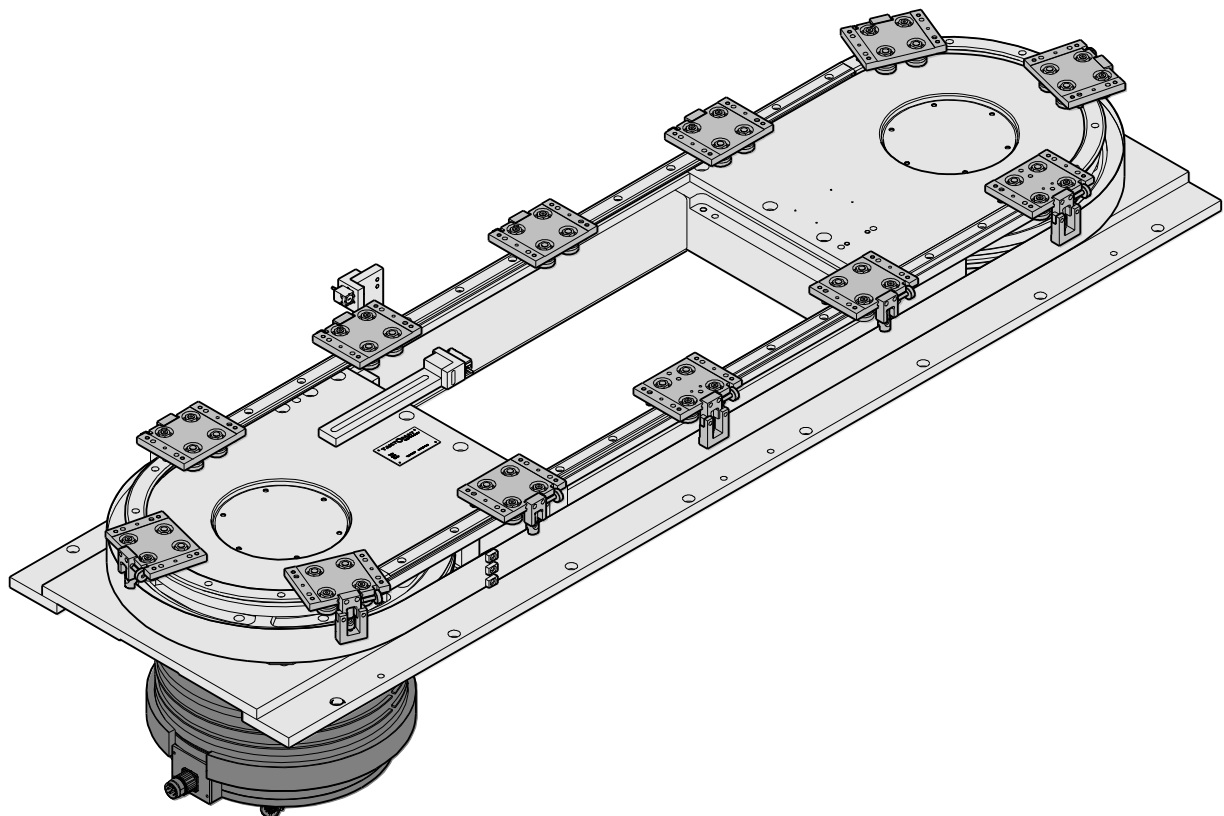


Operating Instructions

Linear indexing conveyor

LB series



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Original document

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1 Notes on these Operating Instructions

These Operating Instructions are valid for all linear indexing conveyors of the LB series. These differ from each other externally in terms of their dimensions and the number of workpiece carriers. The exact details can be found in the documentation for the specific contract concerned.

For the owner and operator of the linear indexing conveyor, these Operating Instructions provide the basis for trouble-free operation and are intended for users with the following expertise:

- In-depth knowledge of mechanical engineering.
- In-depth knowledge of electrical engineering.

The Operating Instructions must be read, understood and observed by the staff responsible for installation and operation. Familiarity with these Operating Instructions is necessary in order to avoid faults, damage and injury and to ensure trouble-free operation.

These Operating Instructions must be stored in the immediate vicinity of the linear indexing conveyor and must always be accessible to operating staff.

TAKTOMAT GmbH accepts no liability and will entertain no warranty claims for interruptions to operation or damage that arise from a failure to observe these Operating Instructions.

Information of special importance is indicated in the following ways:

The meanings of the symbols are as laid down in the ANSI Z535.6-2006 standard.

WARNING
to property.

Failure to observe the instructions may result in death, severe physical injury or considerable damage

CAUTION

Failure to observe the instructions may result in minor injury or minor damage to property.

NOTE

Notes to facilitate working with the product or references to additional information.

In the event of technical problems, please contact the TAKTOMAT Service team.

2 Safety information

Basic information

- The linear indexing conveyor is constructed on the basis of state-of-the-art technology and the recognized technical safety regulations. It is nevertheless possible that risks for life and limb of the user or third parties may arise or that the system and other property may be damaged when it is used. The linear indexing conveyor may only be used when it is installed in a complete machine.
- Only use the linear indexing conveyor if it is fully in order technically. Only use the unit for its intended purpose. Be aware of all risks and safety aspects. Observe the Operating Instructions. Rectify any faults, especially those that may impact on safety, without delay either yourself or by contacting the TAKTOMAT Service team.
- The linear indexing conveyor is designed to be installed within a construction that provides safety equipment to prevent access during operation.
- Always store the Operating Instructions in an easily accessible place close to where the linear indexing conveyor is being used.
- In addition to the information contained in these Operating Instructions, the statutory and other legally binding regulations with respect to safety at work and environmental protection must be observed and applied.
- Staff tasked with carrying out any activities on the linear indexing conveyor must read the Operating Instructions and the current chapter "Safety information" in particular before starting work. This applies particularly to any staff who only occasionally carry out such activities, for instance when making electrical connections to the system.
- If a fault occurs on the linear indexing conveyor, it must be taken out of service immediately. Have the fault rectified.
- Do not make any modifications to the linear indexing conveyor, including additions or conversions. This also applies to installing and adjusting safety equipment.
- Replacement parts must comply with the technical requirements laid down by the manufacturer. This can only be guaranteed if original TAKTOMAT replacement parts are used.
- Only use staff who have been trained, instructed and appropriately tasked. Clearly define the responsibilities of staff for the purposes of operation.

Safety information for operation

- Do not perform work in any way that may compromise safety.
- Immediately shut down the linear indexing conveyor in the event of a malfunction. Rectify faults without delay.
- The linear indexing conveyor may only be used in closed, clean, dry rooms and within the specified operating limits.

Electrical power

- An electric power supply socket compliant with local electrical regulations and safety requirements must be present in order to power the linear indexing conveyor from the public electricity network.
- Only use contact breakers with the prescribed current rating. Shut down the system immediately if a malfunction occurs in the power supply.
- Work on the electrical system of the linear indexing conveyor may only be carried out by a qualified electrician or by staff who have been suitably instructed under the guidance and supervision of a qualified electrician and in accordance with electrical regulations.
- Any parts of the system on which testing, maintenance and repair work is being carried out must be isolated from the power supply. First check that those components that have been isolated from the power supply are no longer live and then ground and short them and insulate any neighboring components that are still live.
- Regularly check the electrical equipment of the linear indexing conveyor. Any inadequacies such as loose connections or scorched cables must be rectified immediately.
- If it is necessary to carry out work on live components, enlist the help of another person to actuate the shunt release circuit breaker in the event of an emergency.
- Only use electrically insulated tools.

Warranty

Within the context of the contract and delivery conditions, TAKTOMAT guarantees that every TAKTOMAT product supplied has been manufactured in accordance with appropriate regulations.

This warranty does not extend to damage resulting from normal wear and tear, improper treatment, negligence, the use of non-original replacement parts, inadequate maintenance and/or a failure to observe these Operating Instructions.

The system may only be used by persons who have received appropriate instruction and within the specified operating limits. If this is not the case, the warranty will be null and void as laid down in the delivery conditions.

Device identification

The rating plate is located on the top of the linear indexing conveyor.

The following data is given on the rating plate:

- Manufacturer's details
- Device type
- Device number

Intended use

The linear indexing conveyor is designed to be used only for linear transport of workpiece carriers that are loaded with workpieces by the operator.

Any use that deviates from the intended use is regarded as inappropriate use that is not permitted. This includes

- any use outside the permitted operating limits
- any use in conjunction with foodstuff products
- any use in conjunction with aggressive materials (such as acids)
- any use in environments where there is a risk of explosion

The manufacturer/supplier shall not be liable for any damage resulting from such use. The stipulations regarding the intended use also cover observation of the Operating Instructions and adherence to the Care and Maintenance Instructions.

CAUTION

Changes to the structure of the materials used in the linear indexing conveyor, e.g. the drilling of additional holes, can result in damage to the components. This is regarded as being improper use and consequently no warranty claims or liability will be accepted.

NOTE

The linear indexing conveyor is a component part of a complete machine and may only be operated within a CE-compliant machine.

3 Short description of the product

3.1 Linear indexing conveyor - overview

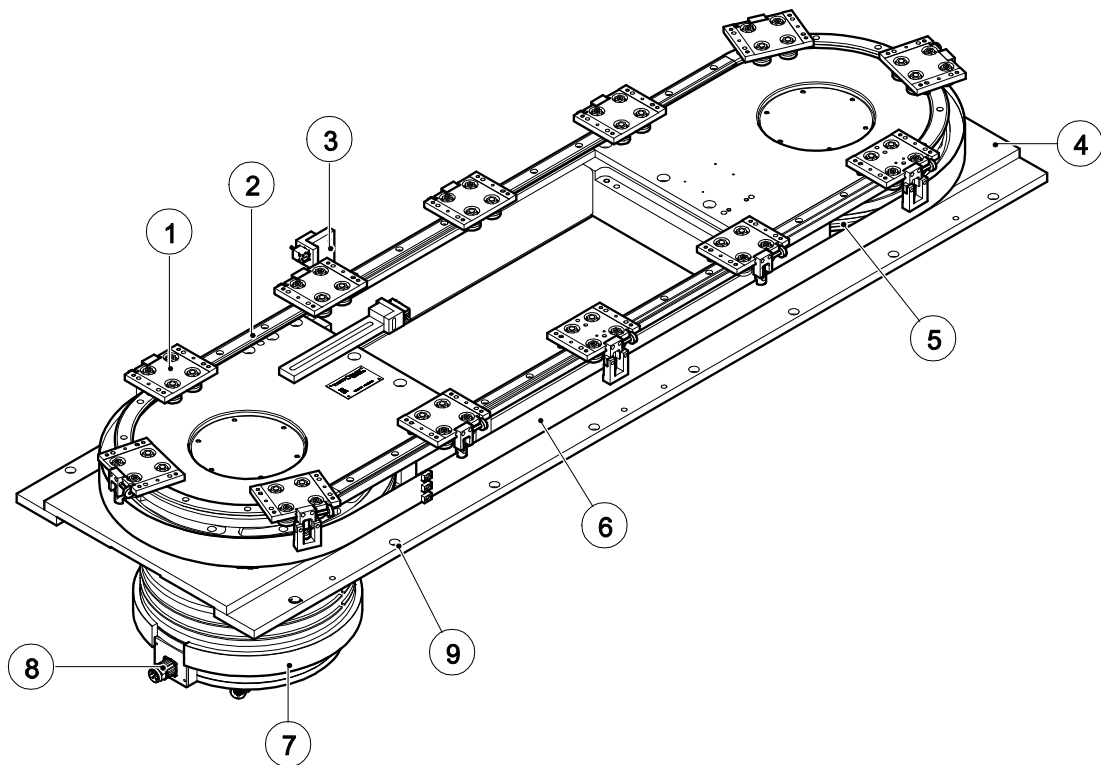


Figure 1 Overall view of the linear indexing conveyor

- 1 Workpiece carrier
- 2 Linear guide rail
- 3 Measuring sensor
- 4 Frame
- 5 Deflection pulley
- 6 Conveyor belt
- 7 Torque motor
- 8 Connector for frequency inverter
- 9 Holes for screw connections to the surrounding construction

3.2 Technical description

The linear indexing conveyor is intended to be installed in a surrounding construction, thus integrating it to form part of an overall system. The linear indexing conveyor is controlled by the overall system. The functions of the protective equipment of the system are also connected to the linear indexing conveyor via the controller.

The linear indexing conveyor is made up of two deflection pulleys fitted in the frame (Figure 1/4), around which a steel conveyor belt (Figure 1/6) passes. The conveyor belt is driven by a torque motor (Figure 1/7). The workpiece carriers (Figure 1/1) are clamped to the conveyor belt. When the conveyor belt moves, the workpiece carriers are moved with a precise linear motion on a rail (Figure 1/2) mounted on the frame. The position of a workpiece carrier is referenced for operation at the light barrier of the measuring sensor (Figure 1/3). The torque motor is connected to a frequency inverter that is part of the linear indexing conveyor.

The frequency converter is connected to the programmable logic controller (PLC) of the overall system. All electronic settings for the linear indexing conveyor are then made using the PLC of the overall system. The electrical safety equipment of the overall system incorporates the linear indexing conveyor.

3.3 Functional description

In the overall system, a number of insertion stations are arranged around the linear indexing conveyor. At each of these stations, precisely one defined work step is performed on the workpiece in the workpiece carrier.

The workpiece is placed in a workpiece carrier and is then stepped on to the other insertion stations for processing until it is removed from the workpiece carrier and stacked at the last work step.

When the linear indexing conveyor is in operation, this workflow is performed for all workpiece carriers whenever they pass through the insertion stations.

4 Transport

The linear indexing conveyor can be transported using hoisting tackle and a crane or a forklift truck. Four eye bolts (Figure 2/1 on page 12) (accessory) must be screwed into the linear indexing conveyor to allow the hoisting belts to be attached.

WARNING

The linear indexing conveyor can tip during transport. Risk of injury and damage to property!

CAUTION

Only lift the linear indexing conveyor using these eye bolts.

Only use suitable hoisting gear that is in perfect condition and lifting equipment with an adequate load capacity. Refer to the technical data associated with the contract for details on the weight of the linear indexing conveyor.

Observe the following when transporting the linear indexing conveyor:

- Clean the linear indexing conveyor, see Section 6.
- Pack the linear indexing conveyor in PVC sheeting or waxed paper and, if necessary, include desiccant in the packaging.
- Pack electrical components so that they are protected against jolts or breakage.

Label the packaging to indicate the delicate nature of the cargo (e.g. TOP, FRAGILE, DO NOT BEND) and apply appropriate transport markings (e.g. mark the center of gravity). Any regulations and transport conditions laid down by the transportation company must be observed in addition to these measures.

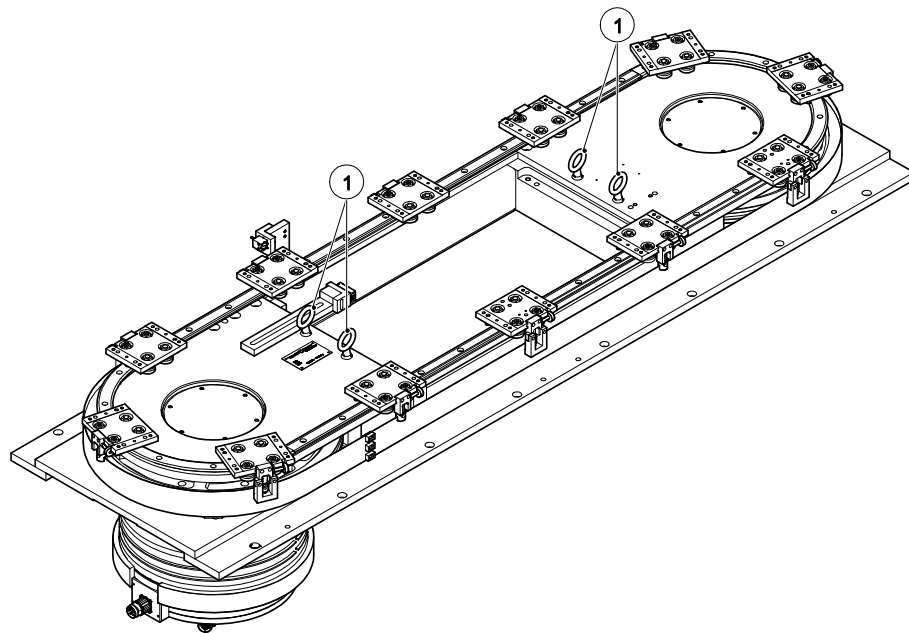


Figure 2 Arrangement of the eye bolts

- 1 Eye bolts; 4x (accessories)

5 Installation, commissioning and operation

5.1 Installation of the linear indexing conveyor in the surrounding construction

The linear indexing conveyor is delivered packed on a pallet. Four eye bolts (Figure 2/1) to which hoisting gear can be attached are screwed into the linear unit.

CAUTION *Only lift the linear indexing conveyor using these eye bolts.*

Remove the packaging and transport securing devices before installation. Check that the linear indexing conveyor is complete and clean.

The customer is responsible for installing the linear indexing conveyor and connecting it to the PLC of the overall system. The circuit diagrams and program controllers specific to a given contract are included with the delivery.

The safety information contained in these Operating Instructions must be observed when installing and connecting the linear indexing conveyor.

The following conditions must be met with respect to the installation construction:

- The installation construction must be absolutely horizontal (0° inclination).
- The surface on which the linear indexing conveyor rests must be flat and clean.

Remove the four eye bolts (Figure 2/1) after installation.

5.2 Commissioning and operation of the installed linear indexing conveyor

CAUTION *The linear indexing conveyor may only be used in closed, clean, dry rooms and within the specified operating limits. Heavy sailing of the rails must always be prevented.*

After it has been installed, the linear indexing conveyor is controlled during commissioning and productive operation using the programmable logic controller (PLC) of the overall system.

6 Maintenance

6.1 Maintenance table

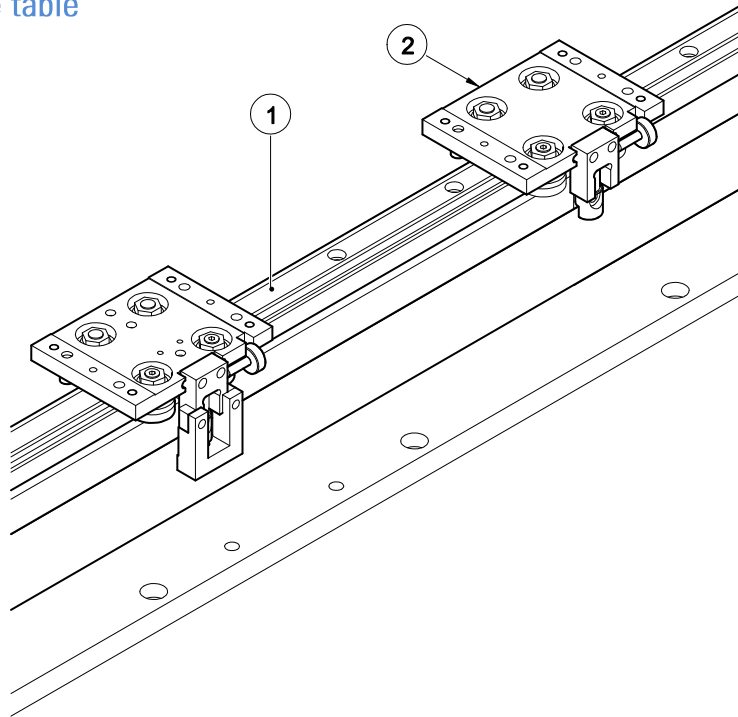


Figure 3 Maintenance tasks

Interval	Position	Activity
100 h	-	Clean the linear indexing conveyor
100 h	1	Clean the rail and apply anti-corrosion oil
100 h	2	Soak the lubrication blocks on the workpiece carrier with oil. Oil viscosity: 68 cSt (or equivalent)

Observe the following notes on the use of cleaning agents and on carrying out cleaning:

- Only use solvent-free, water-soluble cleaning agents.
 - Do not use flammable cleaning agents.
 - Do not use aggressive cleaning equipment.
 - Do not use steam or cryogenic fluids for cleaning.
 - Do not use high-pressure equipment or media for cleaning.
 - Cleaning agents must not be allowed to enter electrical or mechanical components of the system.
- (1) Take the linear indexing conveyor out of operation and ensure that it cannot be switched on.
 - (2) Shut down neighboring components of the system and ensure that they cannot be switched on.
 - (3) Remove any covers that have to be removed in order to carry out cleaning.
 - (4) Clean the linear indexing conveyor.
 - (5) Remove any traces of cleaning agents from the linear indexing conveyor.
 - (6) Clean any corroded areas and apply new corrosion protection.
 - (7) Remove cleaning agents and cleaning equipment from the working area of the linear indexing conveyor.
 - (8) Dispose of cleaning agents properly.
 - (9) Replace any protective and safety equipment that has been removed and checked that it operates correctly.
 - (10) Replace any damaged and illegible labels and covers.
 - (11) Attach any covers that have been removed.
 - (12) Only take linear indexing conveyors and systems into operation again when they are fully functional.

7 Decommissioning, storage and disposal

7.1 Decommissioning

The linear indexing conveyor can be transported using hoisting tackle and a crane or a forklift truck (see Section 4).

- (1) Switch off power and unplug electrical connections.
- (2) Unscrew the screw connections (Figure 1/9) on the frame.
- (3) Screw in four eye bolts (Figure 2/1) and attach hoisting gear.

CAUTION

Only lift the linear indexing conveyor using these eye bolts.

- (4) Lift the linear indexing conveyor, move it away and place it on a pallet.
- (5) Prepare the linear indexing conveyor for storage.

7.2 Storage

Observe the following points if the linear indexing conveyor is stored for an extended period:

- The storage location must be dry and largely free of dust.
- Avoid fluctuations in temperature.
- Avoid wind and drafts.
- Avoid the formation of condensation.
- Select suitable covering material that will be able to withstand environmental influences and will not become detached.
- Do not leave any loose or knocking components on the linear conveyor.
- Do not subject the linear conveyor to direct sunlight during storage.
- Observe the temperature range for storage. See the section entitled "Technical Data".
- Choose a suitable storage location in which the coverings cannot be damaged.
- Clean the linear indexing conveyor. The linear indexing conveyor must be free of all traces of dirt.
- Visually inspect the interior and exterior of the linear indexing conveyor.
- Remove any foreign bodies.
- Treat any possible areas of corrosion.
- Clean and oil the rails and workpiece carriers.
- Cover electrical connectors with suitable caps.

- Cover the linear indexing conveyor with plastic sheeting, ensuring that the covering is dustproof.
 If necessary, use additional desiccant under the plastic sheeting.

7.3 Disposal

When the linear indexing conveyor has come to the end of its service life, it can be removed from the overall system and dismantled and the various groups of materials can be disposed of properly.

8 Technical data

Customer-specific technical data is recorded in the contract documentation.

- Sound intensity level < 78 dB(A)
- Permitted ambient temperature during operation..... 10 – 45 °C
- Permitted humidity during operation:
 non-aggressive, clean, dust-free environment
 at a humidity of between 10 and 85%
 at a height above sea level of < 2000 m (6562 ft)
- Permitted temperature for storage -20 through 100 °C

9 Order-specific data

Order-specific electrical pinouts for the linear indexing conveyor are enclosed to allow electrical installation in the surrounding construction.

10 TAKTOMAT Service

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11 Annex

11.1 Etel DSC2P torque motor controller

The tables below show the pinouts for the Etel controller.

The phase-angle sensor on the torque motor is connected to the motor controller via the connector JC5 (Figure 4).



Figure 4 Etel DSC2P controller

Connector JC5, analog encoder				
Etel controller			Heidenhain sensor	
Pin	Signal	Function	Signal	Color
1	Reserved	Do not connect	-	-
2	Reserved	Do not connect	-	-
3	Reserved	Do not connect	-	-
4	+5 VDC	Encoder output (+5V)	Up (5V)	Brown/green
5	GND	Encoder output (0V)	Un (0V)	White/green
6	COS -	Cosine input -	B -	Pink
7	SIN -	Sine input -	A -	Green
8	IDX -	Index input -	R -	Black
9	Reserved	Do not connect	-	-
10	EHO	Do not connect	-	-
11	ELS	Do not connect	-	-
12	GND	Encoder output (0 V)		
13	COS +	Cosine input +	B +	Gray
14	SIN +	Sine input +	A +	Brown
15	IDX +	Index input +	R +	Red

See also page 23 of the ETEL "DSC2P Hardware Manual" and page 13 of the Heidenhain "RON 285 Fitting Instructions"

The motor is connected via the connector JC7 (Figure 4).

Connector JC7, motor		
Pin	Signal	Function
1	PE	Protective conductor
2	PH3	Motor phase 3
3	PH2	Motor phase 2
4	PH1	Motor phase 1

See also page 34 of the ETEL "DSC2P Hardware Manual".

The PLC, the OMRON sensor, the initialization unit and the power supply are connected to the controller via connector JC9 (Figure 4).

Connector JC9 inputs/outputs				
Pin	Signal	Function	From/to	Color/designation
1	GND	Auxiliary voltage output (0V)	Unassigned	
2	AIN1 +	Analog input 1 +	OMRON	Inner wire (black)
3	GNDext	External voltage input (0V)	Transformer	
4	DOUT1	Digital output 1 +	PLC	Error
5	DOUT3	Digital output 3 +	PLC	Ready
6	DIN1 +	Digital input 1 +	PLC	Manual/automatic
7	DIN3 +	Digital input 3 +	PLC	Step
8	DIN9 +	Digital input 9 +	Ini	WT 1
9	AIN1 -	Analog input 1 -	OMRON	Shielding (black)
10	DOUT4	Digital output 4 +	PLC	In position
11	+Vext	External voltage input (24V)	Transformer	
12	DOUT2	Digital output 2 +	PLC	Referencing
13	DIN2 +	Digital input 2 +	PLC	Manual left
14	DIN4 +	Digital input 4 +	PLC	Manual right
15	DIN10 +	Digital input 10 +	PLC	Emergency stop

See also page 30 of the ETEL "DSC2P Hardware Manual" and page 29 of the OMRON "Smart Sensors Operating Instructions: Laser Sensors".

The temperature sensor for monitoring the motor is connected to connector JC10 (Figure 4).

Connector JC10, temperature sensor				
Pin	Signal	Function	From	Color
1	GNDext	External voltage input (0V) (the same GNDext as for JC9)	S01.120	Pink
2	Unassigned	-	-	-
3	Unassigned	-	-	-
4	Unassigned	-	-	-
5	Unassigned	-	-	-
6	TSD	Digital temperature sensor input	S01.120	Blue
7	Unassigned	-	-	-
8	Unassigned	-	-	-
9	Unassigned	-	-	-
See also page 28 of the ETEL "DSC2P Hardware Manual".				

Note: After connecting the temperature connector, parameter K141 must be set to 1 in the Etel controller.

An auxiliary relay which allows the power supply to the motor to be interrupted is connected to connector JC12 (Figure 4).

Connector JC12, safety relay		
Pin	Signal	Function
1	Short-circuit relay	Short-circuit relay input (+24V)
2	GNDaux	Auxiliary voltage input (0V)
3	Vaux	Auxiliary voltage input (+24V)
4	Safety relay -	Safety relay input (+0V)
5	Safety relay +	Safety relay input (+24V)
See also pages 37 and 38 of the ETEL "DSC2P Hardware Manual".		

The supply voltage is connected to connector JC13 (Figure 4).

Connector JC13, power supply		
Pin	Signal	Function
1	PE	Protective conductor
2	L1	Line input 400V 50 Hz
3	L2	Line input 400V 50 Hz
4	L3	Line input 400V 50 Hz
See also page 37 of the ETEL "DSC2P Hardware Manual".		

Connector JC14 (Figure 4) is used to connect the external braking resistor.

Connector JC14, external braking resistor		
Pin	Signal	Function
1	R -	External braking resistor
2	R +	External braking resistor
See also page 38 of the ETEL "DSC2P Hardware Manual".		

11.2 Moving the zero point using the OMRON sensor

It is possible to change the zero point of the OMRON sensor. This is useful, for instance, if the position to be approached needs to be moved by a few millimeters. In order to achieve this, an offset value by which the zero point is to be moved is entered in the sensor.

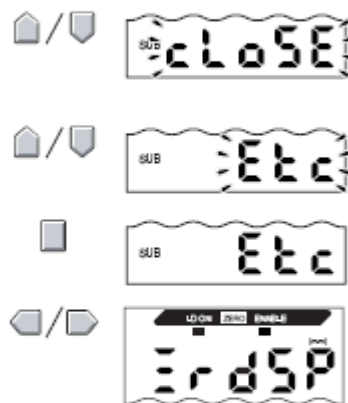
The offset value is set as follows:

a) Switching to function mode (FUN) and to the function SPCL:



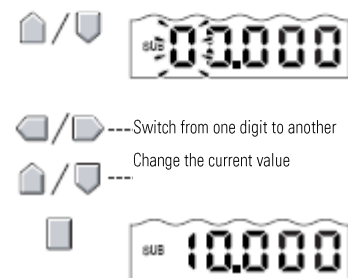
1. Set the mode selection switch to FUN (function mode).
2. Use the Left and Right buttons until [SPCL] is shown on the main display.

b) Switching to ZRDSP:



3. Press the Up or Down button. (The subsidiary display flashes.)
4. Press the Up or Down buttons until [ETC] or [ALL] is shown.
5. Press the Enter button (ENT).
6. Use the Left and Right buttons until [ZRDSP] is shown on the main display.

c) Setting the offset value



7. Press the Up or Down button. (The left digit of the subordinate display flashes.)
8. Set the required offset value.
9. Confirm your entries by pressing the Enter button (ENT). (The setting is saved.)

Now the voltage at the analog output is not equal to 0V at the original zero point. The voltage is 0V at the new zero point, which differs from the old zero point by the offset value set.