pockets are even after power has been turned off and on. On power up first there is a splash screen with the software revision number. Then the screen asks the user to confirm the current pocket. If the crucible has not been moved then press Ok. If the crucible has been moved due to an operation such as cleaning then press Find Pocket and the indexer will check its internal reference point and then return to the indicated pocket.

If the EB source, indexer motor or any of the drive linkage has been disconnected or for some reason the pocket does not line up then press Ok and then repeat the Alignment procedure in chapter 4.

Operation

Crucible pockets are selected by pressing the large green button. A list of pockets will display. Press the desired pocket. The up or down arrow will bring up the rest of the list of pockets.

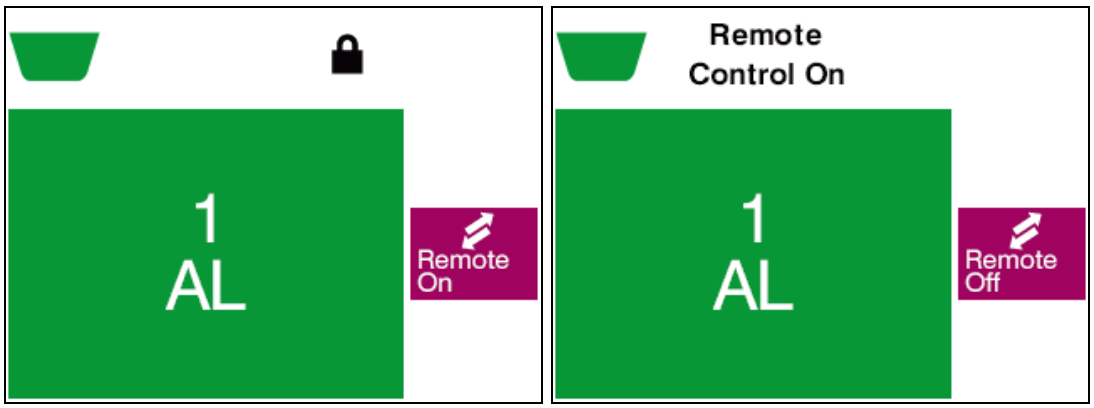


When the crucible is moving the graphic will spin.

When the crucible is in position the green pocket will be displayed.

Remote Operation

All types of crucibles can be operated remotely. Press the **Remote On** button to activate remote operation. “Remote Control On” will be displayed when in remote mode.



Error Codes

These are HARD alarms that force a stop condition and require hardware fix and controller reboot to clear.

** HOME SWITCH NOT FOUND **

EEPROM failure - no acknowledge

EEPROM failure - write verify

HOME switch EndStop encountered

Indexer model unknown

MICRO switch EndStop encountered

Motor assembly cable disconnected

Motor not connected

Motor polarity swapped

Motor stall timeout

OUT OF POSITION

PWM shutdown - motor shorted

The following alarms are not considered HARD but they do force the entering of a valid value of the variable in question. Use unlock to access the CONFIG screen.

Invalid backlash degrees

Invalid banana end pocket

Invalid banana speed

Invalid CCW home offset

Invalid CW home offset

Invalid crucible Type

Invalid current pocket

Invalid find pocket type

Invalid input coding type

Invalid input select type

Invalid linear model index

Invalid linear size index

Invalid mode

Invalid motor direction

Invalid number of pockets

Invalid output coding type

Invalid PID factor

Invalid position switch count

Invalid rotary model index

Invalid rotation type

Invalid screen saver minutes

Invalid speed

Invalid system parameters CRC

TELEMARK EU Declaration of Conformity

No 01/CE/15

Battle Ground, 18-11-2015

Telemark

1801 SE Commerce Ave

Battle Ground, WA 98604 USA

/manufacturer/

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Commercial name: POCKET INDEXER CONTROLLER

Generic denomination/function: The Models 396 and 398 indexers provide either manual or PLC selection of 4 to 30 pockets, and continuous or retrograde (banana pocket) operation with speed control. The Model 397 offers 2 to 9 pocket selection for linear sources.

Models: 396, 397, 398

The object of the declaration described above is in conformity with relevant Union harmonisation legislation:

EMC DIRECTIVE 2014/30/UE	*DIRECTIVE 2014/30/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 2004/108/WE*
STANDARD EN 61326-1:2013	*Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements.*
LVD DIRECTIVE 2014/35/EU	*DIRECTIVE 2014/35/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits and repealing Directive 2006/95/WE*
STANDARD EN 61010-1:2010	*Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements*

This declaration is the basis for affixing the CE conformity marking.

This declaration relates exclusively to the machinery in the state in which it was placed on the market, and excludes components which are added and/or operations carried out subsequently by the final user.

Battle Ground, 18-11-2016
(place and date of the declaration)

Gerald G. Henderson
President

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