

HEIDENHAIN





Scanning Unit Exchange LC 1x3 LC 4x3 LC 1x5 LC 4x5

ATS Software ID 539862-xx Software Version 3.0.xx

Product key option 21, ID 1080333-xx required

1 General	5
1.1 How to use these instructions	5
1.2 Safety precautions	6
2 Exchanging LC scanning units	9
2.1 General information	
2.2 Absolute linear encoders that are supported	10
3 Information on cleaning encoders	13
3.1 General information	13
4 Service traversing device	15
4.1 General information	15
5 Exchanging scanning units of LC 1x3 and LC 4x3	17
5.1 General Information	17
5.2 Procedure for LC xx3 / LC xx9 service programming	
6 Exchanging scanning units of LC 1x5 and LC 4x5	29
6.1 General information	29
6.2 Procedure for LC xx5 service programming	30
7 Functional check	41
7.1 General information	41
8 Contact	43
8 Your HEIDENHAIN helpline	43
8 HEIDENHAIN technical helpline	43
8 HEIDENHAIN Helpline for	
repairs, spare parts, exchange units, complaints and service contracts	43
8 Technical training	43

1 General

1.1 How to use these instructions

About these instructions	These operating instructions are valid for the ATS A djusting and T esting S oftware Version 3.0.xx ID 539862-xx with active product key Option 21, ID 1080333-xx.
	The ATS software is executable on the following hardware:
	 PWM 20 ID 731626-01 and PC expansion board IK 215 ID 386249-xx
Explanation of the symbols	Symbols represent the type of information.
	Note
	E.g., reference to more detailed information in another chapter
шĻ	Attention
	E.g., indication of error messages that may be displayed or repetition of program steps
	DANGER
	E.g., information that incorrect operation may cause the danger of electrical shock or lead to the destruction of components
Other	For more information please refer to the following documentation:
documentation	LC Replacing Instructions AE LC 1x3_1x5 ID 1098560-90 AE LC 4x3_4x5 ID 1096193-90
	User's Manual ATS Software ID 543734-xx
	HEIDENHAIN User's Manual Cable and Connection Technology ID 1117945-xx
	PWM 20 Operating Instructions ID 1125089-xx
	■ IK 215 Operating Instructions ID 549369-xx
	Documentation of the machine tool builder
	Interfaces of HEIDENHAIN Encoders ID 10/8628-xx
	 Mounting instructions of the encoders Encoder brochures (www.heidenhain.de)
Target group	The activities described in this manual may only be performed by specialists for service, maintenance and commissioning who have profound knowledge of electronics, electrical engineering and NC machine-tool technology.
<u>F</u>	Note
	Keep these instructions for later reference!
Screen displays	
	Note
	The screenshots and displays in these instructions depend on the encoder type connected and on the product key. Thus, they may differ from your testing situation. The images only serve as examples!

1.2 Safety precautions

(jan)

Note

Observe the safety precautions below to avoid injury or damage to persons or products.

To avert potential dangers, only use the product in the manner described! A service exchange scanning unit in factory default condition does not work with an NC control before it is programmed.

When connecting encoders to the test unit, please note the following:

- 1. Switch off the encoder power supply ("Disconnect encoder").
- Then connect or disconnect the plugs. Observe the ESD precautions! Make sure that the connector contacts are clean!





Note

To avoid contact problems, always tighten the coupling ring when you connect the adapter cable!

Only switch on the power of the scanning unit, while it is in the scale housing!





DANGER

Do not operate defective units!

When the programming of the scanning head is completed, the encoder memory is reset to its factory default setting.

The ATS software offers the possibility of storing and editing machine-specific or equipment-specific information in the customer's memory area. The data may comprise safety-relevant information.

When servicing, please take care to adapt this memory area. Noncompliance with this warning could result in damage to the machine or in personal injury.

When troubleshooting always contact the machine tool builder for information (e.g. meaning of the data in the OEM memory).



Note

Support is provided by HEIDENHAIN Traunreut or by the HEIDENHAIN agencies (see "Contact" at the end of this manual).

2 Exchanging LC scanning units

2.1 General information

This software function serves to exchange defective scanning units of LC 1x3*, 1x5, 4x3 and 4x5.

* The placeholder x stands for the interface, e.g. LC 115 or LC 185 means HEIDENHAIN **EnDat**; **Fanuc, Mitsubishi** and **SIEMENS** are represented by 9. The interface type is specified through the first letter of the company name, e.g. LC 495 **S** for SIEMENS, etc.

With this software, you can associate new service scanning units with the scale unit by means of data transfer and run a functional test.

The required data is read out from the original scanning unit and transferred to the new one. The interface of the scanning unit must work for this purpose. If the data cannot be read out, the LC needs to be replaced.

The function "LC service programming OEM customers" must be enabled through the productkey option 21 in the ATS software; also see chapter "Manage product keys" in the User's Manual for the ATS software.

In the ATS, you can look up under "Manage product keys / Currently available options" whether a product key is active.

	g and Testing Software
File Help	
Connect encoder	
Configuration	
Configure hardware	
20 Language selection	1
Manage product ke	ys 📐



Ê.

Note

For general information on installing and operating a PWM 20, please refer to the User's Manual of the ATS Software (ID 543734-xx) and the PWM 20 Operating Instructions (ID 729905-xx).

2.2 Absolute linear encoders that are supported

The exchange of scanning units of the following linear encoders is supported: LC 183, LC 193F, LC 193M LC 189*, LC 199F, LC 199M LC 483, LC 493F, LC 493M LC 489*, LC 499F, LC 499M LC 115, LC 185, LC 195F, LC 195M, LC 195S LC 415, LC 485, LC 495F, LC 495M, LC 495S

* LC x89 (EnDat) are only supported as of software 3.0.06



Note

Encoders with "Functional Safety" and older LC 1x2 and LC 4x1 are not supported!

The following service function can be executed:

LC xx3/LC xx9 service programming



LC xx5 service programming

C Service
LCxx5 service programming

The service function the ATS uses to program the scanning unit depends on the connected LC (dynamic selection of function).

When you select the function, a wizard starts that will guide you through the programming steps.

Note

Read the messages and follow the course of the program!

Consult HIF (Hesis Including Filebase) to find out whether the service scanning unit is compatible.

HIF is available to registered users at https://portal.heidenhain.de.

The Encoders Service helpline also provides information.



Attention

Do not power the scanning unit (AE) outside the scale unit! Illumination control may overdrive and damage the infrared LED.



3 Information on cleaning encoders

3.1 General information

Before you replace a scanning unit, check the scale unit and the glass scale for contamination and clean them, if required. A contaminated scale may cause malfunctions or failure of the new exchange scanning unit.

Every service scanning unit (exchange scanning unit) is delivered with replacing instructions.

Please observe the prescribed procedure:

- Opening the linear encoder
- Cleaning
- Exchanging the scanning unit
- Closing and sealing the linear encoder

Replacing instructions:

Device (scanning unit)	ID of replacing instructions
AE LC 1x3_1x5	1098560-90
AE LC 4x3_4x5	1096193-90

Note

The replacing instructions also contain ID numbers and names of consumable items (sealants, lubricants, shipping braces, etc.)

Use appropriate material for cleaning, such as soft, lint-free cloth and isopropyl alcohol or standard glass cleaner.

Do not scratch the inside of the scale.

Use the recommended sealants and lubricants.

Sealant: Paktan 6090 ID 200417-02 (to seal the end blocks of LC 4xx)

Sealant: Terostat-MS 930 ID 256535-01 (to seal the gap between sealing lip and LC 1xx end block)

Lubricant: Molykote 111 ID 202173-03 (to lubricate the closing edge of the sealing lips)

4 Service traversing device

4.1 General information

For inspection and programming, the scanning gap (air gap) between the scanning unit and the scale housing must be optimally adjusted.

To ensure this, there is the possibility of mounting the encoder via a mechanical traversing device (ID 371963-01). The encoder-specific mounting tolerances must be observed for this purpose.



Traversing device ID 371963-01

(jan)

Note

The scanning unit must not be moved in the scale housing without defined scanning gap!

If a slanted scanning unit is moved, it may grind against the inside of the scale housing; the resulting abrasion particles can cause malfunctions!

Alternatively, you can use the shipping braces.

5 Exchanging scanning units of LC 1x3 and LC 4x3

5.1 General Information

Example of an encoder designation:

Scale LC 183; original scanning unit AE LC 183; exchange scanning unit AE LC 1xx Service

Note

With the ATS product key option 21 only service scanning units can be programmed through data transfer (data are read out from the original AE and transferred to the Service AE). Backup the data of the linear encoder before you exchange the scanning unit!

Ensure that the service scanning unit is compatible!

For further information, refer to

- the online database HIF (HESIS Including Filebase) at
- https://portal.heidenhain.de (for registered users only!)
- the HEIDENHAIN helpline, phone no.: +49 (8669) 31-3104

5.2 Procedure for LC xx3 / LC xx9 service programming

Note

Start the ATS software and connect the original linear encoder to the test unit via an adapter cable.

The User's Manual Cable and Connection Technology PWM 20 Testing Package contains various adapter cables.

Use the transportation lock or the traversing device to stabilize the scanning unit and to avoid damage inside the scale unit.





- ▶ 1. Connect the defective LC 1x3, 1x9 or LC 4x3, 4x9 to the PWM 20.
- ▶ 2. Connect the encoder.

Note

It is important that you always connect/identify the defective LC first!



3. Enter the ID of the LC and press the "Connect" button to start. Alternatively, you can also connect manually (click <u>Manual settings</u>).

Note

Always use the ID on the ID label of the scale unit! Do not set the checkmark in the field "Use power supply from subsequent electronics"! This function is intended for the feed-through mode.

ing this dialog you can specify the	data required by the program for connecti	ing an encoder by entering the encoder	s ID-number.	
incoder data D-number	557650-06			
 Encoder designation: Encoder interface: Supply voltage [V]: 	LC 483 EnDat 5.00			
If the selected end safety, please obs	oder does not match the connected e arve the warnings and directions in th	ncoder, the encoder, interface card e Mounting Instructions.	or PC could be become damaged.	For your ow

▶ In the basic menu of the program for replacing scanning units, start the function "LC xx3 / LC xx9 service programming".

File Help	
R Disconnect encoder	<
D Basic functions	
_ [Position display	
Incremental signal display	
- 💦 Display encoder memory	
Comparison of encoder memory	
Voltage display	
Diagnostics	
Absolute/incremental deviation	
- 💱 Online diagnostics	
D Service	
LCxx3 / LCxx9 service programming	
Configuration	
Configure hardware	
- 🧟 Language selection	
Manage product keys	
V	

An overview of the next program steps appears.

▶ Press the "Next >" button to go to step 1: Read out defective scanning unit.

The defective LC the scanning unit of which is supposed to be exchanged, must already be connected!

Note

Once this function is active, the supply voltage for the LC is switched off. The switch is displayed in green **Control**. Only dis(connect) the encoder while the symbol is green!

The state state	
The encoder-	g box to reprogram an CC service scamming unit (SO). specific data is read out from the SU to be exchanged.
The follo	wing steps must be taken
Step 1:	Connect and read out defective scanning unit (SU)
Step 2:	Connect and verify LC-SERVICE SU
Step 3:	Reprogram LC-SERVICE SU
Step 4:	Overview of the newly programmed data
Step 5:	Instructions for checking the scale offset
	NOTE: Danger to internal components. When handling components that can be damaged by electrostatic discharge (ESD)you must follow the safety recommendations.

Step 1:

▶ Press the "Next >" button to start reading out the data of the defective scanning unit.

SU LC1x	3 / 4x3 Servic	e programming	1				
Use this dialog	g box to read out the er	coder-specific data from th	ie defective SU.				
Step 1: Re	ead out defective	su					
Now conne Press the (N	ct the defective SU fro lext >) button once the	om which the data is to be scanning unit has been co	read. innected.				
	IMPORTANT: Please ensure tha	t the connected SU is rea	ally the SU to be exchange	ed.			
_	Malfunctions can	ccur later if the data fro	m a different SU is read.				
Progress							
Progress			0%				
Progress			0%		Back	Next >	Cancel

The progress of the data transfer is displayed as a progress bar.

U LC1x	3 / 4x3 Service programming
se this dialo	g box to read out the encoder-specific data from the defective SU.
Step 1: R	ead out defective SU
Now conne Press the (N	<pre>ct the defective SU from which the data is to be read. lext >) button once the scanning unit has been connected.</pre>
<u>.</u>	IMPORTANT: Please ensure that the connected SU is really the SU to be exchanged. Malfunctions can occur later if the data from a different SU is read.
Progress	
	61%
	< Back Novt > Cance

Error messages/warnings that may be displayed:

Example 1:

The ATS software reports an LC service scanning unit. This may have two causes:

- 1. Was accidentally the exchange scanning connected?
- Click the "No" button to cancel.
- 2. The scanning unit of the LC was already exchanged earlier.
- Click the "Yes" button to read out the data of the connected scanning unit.

The connected scanning unit is an LC service scanning unit. Ensure that you have connected the defective scanning unit in order to read out the data. Do you want to proceed and read out the scanning unit?	LC serv	ice scanning unit	
	<u>(</u>	The connected scanning unit is an LC service scanning unit. Ensure that you have connected the defective scanning unit in order to read out the data. Do you want to proceed and read out the scanning unit?	

Example 2:

Error message, if no data can be read out from the encoder memory of the LC. There could be a connection problem (connector). In this case you have to replace the entire encoder, or contact the HEIDENHAIN helpline (repairing may be possible).



Step 2:

After the data of the defective scanning unit was read out successfully, connect the new Service AE to the PWM 20. The supply voltage is switched off now!



Attention

Do not power the scanning unit (AE) outside the scale unit! Illumination control may overdrive and damage the infrared LED.

When you press the "Next >" button, the ATS checks whether the correct exchange scanning unit is connected.

LCIX	3 / 4x3 Service programming
0	The data was read out successfully! The following dialog now verifies the LC-SERVICE SU to be reprogrammed.
Step 2: C	onnect and verify LC-SERVICE SU
low conne This reads a	ct the LC-SERVICE SU and press the (Next >) button. nd verifies the data from the LC-SERVICE AE.
i)	CAUTION: Customer.specific data will be lost later during reprogramming. Only LC service scanning units can be reprogrammed.
Progress	
	43%

Example 1:

The connected scanning unit has already been programmed. Multiple programming of service scanning units is possible without any problems. Click "Yes" to continue verification.

The connected LC service scanning unit has already been programmed. Do you want to continue anyhow?
Nex Nex

Example 2:

The Service AE was not connected.



Step 3:

Press the "Next >" button to write the data of the defective scanning unit to the Service scanning unit.

Note

Customer data (OEM data, offset of reference point, etc.) are overwritten here (**reset to** factory default condition)!

You may have to run a data backup beforehand (see User's Manual of the ATS software).

ᇞ

Attention

Do not disconnect the scanning unit while it is being programmed, as this would destroy the AE scanning unit!

his step the linear-e wn under "Linear-er	ncoder data that was read is writte ncoder data."	n into the LC service scanning unit. Before you apply th	he data to the LC service scanning unit, plea	ase check all data
tep 3: Reprogr	am LC-SERVICE SU			
ease press the (Ne	xt >) button now in order to apply	the determined data.		
near-encoder	data			
 Designation: Interface: Code bits: 	LC 483 EnDat 2.2 32	ID number:Measuring step:	557650-06 5 nm	
Data NOTE	relevant to operation is change :: Customer-specific data can be	d in this step. I lost during this step.		
CAUT since	FION: Do not disconnect the SU this could damage it.	during programming under any circumstances,		
rogress				

Step 4:

- > Display of the newly programmed data of the LC service scanning unit
- ▶ Press the "Next >" key to activate position verification (step 5).

•	
°	The LC service scanning unit was programmed successfully. Please check its correct operation with suitable diagnostic tools.
ep 4: 0	erview of the newly programmed data
e LC-SER ess the (N	//CE SU was programmed successfully. ext >) button for information about the position inspection.
ata of th	e reconfigured LC service scanning unit
 Designa ID numb Interface Measuri Code bit Datum o 	ion: LC 483 er: 557650.06 c; EnDat 2.2 g step; 5 mm s: 32 fiset: 0 mm
Ŀ	IMPORTANT: The correct operation of the new LC service scanning unit must be checked before it is put into operation. It must be tested as described on the next page.

Step 5:

Finally, the program inspects whether the LC is fully functional.

For this purpose, two defined positions marked with arrows on scale and scanning unit must be exactly aligned.

Alternatively, you can use the dimension * indicated in the drawing for the distance between the front faces of scale unit and scanning unit (see displayed drawing).



Note

The displayed drawing is to be considered an example.

On LC models with mounting spar, the end blocks at the scale housing are smaller and without holes. This means that the dimensions are different. The position of the arrows is decisive.

instructions for checking the scal	e offset after reprogramming.
Drawing for LC4x3 and L	24x9
Step 5: Instructions for	HEIDENHAIN 16.5*
1) After concluding the dialog, p	lease move the newly programmed LC-SERVICE scanning unit to the position indicated in the drawing above (where the SU and cassette
 2) The position dialog is automa 	tically started when the "Position inspection" button is pressed.
3) The absolute position must n	ow indicate the value 4 000 000± 100 000 (in measured value display) or the value 20 000µm± 500µm (in position display).
	If the position inspection from step 3) does <u>not</u> show a correct value, the newly programmed unit <u>may not be used under any circumstances</u> !

ᇞ

Attention

To inspect the scale offset, the scanning unit must be guided mechanically with high precision. This is obtained by mounting the LC to a HEIDENHAIN traversing device. The displayed dimensional drawing (see above) shows the dimensions for the examination on the Service traversing device.

Alternatively, you can also use the transportation lock (two red plastics parts slid below the scanning unit). The position where measuring starts cannot be reached as long as the transportation lock is mounted.

In this case you have to work with a guide mark (line on the scanning unit; see figures).

The negative example below shows an LC 4x3 which was moved to the position where measuring starts without the required second transportation lock.

The position of the scanning unit towards the scale housing is mechanically undefined. The scanning unit is oblique towards the scale!



(ja

Note

The current scanning units already have a guide mark.

Exactly align the guide mark on the Service AE and the arrow point on the scale housing. The red transportation locks must be engaged.



Preparing the LC for position verification, if there is no guide mark on the service scanning unit:

For position verification without traversing device, a guide mark needs to be added on the scanning unit (AE).

Mark the scale housing at 30 mm distance left from the arrow point on the scanning unit (see figure).

Exactly align the new marking and the arrow point on the scale housing. The distance between the two arrow points is precisely 30 mm.



Start the inspection with the "Position verification" button.

Attention

ᇞ

Observe the messages on the screen!

The additional traverse distance of 30 mm must be added to the value in the graphics. The measured value [steps] depends on the resolution!

The position can be displayed in steps or in μ m.

Scale offset at the guide mark, absolute position in [steps]:

100 000 000 steps; tolerance \pm 100 000 steps with an LC with 5 nm resolution



Example: LC with 5 nm resolution

A few sets day on a set of few set					
Absolute position		-		Mar	mund value Isterni
		10	00	\mathbf{n}	\frown
				: i e'	44
Incomental pacilian		.0	00	00	<u> </u>
and emerican position				Me	nured value [steps]
		10	$\mathbf{n}\mathbf{n}$	0 7	$\mathbf{n}\mathbf{n}$
		- ii i		i۲	91 i I
Absolute position [bits]					
32 31 38 29 28 27 26 2	5 24 23 22 21 20 19 18	17 16 15 14 13	12 11 10 9	8 7 6 5	4 2 2 1
Incremental status	EnDat status				
Incremental status	EnDat status	0	0	0	0

Scale offset at the guide mark, absolute position in [μ m]: Display value 50 000; tolerance \pm 500 μ m

Calculation:

Position value [µm] = Value from displayed graphics [µm] + Guide mark [µm] 20 000 µm + 30 000 µm = 50 000 µm

Position display (EnDat 2.2	1				
i osnon alspiny (Ensur Li	•				
Absolute position					Position famil
		CC	200		20
		5			
		100	<u>, , , , , , , , , , , , , , , , , , , </u>		10
Incremental position					
			200		Position (µm)
		!			
			JUL		
Absolute position [bits]					
32 31 30 29 28 27 28 25	24 23 22 21 20 19	18 17 16 15 1	4 13 12 11 10	9 8 7 6 9	5 4 3 2 1
Incremental status	EnDat status				
0 0	0	0	0	0	0
Frequency Amplitudes	Transmission	Error	Harnings	Ref.mark	Burry
					(

When step 5 is completed, the exchange of the LC scanning unit is finished.



No alarms or warnings may be generated. The LED displays must be "green" for the incremental and the EnDat status!



Note

Always use the transportation lock or a suitable traversing device when you move the scanning unit. This avoids mechanical damage inside the scale unit.

Mount the LC to the machine according to the mounting instructions.

Observe the mounting dimensions and tolerances!

The position where measuring starts (arrows are opposite each other) cannot be reached as long as the transportation lock is mounted.

6 Exchanging scanning units of LC 1x5* and LC 4x5*

6.1 General information

This software function serves to exchange defective scanning units of the following LC models: LC 115, LC 185, LC 195, LC 195S, LC 195F LC 415, LC 485, LC 495, LC 495S, LC 495F



白

Note

On the ID label of the scanning unit, the ID number is printed, but the model name is not. On encoders with "Functional Safety" option, exchange of scanning unit is not supported.

- *** x** = Placeholder for the interfaces:
- 1 = EnDat without incremental signal
- 8 = EnDat with 1Vpp incremental A/B signals
- 9 = No EnDat with interface code S = Siemens, F = Fanuc, M = Mitsubishi (for further information see respective product catalogs)

With this software, you can associate new service scanning units with the scale unit and run a functional test.

The required data is read out from the original scanning unit and transferred to the new one. Moreover, the offset of the zero point on the scale is written to the new scanning unit.

The interface of the scanning unit must work for this purpose. If the data cannot be read out, the entire LC needs to be replaced.

The function "LC service programming OEM customers" must be enabled through the productkey option 21 in the ATS software. (Also see chapter "Manage product keys" in the User's Manual for the ATS Software.)

In the ATS, you can look up under "Manage product keys / Currently available options" whether a product key is active.

6.2 Procedure for LC xx5 service programming

Start the ATS software and connect the original linear encoder to the test unit via an adapter cable.

The User's Manual "Cable and Connection Technology PWM 20 Testing Package" contains various adapter cables.

Note Note

Use the transportation lock or the traversing device to stabilize the scanning unit and to avoid damage inside the scale unit.



▶ 1. Connect the defective LC 1x5 or LC 4x5 to the PWM 20.

(ja

Note

It is important that you always connect/identify the defective LC first! Do not power the scanning unit outside the LC scale unit! Illumination control may overdrive and damage the infrared LED.



▶ 2. Establish a connection to the encoder.

File Heln		
💭 Connect encoder	₽	4
Configuration		
Configure hardware		
- 🧟 Language selection		
Manage product key	'S	

3. Enter the ID of the LC and press the "Connect" button to start. Alternatively, you can also connect manually (click <u>Manual settings</u>).

Note

Do not set the checkmark in the field "Use power supply from subsequent electronics"! This function is intended for the feed-through mode. If you activate this function, the encoder power supply is switched to the subsequent electronics (e.g. machine control system) and the LC is not powered (ATS error message).

Using this dialog you can specify the	data required by the program for connecting an encoder by enter	ing the encoder's ID-number.
Encoder data		
ID-number	689676-06	
Encoder designation: Encoder interface: Supply voltage [V]:	LC 415 EnDat 5.20	
If the selected end safety, please obs	oder does not match the connected encoder, the encoder, rve the warnings and directions in the Mounting Instruction er Laserschutzklasse unterliegen sind entsprechend geker Montageanleitung des Messgerätes sowie alle darin entha am Betätingen der Schaltfläche Verbinden ist der Laser der	interface card or PC could be become damaged. For your own ns. unzeichnet. Beachten Sie in diesem Fall die Hinweise auf dem Itenen Warnungen und Hinweise.
ACHTUNG: Nach d		
ACHTUNG: Nach d		

▶ 4. Select "LC xx5 service programming" to start the exchange of the scanning unit.

HEIDENHAIN: ATS - Adjusting and Testing Software		×
File Help		
P Disconnect encoder		
D Basic functions		
Position display		
- O Incremental signal display		
- 📿 Display encoder memory		
- 🍕 Comparison of encoder memory		
Voltage display		
Diagnostics		
Absolute/incremental deviation		
Online diagnostics		
C Service		
LCxx5 service programming		
Configuration		
Configure hardware		
- See Language selection		
Manage product keys		
	LC 185	689697-07

An overview of the next program steps appears.

The defective LC the scanning unit of which is supposed to be exchanged, must already be connected.

(ja)

Note

The software switches off the supply voltage of the LC to ensure that the encoder is not under power when it is reconnected.

▶ Press the "Next >" button to go to step 1: Read out defective scanning unit.

Note

Note the displayed messages!

File Help	115 - Adjusting and lesting Software
LC1x5 / 4	4x5 Service programming
Use this dialog The encoder-s) box to reprogram an LC service scanning unit (SU). pecific data is read out from the SU to be replaced.
The follow	ving steps must be taken
Step 1: 0	Connect and read out defective scanning unit (SU)
Step 2: 0	Connect and verify LC-SERVICE SU
Step 3: F	Reprogram LC-SERVICE SU
Step 4: 0	Dverview of the reprogrammed data
Step 5: I	nstructions for checking the scale offset
La	NOTE: Danger to internal components. When handling components that can be damaged by electrostatic discharge (ESD) you must follow the precautionary measures.
	Next > Cancel
	LC 185 689697-07

Step 1:

▶ Press the "Next >" button to start reading out the data from the defective scanning unit.

e Help					
-C1x5 / 4	x5 Service programming				
Use this dialog	box to read out the encoder-specific data from the defective	SU.			
Step 1: Re	ad out defective SU				
Now connec Press the (Ne	: the defective SU from which the data is to be read. xt >) button once the scanning unit has been connected.				
	Mease ensure that the connected SU is really the SU Malfunctions can occur later if the data from a differ	I to be exchanged. ant SU is read.			
Progress					
		0%			
			< Back	Next >	Cancel

The progress of the data transfer is displayed as a progress bar.

_C1x5 /	Ix5 Service programming		
Use this dialo) box to read out the encoder-specific data from the defective SU.		
Step 1: R	ad out defective SU		
Now conne Press the (N	t the defective SU from which the data is to be read. ext >) button once the scanning unit has been connected.		
Ţ	IMPORTANT: Please ensure that the connected SU is really the SU to be exchanged. Malfunctions can occur later if the data from a different SU is read.		
Progress	73%		

Warnings and error messages may be displayed.

Example 1:

The ATS software reports an LC service scanning unit.

This may have two causes:

- 1. Was accidentally the exchange scanning connected?
- 2. The scanning unit of the LC was already exchanged earlier.
- ▶ Click the "No" button to cancel Service programming.
- Click the "Yes" button to read out the data of the connected scanning unit.

LC service scanning unit
The connected scanning unit is an LC service scanning unit. Ensure that you have connected the defective scanning unit in order to read out the data. Do you want to proceed and read out the scanning unit?

Example 2:

Information that the service scanning unit was not connected

Wrong LC service scanning unit	Wrong LC s
The connected SU is the same SU from which the data was read. Please connect the correct LC-SERVICE SU.	Ŀ
ОК	

Example 3:

Error message, if no data can be read out from the encoder memory of the LC. There could be a connection problem (connector). In this case you have to replace the entire encoder, or contact the HEIDENHAIN helpline (repairing may be possible).



Step 2:

After the data of the defective scanning unit was read out successfully, connect the Service AE to the PWM 20. The supply voltage is switched off now!



Attention

Do not power the scanning unit (AE) outside the scale unit! Illumination control may overdrive and damage the infrared LED.

When you press the "Next >" key, the ATS checks whether the correct exchange scanning unit is connected.

e neip	
C1x5 /	4x5 Service programming
٢	The data was read out successfully! The following dialog now verifies the LC-SERVICE SU to be reprogrammed.
Step 2: C	onnect and verify LC-SERVICE SU
Now conne This reads a	ct the LC-SERVICE SU and press the (Next >) button. Ind verifies the data from the LC-SERVICE SU.
i)	The function settings, OEM memory areas, etc. will be reset to the factory values or cleared in this sequence. Only LC service scanning units can be reprogrammed.
	IMPORTANT: The LC-SERVICE SU may only be supplied with power when the SU is in the profile; otherwise it could become damaged.
Progress	
riogless	306
	570

Example: The AE of this LC was already exchanged. The connected scanning unit has already been programmed. Multiple programming of Service scanning units is possible without a

Multiple programming of Service scanning units is possible without any problems. Click "Yes" to continue verification.

Programmed LC service scanning unit
The connected LC service scanning unit has already been programmed. Do you want to continue anyhow?

Step 3:

The data read out from the defective LC is displayed.

Press the "Next >" button to write the data of the defective scanning unit to the service scanning unit.

(ja

Customer data (OEM data, offset of reference point, etc.) are overwritten here (**reset to** factory default condition)!

You may have to run a data backup beforehand (see User's Manual of the ATS software).



Attention

Note

Do not disconnect the scanning unit while it is being programmed, as this would destroy the AE!

Help				
C1X5 / 4X5 Ser	vice program	ning		
this step the linear-encod nown under "Linear-encod	der data that was read is ler data."	written into the LC service scanning unit. Before you apply the	he data to the LC service scanning u	nit, please check all dat
Step 3: Reprogram	LC-SERVICE SU			
Please press the (Next >	•) button now in order to	apply the determined data.		
Linear-encoder dat	a			
 Designation: 	LC 185	• ID number:	689697-07	
 Interface: Functional safety: 	EnDat 2.2 No	Device is being reprogrammed; this can take up to one minute		
i In this ste	ep the function setti	Do not remove the SU under any circumstances: this would destroy i	, it.	
CAUTION since this	l: Do not disconnect th s could damage it.	e SU during programming under any circumstances,		
Progress				
		36%		
			< Back Next >	Cancel
			4	

Step 4:

- ▶ Display of the newly programmed LC Service scanning unit
- ▶ Press the "Next >" key to activate position verification (step 5).

0	The LC service scanning unit was programmed success	sfully. Please check its correct operation with suitable diagnostic tools.
Step 4: O	verview of the reprogrammed data	
The LC SER Press the (N	RVICE scanning unit was reprogrammed successfully. Next >) button for information about the position inspection.	
Data of th	ne reconfigured LC service scanning unit	
ID numl Interfac Measuri Code bi Datum o	Important: The complete unit with the new LC-SEF before the encoder can be operated.	RVICE scanning unit must be subjected to functional testing
	The following tests must be performed with the co	(test is called automatically)

Now move the service scanning unit to the position shown in the dimension drawing.

In addition to the triangular mark, service scanning units have a marking line on their mounting base. This line on the service scanning unit must be aligned with the triangular mark on the scale housing (see figure).



Alternatively, you can use the dimension * indicated in the drawing for the distance between the front faces of scale unit and scanning unit (see figure).



ſ

Note

The procedure is the same for LC 1x5 and LC 4x5! The value * depends on the LC model (slimline LC; with or without mounting spar; full-size LC)!

Step 5:

Press the "Position check" button to start the inspection of the scale offset after finishing programming.



Attention

Observe the messages on the screen! The measured value display changes according to the encoder resolution.

^{⊫ Help} LC1x5 / 4x5 Service pi	ogramming
Instructions for checking the scale offs	et after reprogramming.
Drawing for LC1x5	
Step 5: Instructions for chee	HEDERUKAND 48.5 + O + C + C + C + C + C + C + C + C + C
1) After concluding the dialog, pleas (where the marking line on the SU	move the reprogrammed LC-SERVICE scanning unit to the position indicated in the drawing above and the arrow on the cassette meet).
 2) The position dialog is automatical 3) The absolute position must now in 	y started when the "Position inspection" button is pressed. dicate the value 5 000 000± 100 000 (in measured value display) or the value 50 000μm± 1 000μm (in position display).
	If the position inspection from step 3) does <u>not</u> show a correct value, the reprogrammed unit <u>may not be used under any circumstances</u> !
	< Back Position check

The position can be displayed in steps or in $\mu m.$

Scale offset with position display in [steps]:

Value 5 000 000; tolerance \pm 100 000 steps with an LC with 5 nm resolution The value depends on the resolution!



Attention

If the specified value is not reached during the position inspection, the LC is not functional!

Example: LC with 5 nm resolution

ile He	lp																						
Pos	ition	disp	lay	[En	Dat	t 2.2	2]																
Abs	olute	positio	on																		_		
																-				-	Measu	ired valu	e [steps
																		U					i
Inci	remen	tal pos	sition	i -																			
																	-		_		Measu	red valu	e [steps
Abs	olute	positio	on [b	its]													_	_	_				_
32	31 :	0 29	28	27	26	25	24 2	23 2	22 21	20	19	18	17	16 1	5 14	13	12 11	10	9 8	76	5	1 3	2 1
Inci	remen	tal sta	tus					Er	nDat s	tatus	;												
	C)			((D			(0			0			0		C)
	rrequ	incy			Amp	nuues			mans	missio							warnings		Re	Limark		Dua	y
轉	Ŀ.	CL	=	±Î‡		±	\$	\$	2														£.
										, 													

Scale offset with position display in [µm]: Value 50 000; tolerance \pm 1000

osition	displa	/ [En	Dat 2	.2]						
Absolute	position									
								500	003	Position [µm
Incremer	ital positi	n								
Absolute	position	[bits]						500	303	.95
32 31	30 29 2	3 27	26 25	24	23 22 21	20 19	18 17 16 1	5 14 13 12 11 10	9 8 7 6 5	4 3 2 1
	tal atatus				EnDats	tatus				
Incremer	ital status		•				0	٥	O	Busy
Incremer) ency		Amplitude	s	Trans	mission	Error	Warnings	Retallark	500)

7 Functional check

7.1 General information

After programming the Service scanning unit of the LC linear encoder, run a functional test with the PWM 20.

- The scanning unit must traverse the entire measuring range. No warnings or alarms may occur (if there are any: delete them and inspect the measuring range again.)
- Check the OEM memory areas and reset all values to zero, if necessary. (You may have to load the data of the original scanning unit).
- Check the beginning of measurement.
- Check the zero point. The LC must on no account reach the zero point. Reset the zero point!
- The analog output signals must be within the prescribed tolerance limits.
- Check the functional reserve with the help of the online diagnosis [open loop]. In the bar diagrams, the markers should be in the area to the right, between 50 % and 100 %.

Note

The functions are described in the User's Manual "ATS-Software", ID 543734-xx.



No alarms or warnings may be generated. The LED displays must be "green" for the incremental and the EnDat status!



Note

Always use the transportation lock or a suitable traversing device when you move the scanning unit. This avoids mechanical damage inside the scale unit. Mount the LC to the machine according to the mounting instructions. Observe the mounting dimensions and tolerances!

8 Contact

Your HEIDENHAIN helpline

The qualified, multilingual specialists of the **HEIDENHAIN helpline** in Traunreut support you in solving your problems.

Especially if you need **technical support** the HEIDENHAIN helpline team can provide detailed advice and information on measuring systems, controls, and NC and PLC programming.

HEIDENHAIN technical helpline

Encoders/machine calibration +49 8669 31-3104 E-mail: service.ms-support@heidenhain.de

NC programming +49 8669 31-3103 E-mail: service.nc-pgm@heidenhain.de

NC support +49 (8669) 31-3101 E-mail: service.nc-support@heidenhain.de

PLC programming TNC +49 (8669) 31-3102 E-mail: service-plc@heidenhain.de

Lathe controls +49 (8669) 31-3105 E-mail: service.lathe-support@heidenhain.de

HEIDENHAIN Helpline for repairs, spare parts, exchange units, complaints and service contracts

Germany +49 (8669) 31-3121

Outside Germany +49 (8669) 31-3123

Complaint management, service contracts and calibration services +49 (8669) 31-3135

E-mail: service.order@heidenhain.de

Technical training

+49 (8669) 31-2293, 31-1695 Fax: +49 (8669) 31-1999 E-mail: mtt@heidenhain.de

HEIDENHAIN

DR. JOHANNES HEIDENHAIN GmbH

www.heidenhain.de

Vollständige und weitere Adressen siehe www.heidenhain.de For complete and further addresses see www.heidenhain.de

APS 02-384 Warszawa, Poland www.heidenhain.pl

FARRESA ELECTRÓNICA, LDA. 4470 - 177 Maia, Portugal www.farresa.pt

HEIDENHAIN Reprezentanță Romania Brașov, 500407, Romania www.heidenhain.ro

PL

PT

RO

DE	HEIDENHAIN Vertrieb Deutschland 83301 Traunreut, Deutschland	ES	FARRESA ELECTRONICA S.A. 08028 Barcelona, Spain www.farresa.es
	EAXI 08669 32-3132 E-Mail: hd@heidenhain.de HEIDENHAIN Technisches Büro Nord	FI	HEIDENHAIN Scandinavia AB 01740 Vantaa, Finland www.heidenhain.fi
	12681 Berlin, Deutschland 電 030 54705-240 HEIDENHAIN Technisches Büro Mitte	FR	HEIDENHAIN FRANCE sarl 92310 Sèvres, France www.heidenhain.fr
	07751 Jena, Deutschland	GB	HEIDENHAIN (G.B.) Limited Burgess Hill RH15 9RD, United Kingdom www.heidenhain.co.uk
	44379 Dortmund, Deutschland O231 618083-0 HEIDENIHAIN Technisches Bürn Südwest	GR	MB Milionis Vassilis 17341 Athens, Greece
	70771 Leinfelden-Echterdingen, Deutschland 193395-0 HEIDENHAIN Technisches Büro Südost	нк	HEIDENHAIN LTD Kowloon, Hong Kong E-mail: sales@heidenhain.com.hk
	83301 Traunreut, Deutschland	HR	Croatia → SL
AR	NAKASE SRL.	HU	HEIDENHAIN Kereskedelmi Képviselet 1239 Budapest, Hungary www.heidenhain.hu
AT	B1653AOX VIIIa Ballester, Argentina www.heidenhain.com.ar HEIDENHAINTechn. Büro Österreich	ID	PT Servitama Era Toolsindo Jakarta 13930, Indonesia E-mail: ptset@group.gts.co.id
AU	83301 Traunreut, Germany www.heidenhain.de FCR Motion Technology Pty. Ltd	IL	NEUMO VARGUS MARKETING LTD. Tel Aviv 61570, Israel E-mail: neumo@neumo-vargus.co.il
BE	Laverton North 3026, Australia E-mail: vicsales@fcrmotion.com HEIDENHAIN NV/SA	IN	HEIDENHAIN Optics & Electronics India Private Limited Chetpet, Chennai 600 031, India
BG	ESD Bulgaria Ltd. Sofia 1172, Bulgaria	п	WWW.heidennain.in HEIDENHAIN ITALIANA S.r.I. 20128 Milano, Italy WWW.heidenhain.it
BR	www.esd.bg DIADUR Indústria e Comércio Ltda. 04763-070 – São Paulo – SP, Brazil	JP	HEIDENHAIN K.K. Tokyo 102-0083, Japan www.heidenhain.co.jp
BY	GERTNER Service GmbH 220026 Minsk, Belarus www.heidenhain.by	KR	HEIDENHAIN Korea LTD. Gasan-Dong, Seoul, Korea 153-782 www.heidenhain.co.kr
CA	HEIDENHAIN CORPORATION Mississauga, OntarioL5T2N2, Canada www.heidenhain.com	MX	HEIDENHAIN CORPORATION MEXICO 20290 Aguascalientes, AGS., Mexico E-mail: info@heidenhain.com
СН	HEIDENHAIN (SCHWEIZ) AG 8603 Schwerzenbach, Switzerland www.heidenhain.ch	MY	ISOSERVE SDN. BHD. 43200 Balakong, Selangor E-mail: sales@isoserve.com.my
CN	DR. JOHANNES HEIDENHAIN (CHINA) Co., Ltd. Beijing 101312 China	NL	HEIDENHAIN NEDERLAND B.V. 6716 BM Ede, Netherlands www.heidenhain.nl
	www.heidenhain.com.cn	NO	HEIDENHAIN Scandinavia AB 7300 Orkanger, Norway

- CZ HEIDENHAIN s.r.o. 102 00 Praha 10, Czech Republic www.heidenhain.cz
- DK TPTEKNIK A/S 2670 Greve, Denmark www.tp-gruppen.dk

 Www.heidenhain.no
 PH Machinebanks` Corporation Quezon City, Philippines 1113 E-mail: info@machinebanks.com

RS	Serbia → BG
RU	OOO HEIDENHAIN 115172 Moscow, Russia www.heidenhain.ru
SE	HEIDENHAIN Scandinavia AB 12739 Skärholmen, Sweden www.heidenhain.se
SG	HEIDENHAIN PACIFIC PTE LTD. Singapore 408593 www.heidenhain.com.sg
SK	KOPRETINATN s.r.o. 91101 Trencin, Slovakia www.kopretina.sk
SL	NAVO d.o.o. 2000 Maribor, Slovenia www.heidenhain.si
тн	HEIDENHAIN (THAILAND) LTD Bangkok 10250, Thailand www.heidenhain.co.th

- TR T&M Mühendislik San. ve Tic. LTD. ŞTİ. 34775 Y. Dudullu – Ümraniye-Istanbul, Turkey www.heidenhain.com.tr
- TW HEIDENHAIN Co., Ltd. Taichung 40768, Taiwan R.O.C. www.heidenhain.com.tw
- UA Gertner Service GmbH Büro Kiev 01133 Kiev, Ukraine www.heidenhain.ua
- US HEIDENHAIN CORPORATION Schaumburg, IL 60173-5337, USA www.heidenhain.com
- VE Maquinaria Diekmann S.A. Caracas, 1040-A, Venezuela E-mail: purchase@diekmann.com.ve
- VN AMS Co. Ltd HCM City, Vietnam E-mail: davidgoh@amsvn.com
- ZA MAFEMA SALES SERVICES C.C. Midrand 1685, South Africa www.heidenhain.co.za

Zum Abheften hier falzen! / Fold here for filing!