

Technical Documentation



Twin Line
Multi-Axis Motion Controller

TLM3

Operating system: 1.1xx

Order no.: 0098 441 113 249

Version: V1.01, 06.05

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Twin Line

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Writing conventions and symbols

Work steps If work steps must be carried out in sequence, they are shown as follows:

- Special prerequisites for the following work steps
- ▶ Step 1
- ◁ Important response to this work step
- ▶ Step 2

If a response to a work step is specified, this will inform you that the step has been carried out correctly.

Unless otherwise stated, the individual instruction steps must be carried in the given sequence.

Lists Lists can be sorted alphanumerically or by priority. Lists are structured as follows:

- Point 1
- Point 2
 - Subpoint to 2
 - Subpoint to 2
- Point 3

Making work easier Information on making work easier can be found at this symbol:



*This offers supplementary information on making work easier.
See the chapter on safety for an explanation of the safety instructions.*

Parameters Parameters are shown as follows:

Group.Name Index:Subindex

1 Introduction

1.1 Scope of delivery

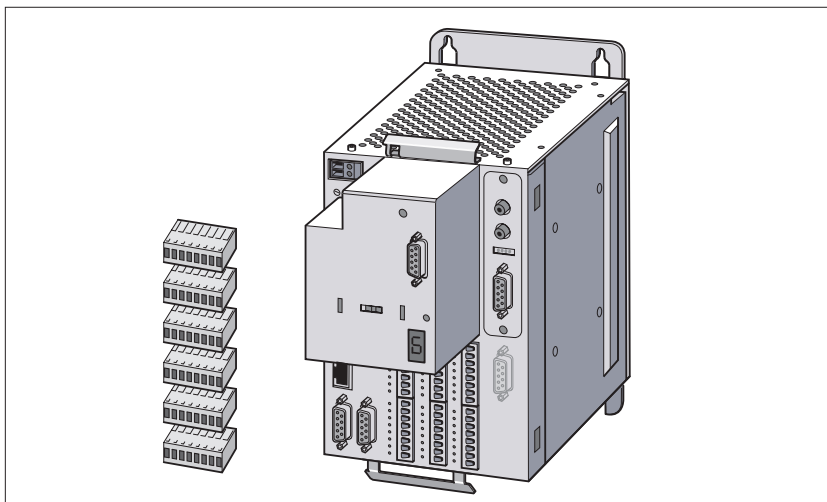


Figure 1.1 Scope of delivery TLM3

Scope of delivery TLM3

The delivery scope of the TLM3 comprises:

Qty	Item	Order number
1	TLM 372TCNAS2E without Profibus interface or TLM3 72TCPAS2E with Profibus interface	0086 505 000 200 0086 505 000 204
6	Terminals for I/O connection	0000 002 102 200
1	CD with documentation regarding TLCC and TLM2	0098 441 113 248

After receiving the shipment, please ensure that all parts of the delivery scope are actually included.

The following parts comprise the delivery scope of the TLM3:

- The TLM3 with or without Profibus interface.
- Six 8-pin counter plugs to connect the digital inputs and outputs. They have already been plugged into the device.
- This document / on CD.

If you notice that parts are missing, please contact your local Berger Lahr Sales Partner immediately.

Accessories Accessories for the Multi Axis Motion Controller are:

Designation	Order number
ACC 2RK BBDE003 sensor adapter cable, Sub-D 15-pin socket, Sub-D 9-pin plug, length: 0.3m	0086 300 901 000
ACC 2FS AAAA003 Sercos plastic fibre-optic cable (POF), plug connector F-SMA, 0.3m	0086 300 901 051
ACC 2FS AAAA015 Sercos plastic fibre-optic cable (POF), plug connector F-SMA, 1.5m	0086 300 901 053
ACC 2FS AAAA050 Sercos plastic fibre-optic cable (POF), plug connector F-SMA, 5 m	0086 300 901 055
ACC 2FS AAAA150 Sercos plastic fibre-optic cable (POF), plug connector F-SMA, 15 m	0086 300 901 058
ACC 3CS 004NNNN 6 replacement terminals for I/O connection and Sub-D plug with CAN terminating resistor 120 Ω	0086 300 901 002

Delivery condition The TLM3 is delivered without application program. Only the part of the software designated as firmware is on the TLM3. It enables transferring an application program to the TLM3 and starting it there. The firmware alone does not control any inputs and does not act at the CANopen Bus. An application on the TLM3 is necessary for this.

1.2 Documentation and references

This manual is to be regarded as supplemental documentation to the manual of the Twin Line Cell Controller TLCC. It describes the additions and deviations of the TLM3 compared to the TLCC.

If this manual contradicts information from the manual of the TLCC, then the statements in this manual apply to the TLM3.

The application of this documentation alone is not sufficient. Always consult the documentation of the TLCC as well. The documentation of the TLCC has the material number 00 9844 111 3208 and can be found as PDF-file on the CD accompanying this device.

1.3 Device overview

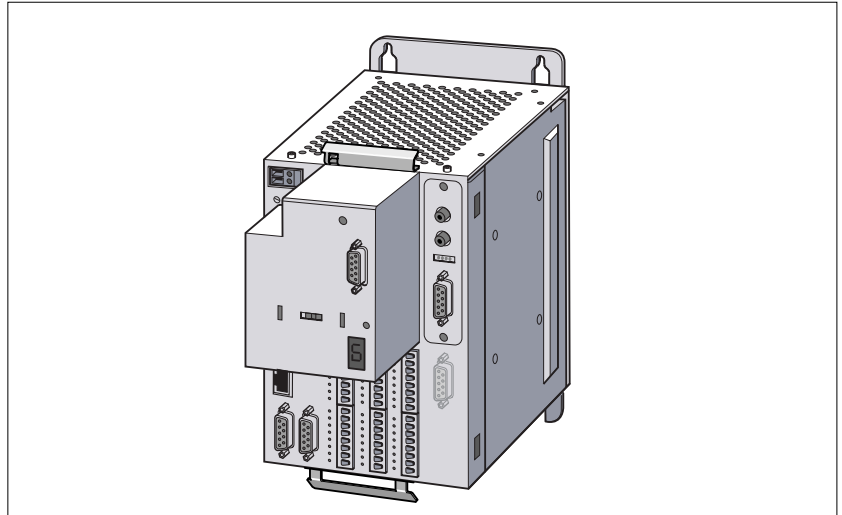


Figure 1.2 Twin Line Multi-Axis Motion Controller TLM3

The Twin Line Multi Axis Motion Controller TLM3 is part of the family of the Twin Line Cell Controllers. The TLM3 is a variation of the TLCC with additional functions and connections. The basic properties of the TLCC also apply to the TLM3. The descriptions for the TLCC basic device can be found in the TLCC manual.

The TLM3 also has the capacity of executing complex and interpolated motion sequences on motors that are controlled via the Sercos field bus. The TLM3 can be programmed in IEC 61131-3.

Main areas of application

The TLM3 with the Sercos field bus is used for interpolated motion sequences because of its calculating power and its Sercos expansion. Drives of the Lexium series are used.

In addition, simple drives using the CANopen network can be controlled by this variation of the TLM3 (e.g. point-to-point positioning as with the standard TLCC).

Ideally, drives are used which have a positioning control integrated in the drive controller so that only positioning commands with the drive can be exchanged through the CAN bus. Especially suited for this are Berger Lahr drives of the families Twin Line for step motors and AC servo-motors, CPD for AC servo-motors as well as IclA for the compact drives

1.4 Connections and extensions

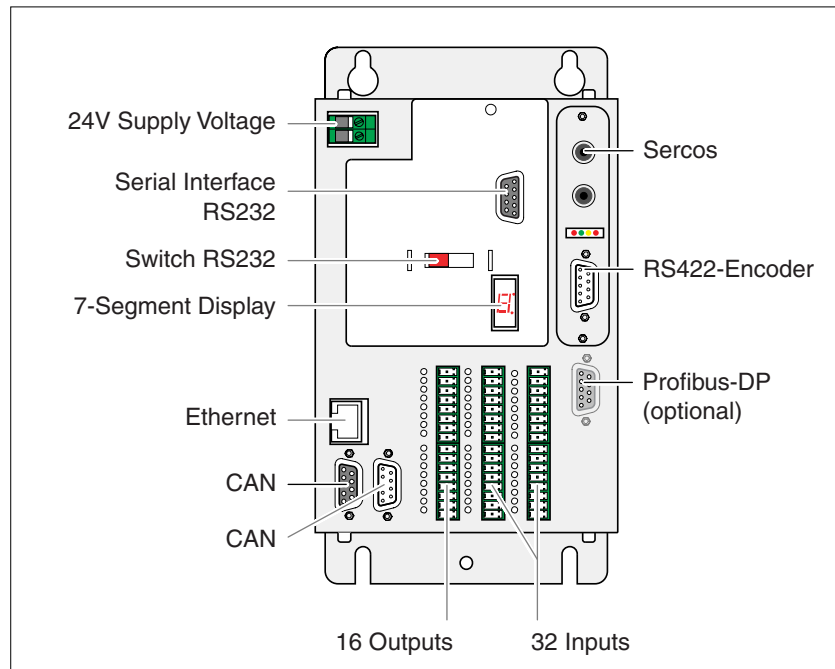


Figure 1.3 Overview TLM3

Sercos The Sercos interface is used for communications between controllers and drives. The Sercos interface can be used to implement numerically controlled high-performance drive applications in mechanical engineering. The communications medium is a fibre-optic cable ring. All internal drive data, parameters and diagnostic results can be displayed and input with the SERCOS interface.

RS422-Encoder input Contrary to the TLCC, the TLM3 has an RS422 encoder input.

Installation information on the installation of additional interfaces of the Multi Axis Motion Controller can be found in chapter 3 "Installation" on page 3-1.

2 Safety

2.1 Hazard categories

Safety notes and general information are indicated by hazard messages in the manual. In addition there are symbols and instructions affixed to the product that warn of possible hazards and help to operate the product safely.

Depending on the seriousness of the hazard, the messages are divided into three hazard categories.



DANGER!

DANGER indicates an imminently hazardous situation, which, if not avoided, **will result** in death, serious injury, or equipment damage.



WARNING!

WARNING indicates a potentially hazardous situation, which, if not avoided, **can result** in death, serious injury, or equipment damage.



CAUTION!

CAUTION indicates a potentially hazardous situation, which, if not avoided, **can result** in injury or equipment damage.

2.2 Safety instructions



DANGER!

Electric shock, fire or explosion

- Only qualified personnel who are familiar with and understand the contents of this manual and the other relevant manuals are authorised to work on and with this drive system.
- Before working on the drive system:
 - Switch off power to all terminals.
 - Place a sign "DO NOT SWITCH ON" on the switch and lock to prevent switching on.
 - **Wait 6 minutes** (for discharge of DC bus capacitors).
 - Measure voltage between DC+ and DC- and check for <48V. (The DC bus LED is not a safe indication for absence of the DC bus voltage).
- Do not short-circuit DC bus or touch unshielded components or screws of the terminals with voltage present.
- Install all covers and close the housing doors before applying power.
- The motor generates voltage when the shaft is rotated. Lock the shaft of the motor to prevent rotation before starting work on the drive system.
- The system manufacturer is responsible for compliance with all applicable regulations relevant to earthing the drive system.
- Do not reach into the drive system (e.g. no pointed objects).



WARNING!

Unexpected responses may cause injury and damage to the system

Enabling and disabling inputs and outputs can cause unexpected states and unexpected responses in the system.

- Start the system only if there are no persons or materials in the danger zone and the system can be operated safely.

2.3 Intended use

2.3.1 Environmental conditions

Environmental temperature	0°C to +50°C
Transport and storage temperature	-40°C to +70°C
Relative humidity	15% to 85% (no condensation allowed)
Installation altitude	h < 1000m above sea level
Protection class	IP20

2.3.2 Intended application

The Twin Line Multi Axis Motion Controller TLM3 is an electrical component for controlling and regulating system parts.

The TLM3 has to be mounted into a control cabinet and be firmly attached. It may be used only with fixed connections in industrial applications.

The Multi Axis Motion Controller can be used as control for drives.

2.3.3 Tasks of the operator

The drive systems described here are products for general use that conform to the state of the art in technology and are designed to prevent any dangers. However, drives and drive controllers that are not specifically designed for safety functions are not approved for applications where the functioning of the drive could endanger persons. The possibility of unexpected or unbraked movements can never be totally excluded without additional safety equipment. For this reason personnel must never be in the danger zone of the drives unless additional suitable safety equipment prevents any personal danger. This applies to operation of the machine during production and also to all service and maintenance work on drives and the machine. The machine design must ensure personal safety. Suitable measures for prevention of property damage are also required.

2.4 Qualification of personnel

Only technicians who are familiar with and understand the contents of this manual and the other relevant manuals are authorised to work on and with this drive system. The technicians must be able to detect potential dangers that may be caused by setting parameters, changing parameter values and generally by the mechanical, electrical and electronic equipment.

The technicians must have sufficient technical training, knowledge and experience to recognise and avoid dangers.

The technicians must be familiar with the relevant standards, regulations and safety regulations that must be observed when working on the drive system.

3 Installation

3.1 Electrical installation

In the following, only those connections are described which the TLM3 is equipped with in addition to the connections of the TLCC. All other connection descriptions can be found in the TLCC manual.



WARNING!

Malfunction and danger of injury!

To ensure the functions and flawless operation of the device, the EMC of the cables needs to be guaranteed. Using unsuited, non-EMC-safe cables can damage the device and cause malfunctions.



WARNING!

Interference with signals and devices may cause injury

Distorted signals can cause unexpected device responses.

- Install the wiring in accordance with the EMC requirements.
- Check compliance with the EMC requirements, particularly in an environment subject to strong interference.

3.1.1 Connecting the Sercos interface

The TLM3 has a Sercos interface as per the IEC/EN 61491 specification. The maximum baud rate is 16 Mbaud.

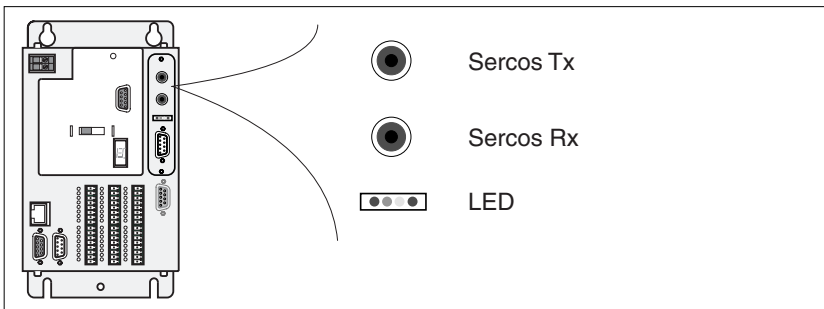


Figure 3.1 Sercos interface connection

LED	Colour	Meaning
l	red	Bus Error (no receiver signal)
k	green	Transmitter active
j	yellow	Receiver active
i	red	+5 V power present

The plug connector must meet the F-SMA standard, it must meet a minimum of quality level 5 and must have a metallic sleeve nut.

Cable specifications

- Maximum fibre-optic line length (POF): 45m
- Minimum bending radius: 30 mm
- Maximum node number: 254

3.1.2 Connection of the RS422 encoder input

The TLM3 has an RS422 encoder input.

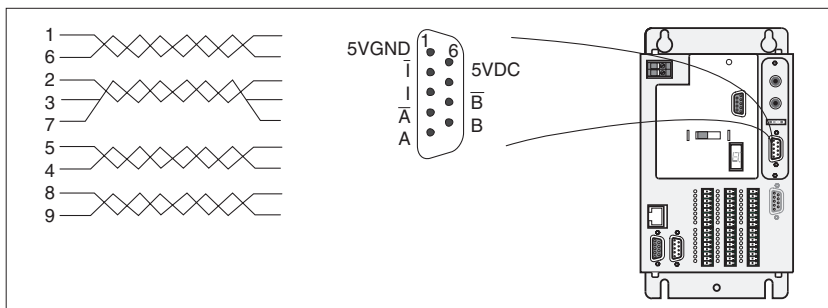


Figure 3.2 Interface connections of the RS422 encoder input

Pin	Signal	Pair	Meaning	I/O
5	A	1	Shaft encoder signal A	I
4	\bar{A}	1	Shaft encoder signal A inverted	I
9	B	2	Shaft encoder signal B	I
8	\bar{B}	2	Shaft encoder signal B inverted	I
1	GND	3	Encoder supply, mass	O
6	5VDC	3	Encoder supply, 5 V, max. 300 mA	O
7	24VDC	3	Encoder supply, 24 V	O
2	I	4	Channel index plus	I
3	\bar{I}	4	Channel index plus inverted	I

Cable specification

- Shielded cable
- Minimum cross-section of the signal wires: 0,25 mm², 5VDC, 24VDC and GND: 0,5 mm²
- Twisted-pair lines
- Shield earthed at both ends
- Maximum length 100 m.

4 Commissioning

The TLM3 does not have a start/stop button. It starts the run-time system with or without application program with the set-up of the supply voltage.

In delivery condition, i.e. without user program, Point 7 of the segment display may not light up. You may now transfer a program to the TLM3. An exact description for this can be found in the TLCC documentation.



DANGER!

Injuries through uncontrolled machine movements!

The TLM3 carries out a saved application immediately after switching on!

If you are not sure whether an application program is saved on the TLM3:

- ▶ Remove all connections of the TLM3 except for the power supply and the programming line (TCP/IP or serial COM1).
- ▶ Switch on the TLM3.
- ▶ Check with the programming tool whether a program is on the control.

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