PE95 / T95 System Controller Manual

1.0.0

USER GUIDE

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Introduction

Thank you for purchasing your Linkam equipment, please take a moment to read this manual before setting up the equipment.
Please register your products by going to www.linkam.co.uk and click on the product/software registration button.

You will need to register your equipment with us to:

- Activate your warranty and technical support
- Access the online setup videos
- Permanently unlock the Temperature control software (if purchased)

If you have purchased control software, please install the software first. This process will guide you through the registration of all your Linkam products.

See your software manual for further installation instructions.

Important Notices

Please check that your Linkam equipment has not been damaged during transit. If there is any evidence of external damage DO NOT SWITCH ON ANY ELECTRICAL ITEMS.
Contact LINKAM or their appointed distributor immediately. Your warranty may be impaired if Linkam is not informed of any transport damage within 7 working days of delivery.
NO attempt should be made to repair or modify the equipment in any way, as there are no user replaceable parts.
No attempt should be made to open the case except by qualified personnel as hazardous voltages are present.
In order to use this equipment successfully, please take time to read this manual all the way through before using it.

Warranty

This equipment has a warranty against defects in material and workmanship for a period of 12 months. Linkam will either repair or replace products that prove to be defective. For warranty service or repair, this product must be returned to Linkam or a designated service facility.
The warranty shall not apply to defects resulting from interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.

Technical Support

Any technical questions or queries should be addressed to the Technical Support Department at the address shown below and on the back of this manual.

Tel: +44(0)1737 363 476
Email: support@linkam.co.uk

Equipment Maintenance

To clean the outside surfaces of the temperature control stages, use a small quantity of isopropyl alcohol with a soft cloth and gently wipe the surface. To clean the sample chamber, use isopropyl alcohol (IPA) and cotton swabs. Take great care not to touch the temperature sensor protruding from the side of the heating element. The sensor is very fragile.

Handling Liquid Nitrogen

To cool samples below room temperature a LNP95 liquid nitrogen pump is required. Please refer to your health and safety manual for instructions on how to handle liquid nitrogen safely. Always use in a well ventilated room.

Feedback

Your feedback will be greatly appreciated, please email us directly info@linkam.co.uk

Safety Information

Important Notice

Please check that your Linkam equipment has not been damaged during transport.
If there is any evidence of external damage to any of the electrical items:-

do not connect the power to the the unit.

Contact Linkam Scientific Instruments Ltd or their appointed distributor immediately. Your warranty may be impaired if Linkam is not informed of any transport damage within 7 working days of delivery.

Requirements for Safe Use

1. Read all of this guide before using the equipment. Save these instructions for later use.
2. Follow all warnings and instructions marked on any of your Linkam equipment, or contained within the manuals.
3. To prevent electric shock, do not remove the cover of the equipment.
4. Never use the equipment if any of the cables, including the power cord, have been damaged. Do not allow any heavy objects to rest on the power cord. Never lay the power cord on the floor.
5. Do not obstruct any ventilation holes. Do not attempt to insert anything into these openings. Provide adequate ventilation of at least 75mm all around the equipment.
6. The mains cord set is the overall disconnect and must remain accessible.
7. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
8. Do not expose the equipment to water. If for any reason it gets wet, then remove the power cord from the power supply and contact Linkam Scientific Technical Support.
9. The equipment is not intended to be used outdoors.
10. Each product is equipped with a 3-wire grounded (earth) power plug. The plug only fits into a grounded-type outlet. Do not defeat the purpose of the grounded type plug.
11. The power cord must be an appropriately rated and approved cord-set for the country it is being used in.
12. Only use an appropriately rated power supply, that is approved for the country it is being used in.
13. If any problems occur then remove the power cord from the power supply and contact Linkam Scientific Technical Support.
14. NO attempt should be made to repair or modify the equipment in any way, as there are no user replaceable parts. Any servicing should be carried out by qualified service personnel. Do not remove the cover from the equipment unless the power cord has been removed from the mains outlet.
15. After servicing the safe state of the equipment must be checked.

Symbol Reference

This safety symbol on the back panel warns the user :

Do not make or remove any connections while the unit is powered on.
Do not remove the cover.
Servicing should only be done by qualified service personnel.

This safety symbol is seen on the back panel of the equipment and warns the user:

To avoid electric shock the power cord protective grounding conductor must be connected to earth or ground.

Informations de sécurité

Note importante
Veuillez vérifier que votre appareil Linkam n'a pas été endommagé pendant le transport.
S'il présente une trace quelconque d'endommagement aux éléments électriques:

ne raccordez pas le cordon d'alimentation et n'allumez pas l'appareil.

Contactez Linkam Scientific Instruments Ltd ou son distributeur désigné immédiatement. Votre garantie pourrait être réduite si Linkam n'est pas informée de tout dommage causé par le transport dans les 7ouvrables suivant la livraison.

Exigences en matière de sécurité d'utilisation

1. Lisez ce guide intégralement avant d'utiliser l'appareil. Conservez ces instructions pour un usage ultérieur.
2. Suivez toutes les mises en garde et instructions marquées sur toute pièce de votre appareil, ou figurant dans les manuels.
3. Si pour une quelconque raison le fusible secteur doit être remplacé, il faut le remplacer par un fusible du même type et avec les mêmes caractéristiques nominales que celles indiquées dans les caractéristiques nominales de l'appareil.
4. Pour prévenir l'électrocution, n'enlevez pas le couvercle de l'appareil.
5. N'utilisez jamais l'appareil si le cordon d'alimentation a été endommagé. Ne laissez pas d'objets lourds appuyés sur le cordon d'alimentation. Ne posez jamais le cordon d'alimentation sur le sol.
6. Le secteur cordon est la déconnexion globale et doit rester accessible.
7. Si l'équipement est utilisé d'une manière non spécifiée par le fabricant, la protection fournie par l'équipement peut être altérée.
8. N'obstruez aucun des orifices de ventilation. N'essayez pas d'insérer quoi que ce soit dans ces ouvertures. Prévoyez un espace de ventilation adéquat d'au moins autour de l'appareil.
9. N'exposez pas l'appareil à l'eau. Si pour une quelconque raison l'appareil est mouillé, retirez le cordon d'alimentation de la prise de courant et contactez le support technique de Linkam.
10. L'appareil n'est pas destiné à un usage à l'extérieur.
11. Chaque produit est équipé d'une fiche d'alimentation mise à la terre ou d'un cordon d'alimentation avec 3 fils à extrémité libre. La fiche ne s'insère que dans une prise de courant mise à la terre. Le cordon d'alimentation à extrémités libres doit être raccordé à une prise de courant à 3 fils correctement mise à la terre. N'empêchez pas le fonctionnement de la fiche mise à la terre.
    Les cordons d'alimentation à extrémité libre suivent les codes couleur suivants:

Couleur	**Fonction**
Marron	conducteur de phase
Bleu	conducteur neutre
Vert/jaune	mise à la terre

12. Le cordon d'alimentation doit être constitué d'un ensemble de câbles répondant aux caractéristiques nominales et approuvé dans le pays d'utilisation.
13. Si un problème survient, débranchez le cordon d'alimentation de la prise de courant et contactez le support technique de Linkam.
14. Il convient de NE PAS tenter quoi que ce soit pour réparer ou modifier l'appareil en aucune façon, dans la mesure où il n'y a aucune pièce remplaçable par l'utilisateur. Tout entretien doit être effectué par du personnel qualifié. N'enlevez le couvercle de l'appareil que si le cordon d'alimentation a été débranché de la prise de courant.
15. Après l'entretien de l'état de sécurité de l'équipement doit être vérifiée.

Étiquettes d'avertissement et indicateurs

Ce symbole de sécurité sur le panneau arrière avertit l'utilisateur:

N'effectuez ou n'enlevez aucun raccordement quand l'appareil est sous tension.
N'enlevez pas le couvercle.
L'entretien doit être effectué exclusivement par du personnel qualifié.

Ce symbole de sécurité est visible sur le panneau arrière de l'appareil et avertit l'utilisateur:

Pour éviter l'électrocution, le conducteur de protection du cordon d'alimentation doit être raccordé à la terre.

System Overview

The T95 System Controller is supplied with or without a LinkPad.

1: T95-LinkPad: a stand alone system which uses a touch screen colour display to input data to control the stage but can also be used with the optional LINK software. Note: when connected to the PC the LinkPad cannot be used to enter ramp parameters but continues to display all the attached sensor values.
2: T95-LINK: a PC interface which requires LINK software to input data to control the stage.

Please check you have received the following items:-

1: T95 System Controller

2: Power cord

3: RS232 cable for PC connection

4: USB Type A to B cable for PC control (Using the optional LINK software) and firmware upgrades

5: Manual

If you have purchased the LinkPad then please also check the following:-

6: LinkPad

7: Stylus

There are three types of system controller which are specific to a range of Linkam stages as some use a thermocouple sensor compared to a platinum resistor or require higher current or different voltage power supplies. The specific type can be seen on the rear panel label under the Model heading and are T95-PE, T95-HS and T95-HT.

T95-PE
Supplied with a 15V 8A power supply and is used for all Peltier stages and small area silver block stages.
Some of these include:-

Peltier		Small Area Silver block Stages	
LTS 120	*LTSE 120*	*THMS 600*	*THMSE 600*
LTSE 120 LC	*LTS 120-Inverted*	*THMSG 600*	*THMS 600PS*
PE 120	*PE 120-XY*	*THMS 350V*	*BCS 196*
PE 120-LI	*PE 100-LI3*	*FDCS 196*	*FTIR 600*
PE 100-LIL	*PE 100-DMI*	*FTIR-600 Vertical*	*DSC 600*
PE-NK120	*PE100-NI*	*THMSEL Low T*	*THMSEL High T*
PE100NIF	*PE-BX120*	*TST 350*	*HFS 350V*
PE100-OI	*PE-ZE120*	*CAP 500*	*MDS 600*
PE100-ZI/200	*PE100-ZI/100*	*HFSX 350*	*HFS 600*
PE100-ZI/25	*PE100-ZAL*		

T95-HS
Supplied with a 24V 5.2A power supply and is used for all the large area stages. Some of these include:-

Large Area		Large Area	
LTS 420	*LTS 420E*	*LTS 420E*	*LTS 420E-Probe*
LTS 350 (discontinued)	*LTS 350E (discontinued)*		

T95-HT
Supplied with a 15V 13A power supply and is used for all high temperature stages which use a thermocouple sensor. None of these are supplied with a LNP 95 Liquid Nitrogen Pump. Some of these include:-

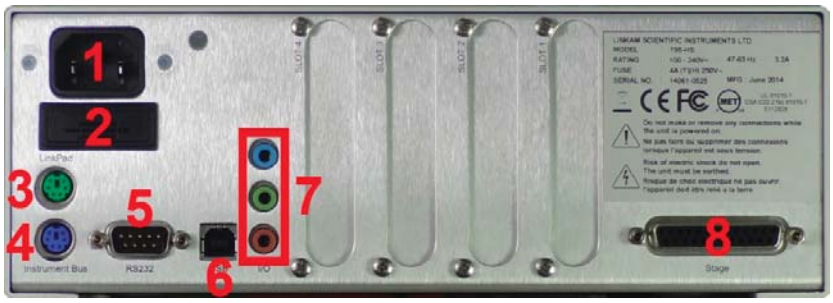
High Temperature		High Temperature	
TS 1500	*TS 1000*	*TS 1200*	*TS 1400-XY*
CCR 1000	*HS 1500*		

Connecting the T95 System Controller

Back Panel Cable Connections

Warning: To avoid any damage to your T95 it is essential that the unit is switched off before connecting or removing any connections.

1: Power socket
2: Fuse holder
3: LinkPad connector
4: Instrument Bus connector, for LNP95 Liquid Nitrogen pump System.
5: RS232 connector for PC Comm port connection.
6: USB connector (used for firmware upgrade only).
7: External input and output sockets.
8: Stage connector.



Refer to your stage manual for additional connection information.

Stage Connector

Most of the standard silver block, large area stages and the Peltier stages do not require any expansion boards and only the stage needs to be connected to the socket marked Stage (8). This supplies power to the stage and measures the temperature using a platinum resistor sensor.

Linkpad Connector

If you have purchased a LinkPad then plug it into the LinkPad connector (3). It may be necessary to pull back the sprung mounted green moulding towards the cable before inserting the connector.

Instrument Bus

This connection is used for the LNP95 Liquid Nitrogen Pump. If your stage has been supplied with an LNP95 then a cable will have been provided which is used to connect the T95 to the LNP95.
It may be necessary to pull back the sprung mounted violet moulding towards the cable before inserting the connector.

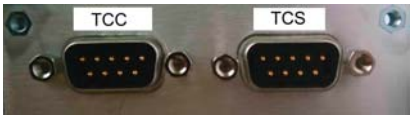
Expansion Boards

Most of the standard silver block, large area stages and the Peltier stages do not require any expansion boards and only the stage needs to be connected to the socket marked Stage (8). If you have purchased a LinkPad then plug it into the LinkPad connector (3).
For a PC connection use the supplied USB cable or RS232 **crossover** cable. NB The USB for control is only supported with the optional LINK software. It may be supported by other 3rd party applications. Please contact the supplier to check.

Any of the stages which use an expansion board will be marked with the same label as the T95 expansion board.
Warning: To avoid any damage to the T95, switch off before making any connections.

T95-HT

Slot 4 will be fitted with a thermocouple sensor board and has two connectors marked TCC and TCS. Connect the cable from the stage marked TCS to the connector marked TCS on the rear of the T95.
The stage lead marked T95 STAGE is connected to the T95 Stage connector (8).

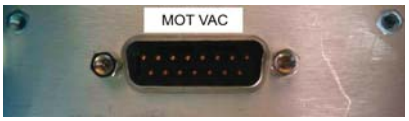


Stages with Vacuum Gauge_2

Connect the optional Pirani gauge to the connector marked VAC. If you have not purchased a Pirani guage with your vacuum system then connect the Vacuum Simulation Plug that is supplied with the system. This will ensure the system will work.

Stages with Motorised Vacuum Control (MV196)

The MV196 motorised valve connects to the MOT VAC connector usually in slot 1.



Stages with Motorised XY Movement (MDS600)

The motorised stages require two motor control boards, one for each axis and are connected to the MOTX and MOTY connectors which are usually in slots 1 and 2.

Tensile Stage

The tensile stage requires two boards, one for the distance and strain gauge connections, the other for the motor control. Connect the MOT TST and TST connectors to the boards as marked.

DSC600 Stage

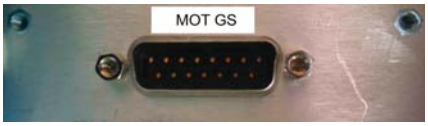
Connect the cable from the stage marked DSC to the connector marked DSC on the rear of the T95.

Stages with RH95

The RH95 Humidity Generator can be connected to the T95 controller so it can be controlled from the LinkPad or optional LINK software. Connect the optional RH95 to gauge to the connector marked RH95.
The RH95 unit can also be used stand alone using the built in touch screen display to set the parameters for the RH95.

Graded Stage

The graded stage needs one of the T95 controllers to have a motor control board.
Connect the cable from the stage marked MOT GS to the connector marked MOT GS on the rear of the T95.



External Input and Output Sockets

There are three 2.5mm jack sockets (7) on the rear of the T95 for synchronising or controlling external equipment, see the relevant section for the electrical specifications.
The LinkPad or optional LINK software can be used to program the outputs on a ramp by ramp basis.

USB Connector

The USB connector is used for control of the system when used with the optional LINK software.
The USB connector is also used for upgrading the firmware of the T95

LNP 95 Liquid Nitrogen Pump

You must read the following sections if the LNP95 Liquid Nitrogen Cooling Pump System is supplied with your system.
The LNP95 System uses liquid nitrogen to cool the stage from ambient to -196°C. The speed of the LNP95 is automatically controlled from 1 to 100 by the T95.

System overview

Please check that all of the following parts have been supplied with the LNP95 System.

1. LNP95 Liquid Nitrogen Pump
2. 2L Dewar (7L or 25L Dewars are available)
3. Power cord
4. Instrument Bus Cable for connection to the T95

Warning: Liquid Nitrogen can be dangerous. When using Liquid Nitrogen (LN) please ensure you follow the recommended handling and safety procedures. Please be additionally careful when using the equipment at low temperature. Sudden movements of the tubing or the siphon when it is at –196c can cause damage.

Handling Liquid Nitrogen

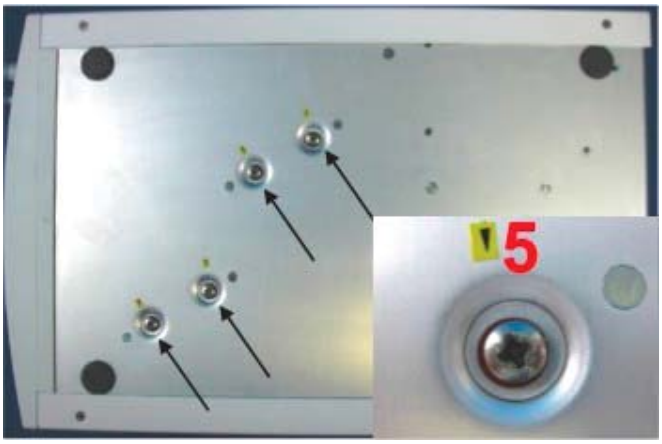
To cool samples below room temperature an LNP95 liquid nitrogen pump system is required. Always use liquid nitrogen in a well ventilated room as there is a danger of asphyxiation.
Refer to your health and safety officer regarding instructions on how to handle liquid nitrogen safely and ensure that you have the correct safety equipment including gloves and safety goggles.

Filling the Dewar

Fill the Dewar approximately 2/3 full and replace the lid with the siphon attached, but ***do not fasten the catches.***
Wait for the liquid nitrogen to stop bubbling before fastening.
When the lid is removed always ensure you place it with the black capillary tube pointing upwards. It is easily damaged or creased which will impair N2 flow and the performance of the system.

Remove Transit Screws

Before using the LNP95 Liquid Nitrogen Pump System, remove the 4 transit screws marked by small yellow labels (5), from the base of the LNP95. These screws hold the pumps in place to avoid any damage in transit.



Keep the screws safe by storing them in the holes (6) on the back panel as shown by the arrows.
Should the LNP 95 be returned for service or repair, the screws **must** be removed from the storage holes and used to secure the pumps for transit (5).

Back Panel Cable Connection

Connect the Instrument Bus cable between the T95 Instrument bus socket (1) and the LNP95 instrument bus socket (2)

Note: either of the purple coloured Instrument Bus sockets on the LNP95 can be used for this purpose

THE LNP95 MUST BE SWITCHED ON BEFORE THE T95.

This enables the T95 System Controller to recognise the LNP95.

Declaration of Conformity

Manufacturers Name: Linkam Scientific Instruments Ltd

Manufacturers Address:

8 Epsom Downs Metro Centre
Waterfield
Tadworth
Surrey
KT20 5LR
UK

Declares that the products as originally delivered:

Product Name: Temperature Programmer,Liquid Nitrogen Cooling System
Product Numbers: T95-HS, T95-PE, T95-HT, LNP 95

have been found to comply with the following applicable European Directives, and carries the CE marking accordingly:

EMC Directive 2014/30/EU using product standard EN 61326-1:2013
Low Voltage Directive 2014/35/EU using product standard EN 61010-1:2010
RoHS 2 Directive 2011/65/EU

and also carries the additional certification:

EMC: FCC CFR47 Part 15

Safety: CB IEC 61010-1/ EN 61010-1
MET UL 61010-1/ CSA C22.2 No.61010-1 under listing E112928

Date: 15th April 2016

R&D Manager: Peter Grocutt

Technical Specifications

T95 System Controller

Dimensions:	376L x 243W x 87H (mm)
Weight:	2.6Kg (excluding cables)
Operating Environment:	5~40°C, 80% relative humidity at 31°C decreasing linearly to 50% at 40°C (without condensation)
Temperature Sensor:	Supplied with platinum resistor input as standard
Temperature Range:	-196°C to 750°C (dependent on Stage)
Temperature Resolution:	0.01°C resolution (dependent on Stage)
Temperature Accuracy:	0.05°C
Temperature Stability:	0.05°C
Set Point Resolution:	0.1°C

RS232 Computer Interface

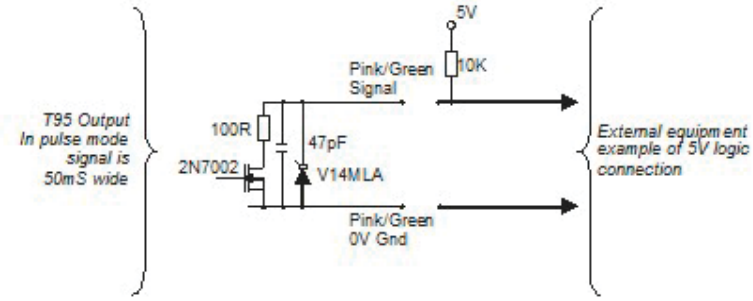
Standard RS232 levels supplied with a cross over RS232 cable.
Set to 19200 baud with 1 stop and no parity.

USB Interface

USB Type B connector:	Used for control using the optional LINK software application and for firmware upgrades

External input and output sockets

Green 2.5mm stereo jack socket: Open drain output. Will sink up to 50mA at 12V.
Pink 2.5mm stereo jack socket: Open drain output. Will sink up to 50mA at 12V.
Blue 2.5mm stereo jack socket: Logic level input from 3.3V to 5V.



Optional LinkPad

Dimensions:	125L x 172W x 80H (mm)
Weight:	0.75Kg (excluding cables)
Operating environment:	5~40°C, 80% relative humidity at 31°C decreasing linearly to 50% at 40°C (without condensation)
Display Resolution:	320 X 240 pixels
Display Size:	5.7 inch
User Interface:	Touch screen

Optional T95 Dual Thermocouple board

Thermocouple:	Type S
Temperature Range:	0°C to 1750°C
Temperature Resolution:	1°C resolution (dependent on Stage)
Temperature Accuracy:	1°C
Temperature Stability:	1°C
Set Point Resolution:	1°C

Optional T95 Tensile board

20N Beam	Resolution: 0.001N
200N Beam	Resolution: 0.01N

Optional T95 Vacuum board

Gauge:	Pirani gauge
Vacuum Range:	$1x10^{-3}$mB to 1268mB

Configured for pressure sensor

Sensor:	PX309 Omega
Output:	0 to 5V dc
Pressure Ranges:	0-20 bar
	0-200 bar

	Other ranges may be possible
Accuracy:	Combined linearity, hysteresis and repeatability +/-0.25% BSL

Optional T95 DSC board

Counts:	+/- 32767
Noise:	+/- 3 counts

Optional T95 Stepper Motor board

Motor Type:	Bipolar Stepper Motor
Motor Current:	Programmable up to 1.2A
Motor Resolution:	64 uSteps
Digital Encoder:	24 bit
End Stops:	2

Optional T95 RS232 Extension board

Baud Rate:	115.2 KBaud
Interface:	8 bit, 1 stop, no parity
Useage:	Interfaces to the Linkam humidity controller

LNP95 Liquid Nitrogen Pump

Dimensions:	376L x 243W x 87H (mm)
Weight:	3.6Kg (excluding cables)
Operating Environment:	5~40°C, 80% relative humidity at 31°C decreasing linearly to 50% at 40°C (without condensation)
Tubing	Silicon Rubber

Equipment Ratings

T95-HS

A.C. Mains Supply:	100-240V at 47-63Hz	
Max current:	3.2A	
Fuse:	Current rating	4A
	Characteristic	T
	Voltage rating	250V~
	Breaking capacity	H

T95-PE

A.C. Mains Supply:	100-240V at 47-63Hz	
Max current:	3.2A	
Fuse:	Current rating	4A
	Characteristic	T
	Voltage rating	250V~
	Breaking capacity	H

T95-HT

A.C. Mains Supply:	100-240V at 47-63Hz	
Max current:	3.7A	
Fuse:	Current rating	4A
	Characteristic	T
	Voltage rating	250V~
	Breaking capacity	H

LinkPad

D.C Voltage:	12V
Max Current:	550mA

Lnp 95

A.C. Mains Supply:	100-240V at 47-63Hz	
Max current:	1.7A	
Fuse:	Current rating	2A
	Characteristic	T
	Voltage rating	250V~
	Breaking capacity	H

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