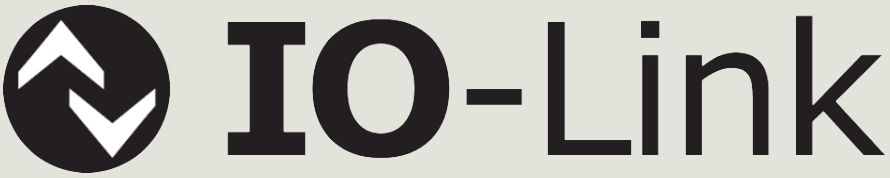
IO-Link

User Manual



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WE IMPROVE YOUR LIFE

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Preface

Dear User,

We are delighted that you have chosen a LINAK® product.

LINAK systems are high-tech products based on many years of experience in the manufacture and development of actuators, lifting columns, desk frames, electric control boxes, controls, batteries, accessories and chargers.

This User Manual does not address the end user. It is intended as a source of information for the equipment or system manufacturer only, and it will tell you how to install, use and maintain your LINAK electronics. The manufacturer of the end product has the responsibility to provide a User Manual, where relevant safety information from this manual is passed on to the end user.

We are convinced that your LINAK product/system will give you many years of problem-free operation.

Before our products leave the factory, they undergo both function and quality testing. Should you, nevertheless, experience problems with your product/system, you are always welcome to contact your supplier.

LINAK subsidiaries and some distributors situated all over the world have authorised service centres, which are always ready to help you. Locate your local contact information on the back page.

LINAK provides a warranty on all products. (See warranty section).

This warranty, however, is subject to correct use in accordance with the specifications, maintenance being done correctly, and any repairs being carried out at a service centre, which is authorised to repair LINAK products.

Changes in installation and use of LINAK systems can affect their operation and durability. The products may only be opened by authorised personnel.

This User Manual has been written based on the present technical knowledge. LINAK reserves the right to carry out technical modifications and keeps the associated information updated.

LINAK A/S

Terms of use

LINAK® takes great care in providing accurate and up-to-date information on its products. However, the user is responsible for determining the suitability of LINAK products for a specific application.

Due to continual development, LINAK products are subject to frequent modifications and changes. LINAK reserves the rights to conduct modifications, updates, and changes without any prior notice. For the same reason, LINAK cannot guarantee the correctness and actual status of imprinted information on its products.

LINAK uses its best efforts to fulfil orders. However, for the reasons mentioned above, LINAK cannot guarantee availability of any particular product at any given time. LINAK reserves the right to discontinue the sale of any product displayed on its website or listed in its catalogues or in other written material created and produced by LINAK, LINAK subsidiaries, or LINAK affiliates.

All sales are subject to the 'Standard Terms of Sale and Delivery for LINAK A/S' available on LINAK websites.

Revision overview

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Voltages removed from connection diagram and I/O specifications	Page 6-8
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Number of pins in connectors removed from 'Configuration' section	Page 13
Information regarding reversed data order added	Page 18-20
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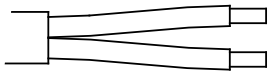
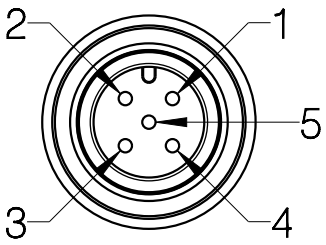
Identical cells in tables merged	All over the document
'Read' and 'Write' changed to 'R' and 'W'	All over the document
LA14, LA25, LA21, LA73 and LC3 IC added	All over the document

Connection diagram

Applicable for: LA14, LA25, LA21, LA33, LA36, LA37, LA73, LA76, LA77 and LC3 IC

BROWN	V DC	
BLUE	GND	
ORANGE	L+ IO-Link Supply V DC	1
GREY	C/Q IO-Link	4
LIGHT BLUE	L- IO-Link Supply GND	3
RED*	Extends the actuator	
BLACK*	Retracts the actuator	
VIOLET*	Parallel data +	
WHITE*	Parallel data -	
GREEN	Not to be connected	
YELLOW	Not to be connected	





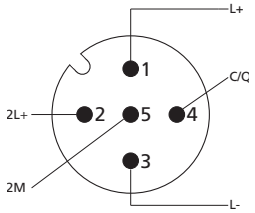
M12 connector
A-Code male

Connections marked with * are only available with flying leads.

The cable colours from the actuator and the M12 port numbers are specified in the table below.
In a setup where the Violet and White wires are not used, we strongly recommend insulating these to avoid short circuits and eventually damaging the actuator.

Please be aware that if the power supply is not properly connected, you might damage the actuator!

I/O specifications

Input/Output	Specification	Comments
Description	IO-Link is standardised IO technology (IEC 61131-9) for the communication with actuators. The point-to-point communication is based on the long established actuator connection without additional requirements regarding the cable material. IO-Link is no fieldbus but the further development of the existing, tried-and-tested connection technology for actuators.	IO-Link
Brown	Connect Brown to positive Power supply motor V DC	Note: Do not change the power supply polarity on the Brown and Blue wires! Power supply GND is electrically connected to the housing through a capacitor and resistor in parallel.
Blue	Connect Blue to negative Power supply motor (GND)	
PIN out	**M12 Flying leads**	
Pin 1 Orange	L+ IO-Link supply V DC	 IO-Link and M12 connector is a plug-and-play solution. If flying leads is the preferred option, please be aware that the LINAK cable colours differ from the IO-Link standard. Transmission rate: 38.4 kbaud (COM 2) Max cable length: 20 meters The IODD file describes the parameters and can be found here: https://ioddfinder.io-link.com
Pin 4 Grey	C/Q IO-Link	
Pin 3 Light Blue	L- IO-Link supply GND	

I/O specifications

Input/Output	Specification	Comments
Red	Extends the actuator (Disabled during Bus activity)	The signal becomes active at: V_{IN} >67% of V DC = ON The signal becomes inactive at: V_{IN} <33% of V DC = OFF Input current: <10 mA Manual run (optional) uses the common GND from the power supply (Blue wire)
Black	Retracts the actuator (Disabled during Bus activity)	
Violet	Parallel data +	The Parallel drive function will support up to 8 actuators running simultaneously. It is possible to run Parallel with a main power supply or separate power supplies. If separate supplies are used, they must have the same potential, and the power supply GND (Blue wires) must be connected in the common ground.
White	Parallel data -	

Protection

Current limit

Current limits can be configured to avoid crushing when meeting an obstacle. These values can be adjusted according to your preferences. Use default values or fine-tune your current limits with 0.25 A/bit.

It is important to note that current limits should not be relied upon as a general stop function, as this will potentially stress the mechanics and could lead to long-term damage to the actuator.

Furthermore, current limits do not correlate directly with the actuator's load curves, meaning they should not be used as indicators of load. Various tolerances in components such as the spindle, nut, and gears can also affect the current consumption of the actuator. Operation in environments with temperatures below 0°C will also increase the current consumption. When temperature drops below 0°C, the default current limit will change to a higher value.

Actuator specific current limit values (above and below reference temp.) can be found in the respective actuator user manual or in the Actuator Connect™ service tool under 'Protection'.

Parallel

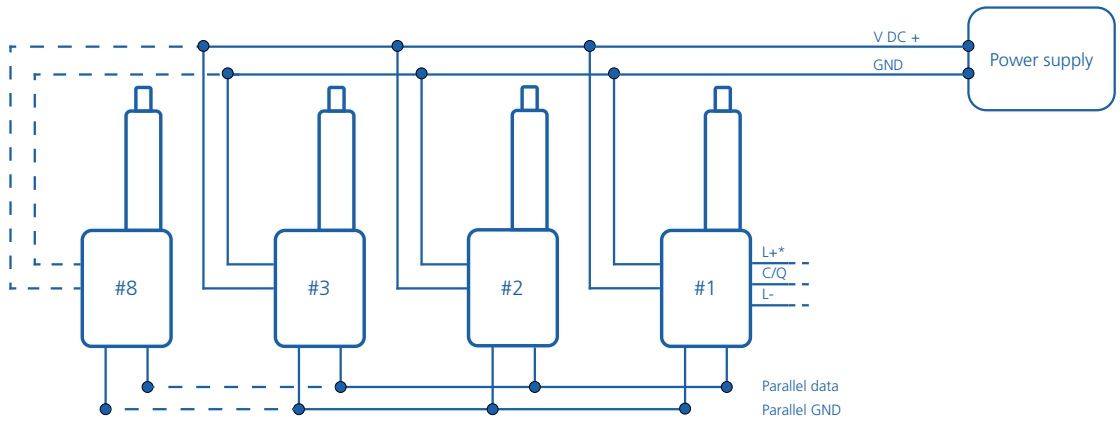
The industrial LINAK® actuators can be ordered with parallel functionality. If this feature is enabled, it is possible to run up to 8 actuators in a parallel system with just one actuator occupying an IO-Link master connection. The system works as a critical parallel, meaning that all actuators must be present in the system and have the exact same configuration (both mechanical and software functionality).

Below is a checklist to ensure that the system operates as intended:

Action	Description
Set up parallel in Actuator Connect	Each actuator must be configured to operate in parallel (2-8 actuators). This can be set up using the Actuator Connect tool. *Please note: In some cases this is pre-configured from factory.*
Wire up the system	The actuators feature internal communication for parallel synchronisation and error codes. Parallel communication utilises two wires, which must be separately connected in a junction box (see connection diagram).
Check cable lengths	Keep the total length of the communication line below 40 meters to avoid communication dropouts. In a parallel system with 8 actuators this would result in signal cable lengths of <5 metres.
Check power supply	It is also possible to use two or more separate power supplies in parallel under the condition that they have the same voltage and wattage output. It is essential that all power supplies share a common ground connection (Blue wire). Please respect actuator specifications regarding voltage level and current consumption!

Parallel

Option 1 - A simple parallel setup

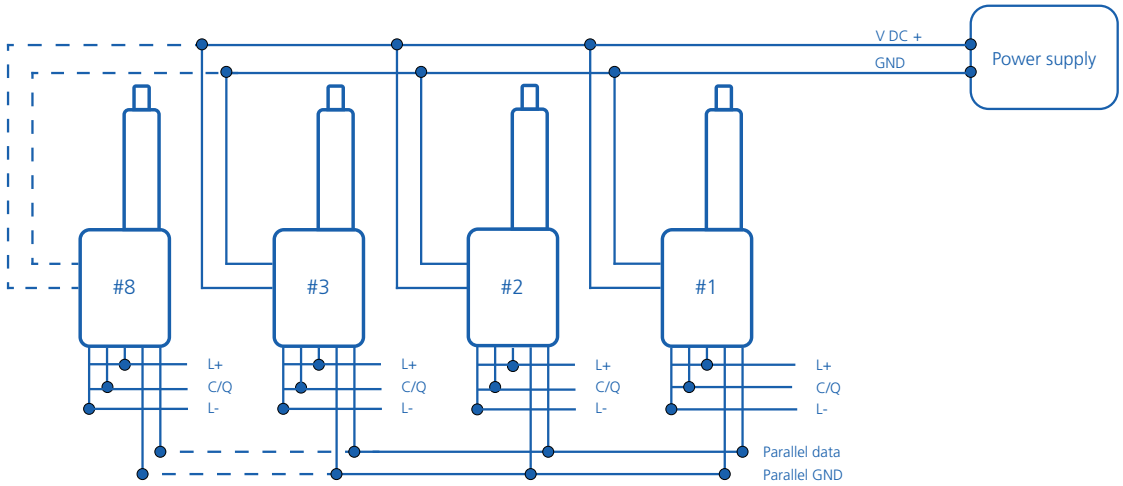


In a simple parallel setup there is only one actuator connected to the point-to-point communication. This actuator receives run commands and shares data with the BUS controller. The remaining actuators in the system are only connected to internal parallel communication. This way, the internal communication ensures that the system operates in parallel and stops in case of an obstacle, or when other errors occur on one of the actuators.

The actuators share simple error messages with the master, which can be distributed via the point-to-point communication.

* Please be aware that Port Class A is used in this example.

Option 2 - Bus communication on all actuators



If there is a need for e.g. monitoring the real-time data of each actuator, it is possible to connect all actuators as nodes to the point-to-point communication. This will provide comprehensive usage data, which can be used to enhance performance in the application. Similar to option 1, this requires that all actuators are connected to internal parallel communication.

It is also possible to use two separate power supplies in parallel under the condition that they have the same voltage and wattage output. It is essential that both power supplies share a common ground connection (Blue wire).

Getting started

This section further describes how to communicate with LINAK® IO-Link actuators and contains examples of typical user scenarios and application solutions. All examples include references to registers which are further described in detail below.

IO-Link IODD

An IO Device Description (IODD) file provides a complete specification of an IO-Link device, including its identity, parameters, process data, and diagnostic details. Acting as both an electronic data sheet and a programmer's guide, it ensures seamless integration and interoperability across devices from different manufacturers by enabling IO-Link masters to automatically configure and communicate with them.

The LINAK_IO_Link_IODDL file is available for download by using the following link: LINAK_IO_Link_IODDL.zip

*Be aware that there are 2 versions for LA25.

Power supply

IO-Link actuators are available with the following supply voltage range: 24 V DC. Actuator specific voltage ranges are specified in the tables below:

Supply voltage	LA14	LA25	LA21	LA33	LA36	LA37	LA73	LA76	LA77	LC3 IC
24 V	√	√	√	√	√	√	√	√	√	√

The accepted supply voltage range is specified for the version as shown below:

Supply voltage	Function	Voltage range		
		V_{MIN}	V_{TYP}	V_{MAX}
24 V	Motor	18 V	24 V	32 V
	IO-Link communication	10 V	24 V	39 V

Setting up the master

In the module settings of the master it is possible to change the "Mode Pin2" (Actuator Supply UA). We recommend configuring the IO port used for the actuator as a "Class A".

When "Class A" is configured, it is not possible to power the motor part of the actuator (Brown and Blue wires) from the IO port of the master.

If the actuator's current draw is less than 2 A, it is possible to power the actuator from the IO port by configuring the port as "Class B" and changing the wiring accordingly.

The configuration parameters need to be filled in, and these parameters will be the "Default value" when sending "251" in Process Data Out. The actuator will not be able to run if the default value for current limits or maximum speed is "0".

Protection

Lost Communication Position

The Lost Communication Position function is designed for applications where there is a risk of intermittent or failed communication between the controller and the actuator. If the actuator loses position feedback due to poor connection, cable damage, or complete communication loss, it can automatically move to a predefined access position—even without any incoming commands from the controller.

The function is governed by two key parameters:

- Access Position (mm)

Defines the mechanical position to which the actuator will automatically drive if communication is lost.

The actuator will move to this position using the currently configured parameters, including speed, soft start, and soft stop.

- Heartbeat Timeout (ms)

Defines the maximum allowed interval without receiving a valid heartbeat frame. If this timeout expires, the actuator assumes communication has been lost and initiates movement toward the configured access position. After the actuator reaches the access position and the heartbeat signal has been restored, the actuator will again accept and execute new incoming commands.

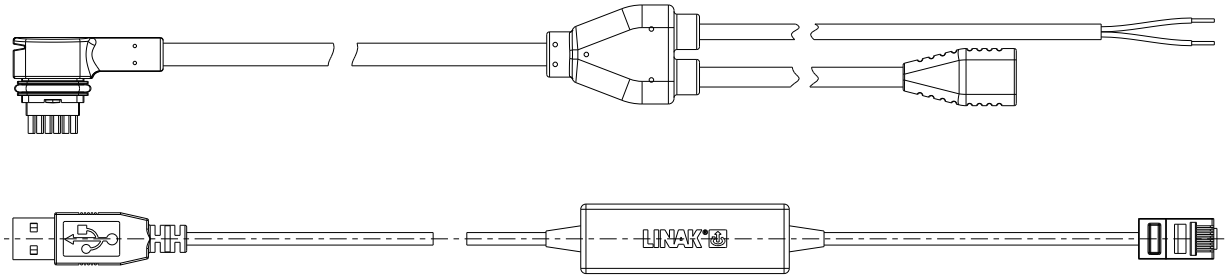
Configuration

Before being integrated into an IO-Link system, a few of the actuator parameters must be checked and eventually changed. This preparation is done via the use of the configuration tool Actuator Connect™ and guarantees that the actuator is able to execute basic functionality.

Further fine-tuning may be required to fulfil system or application requirements. Via this tool it is also possible to access historical usage data and real-time monitoring.

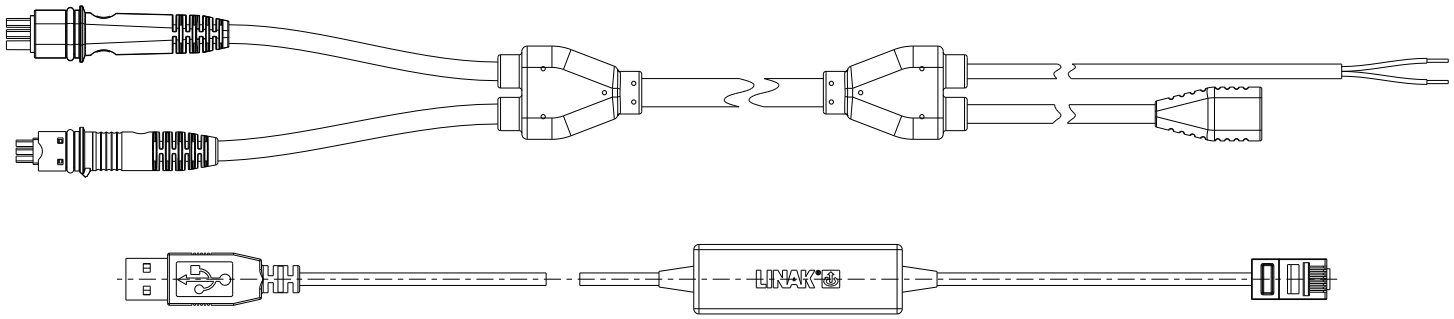
Valid for LA14 and LA25:

A separate configuration cable kit (item no. 0257901 = straight Y-cable + USB2LIN) is required to use Actuator Connect on a PC. This cable must be connected to the actuator. On the opposite side, power must be applied to the flying leads, and the USB connector must be inserted into your PC.



Valid for LA21, LA33, LA36, LA37, LA73, LA76, LA77 and LC3 IC:

A separate configuration cable kit (item no. 0367996 = straight Y-cable + USB2LIN) is required to use Actuator Connect on a PC. This cable must be connected to the actuator. On the opposite side, power must be applied to the flying leads, and the USB connector must be inserted into your PC.



For more information about wiring/connector, please see the Connection Diagram.

Command examples

Before the actuator can engage movement, some general prerequisites must be fulfilled. Timing (e.g. when the actuator is still moving), environmental conditions and errors may indicate that the actuator is in a state where further operation is not possible.

General run prerequisites

Step	Read/ Write	Process data*	Action
1	W	PDO Byte 0-1	"Position" must be set to = 64259 [0xFB03] for 'Stop' To prevent unintended movement, it is required to send a 'Stop' command before running the actuator
2	R	PDI Byte 4	"Error Code" must be = 0 [0x00]
3		PDI Byte 3	"Status Flags" bit 2 (Overcurrent) must be = 0
4		PDI Byte 3	"Status Flags" bit 5 (Heartbeat needed) must be = 0
5		PDI Byte 3	"Status Flags" bit 6 (Actuator is running outside nominal conditions) must be = 0

* PDI = Process Data In / PDO = Process Data Out

Run the actuator outwards

Step	Read/ Write	Process data*	Action
1		-	Check that general run prerequisites are fulfilled
2	W	PDO Byte 2	"Current" must be set to a value 0-250 [0x00-FA] = Current limit 0.25 A/bit 251 [0xFB] = Default current limit set via Actuator Connect™ 252-255 [0xFC-FF] = Reserved
3		PDO Byte 3	"Speed" must be set to a value 0-200 [0x00-FA] = Speed 0.5% /bit 201-250 [0xC9-FA] = 100% speed 251 [0xFB] = Default speed set via Actuator Connect 252-255 [0xFC-FF] = Reserved
4		PDO Byte 4	"Soft Start" must be set to a value 0-200 [0x00-FA] = Start ramp time 0.05 s/bit 251 [0xFB] = Default speed set via Actuator Connect 252-255 [0xFC-FF] = Reserved
5		PDO Byte 5	"Soft Stop" must be set to a value 0-200 [0x00-FA] = Stop ramp time 0.05 s/bit 251 [0xFB] = Default speed set via Actuator Connect 252-255 [0xFC-FF] = Reserved
6		PDO Byte 0-1	"Position" must be set to = 64257 [0xFB01] for 'Run out'
7**	R	PDI Byte 3	"Status Flags" bit 3 and bit 1 change to 1, to indicate that: Bit 3 = Actuator is running out Bit 1 = Endstop reached out

* PDI = Process Data In / PDO = Process Data Out
** Optional

Run the actuator to target position (150 mm)

Step	Read/ Write	Process data*	Action
1		-	Check that general run prerequisites are fulfilled
2	W	PDO Byte 2	"Current" must be set to a value 0-250 [0x00-FA] = Current limit 0.25 A/bit 251 [0xFB] = Default current limit set via Actuator Connect™ 252-255 [0xFC-FF] = Reserved
3		PDO Byte 3	"Speed" must be set to a value 0-200 [0x00-FA] = Speed 0.5% /bit 201-250 [0xC9-FA] = 100% speed 251 [0xFB] = Default speed set via Actuator Connect 252-255 [0xFC-FF] = Reserved
4		PDO Byte 4	"Soft Start" must be set to a value 0-200 [0x00-FA] = Start ramp time 0.05 s/bit 251 [0xFB] = Default speed set via Actuator Connect 252-255 [0xFC-FF] = Reserved
5		PDO Byte 5	"Soft Stop" must be set to a value 0-200 [0x00-FA] = Stop ramp time 0.05 s/bit 251 [0xFB] = Default speed set via Actuator Connect 252-255 [0xFC-FF] = Reserved
6		PDO Byte 0-1	"Position" must be set to = 1500 [0x05DC] for 'Run to Target Position 150 mm'
7**	R	PDI Byte 3	"Status Flags" bit 3 or bit 4 change to 1, to indicate that either: Bit 3 = Actuator is running out Bit 4 = Actuator is running in

* PDI = Process Data In / PDO = Process Data Out
** Optional

Overcurrent state

If an overcurrent occurs, the actuator will be stopped and blocked in that direction until an activation in the opposite direction has been made or the system has been re-powered.

Step	Read/ Write	Process data*	Action
1	R	PDI Byte 3	Confirm that "Status Flags" bit 2 is = 1 for 'Overcurrent'
2	W	PDO Byte 0-1	"Position" must be set to run in the opposite direction of the blockage Set to = 64257 [0xFB01] for 'Run out' or Set to = 64258 [0xFB02] for 'Run in'
3**	R	PDI Byte 3	"Status Flags" bit change to 1, to indicate that either: Bit 3 = Actuator is running out Bit 4 = Actuator is running in Bit 1 = Endstop reached out Bit 0 = Endstop reached in

Clear error

If an error occurs, the actuator will be stopped, and normal movement will not be possible.

Step	Read/ Write	Process Data*	Action
1	R	PDI Byte 4	Confirm that "Error Code" is not = 0
2	W	PDO Byte 0-1	"Position" set to = 64256 (Clear Error Codes)
3	R	PDI Byte 4	Confirm that "Error Code" is = 0 If "Error Code" is not = 0, then correct the error in the system and repeat step 2.

* PDI = Process Data In / PDO = Process Data Out

Process data

IO-Link process data represents real-time input or output data from the actuator, such as position, speed, or states.

This data is exchanged cyclically between the IO-Link master and field devices at fixed intervals defined by the controller.

The size of both process data in and out is 8 bytes.

Process Data Out (Command)

Command Process Data Out (PDO) Real-time cyclic data exchange							
Byte 7 [MSB]	**Byte 6**	**Byte 5**	**Byte 4**	**Byte 3**	**Byte 2**	**Byte 1**	**Byte 0 [LSB]**
Reserved	Reserved	Ramp Down	Ramp Up	Speed	Current Limit	Position	

Byte(s)	Command	Data type	Details	Description	Scaling
Byte 0-1	Position	UINT16	0–64255	Run to position	0.1 mm/bit
			64256	Clear Error Codes (see Process Data In Byte 4)	
			64257	Run out	
			64258	Run in	
			64259	Stop	
			64260	Recovery run out	
			64261	Recovery run in	
			64262– 65535	Invalid value, actuator will not run	
Byte 2	Current	UINT8	0–250	Maximum current limit	0.25 A/bit
			251	Use default current value	
			252–255	Invalid value, actuator will not run	
Byte 3	Speed	UINT8	0–200	Speed	0.5% /bit
			201–250	100% speed	
			251	Default speed	
			252–255	Invalid value, actuator will not run	
Byte 4	Ramp Up	UINT8	0–250	Ramp up time	0.05 s/bit
			251	Default ramp up time	
			252–255	Invalid value, actuator will not run	
Byte 5	Ramp Down	UINT8	0–250	Ramp down time	0.05 s/bit
			251	Default ramp down time	
			252–255	Invalid value, actuator will not run	
Byte 6	Reserved	UINT8	Reserved	Reserved	
Byte 7	Reserved	UINT8			

Some controllers may reverse the data order. Please make sure that the correct Most Significant Byte [MSB] and Least Significant Byte [LSB] are matching your configuration.

Process Data In (Feedback)

Feedback Process Data In (PDI) Real-time cyclic data exchange							
Byte 7 [MSB]	**Byte 6**	**Byte 5**	**Byte 4**	**Byte 3**	**Byte 2**	**Byte 1**	**Byte 0 [LSB]**
Reserved	Speed		Error Code	Status Flags	Current Draw	Position	

Byte(s)	Command	Data type	Details	Description	Scaling
Byte 0-1	Position	UINT16	0–64255	Position of the actuator piston	0.1 mm/bit
			64256– 65023	Reserved	
			65024	Position lost	
			65025– 65535	Reserved	
Byte 2	Current Draw	UINT8	0	Not running	0.25 A/bit
			1–250	Motor current draw	
			251–253	Reserved	
			254	Fault in current measurement circuit	
			255	Reserved	
Byte 3	Status Flags	UINT8	b0	Endstop reached in	Bit-independent status indicators
			b1	Endstop reached out	
			b2	Overcurrent	
			b3	Running out	
			b4	Running in	
			b5	Communication heartbeat needed	
			b6	Actuator is running outside nominal conditions	
			b7	Reserved. Always high	
Byte 4	Error Code*	UINT8	0	No error detected	8-bit error code showing the current active error with the highest priority only
			1	Power on block state	
			2	Position sensor	
			3	Overvoltage	
			4	Undervoltage	
			5	Communication sync.	

* See error code descriptions in section: Error codes

Some controllers may reverse the data order. Please make sure that the correct Most Significant Byte [MSB] and Least Significant Byte [LSB] are matching your configuration.

Process Data In (Feedback)

Byte(s)	Command	Data type	Details	Description	Scaling
Byte 4	Error Code*	UINT8	6	Endstop switch	8-bit error code showing the current active error with the highest priority only
			7	Temperature	
			8	Motor controller	
			9	Internal power supply	
			10	Internal current measurement	
			11	Parallel arbitration	
			12	Position not changing	
			13	Position initialisation not possible	
			14	Alone in parallel system	
			15	Incorrect number in parallel system	
			16	Hardware	
			17	BLDC motor	
			18	Parallel communication	
			19	Parallel running	
			20	Parallel setup stopped	
			254	Other internal error (Not specified)	
			255	Other external error (Not specified)	
Byte 5	Reserved	UINT8	Reserved	Reserved. Always high	
Byte 6-7	Speed	UINT16	0–4015	Speed of actuator	0.1 mm/s /bit
			4016-65535	Reserved	

* See error code descriptions in section: Error codes

Some controllers may reverse the data order. Please make sure that the correct Most Significant Byte [MSB] and Least Significant Byte [LSB] are matching your configuration.

Service Data (ISDU)

IO-Link service data (also called device data or ISDU data) is information about the connected IO-Link device itself, such as its manufacturer, model, part number, serial number, and parameters.

This data is exchanged acyclically, meaning it is only sent when requested by the IO-Link master or PLC, and is used for device management, identification, and diagnostics, rather than for real-time operational control.

Identification

Identification **Service Data (ISDU)** Acyclic data exchange				
Index	**Parameter**	**Data type**	**Description**	**Access**
16	Vendor name	STRING 64	The vendor name that is assigned to a vendor ID	R
17	Vendor text		Additional information about the vendor	
18	Product name		Complete product name	
19	Product ID		Vendor-specific product or type identification (e.g. item number or model number)	
20	Product text		Additional product information for the device	
22	Hardware revision		Unique vendor-specific identifier of the hardware revision of the individual device	
23	Firmware revision		Unique vendor-specific identifier of the firmware revision of the individual device	

Parameters

Parameters **Service Data (ISDU)** Acyclic data exchange						
Index	**Parameter**	**Data type**	**Details**	**Description**	**Scaling**	**Access**
4096	Current Limit - Outwards	UINT8	0-255	Works only when PDO “Current” is 251*	0.25 A/bit	R/W
4097	Current Limit - Inwards					
4098	Ramp Up - Outwards	UINT16	0-65535	Works only when PDO “Ramp Up” is 251.	1 ms/bit	
4099	Ramp Up - Inwards					
4100	Ramp Down - Outwards			Works only when PDO “Ramp Down” is 251.		
4101	Ramp Down - Inwards					
4102	Maximum Speed	UINT8	0–200	Overrules PDO “Speed”.	0.5% /bit	
			201–255		100%	

*Actuator must power cycle before changes apply.

Parameters

Parameters Service Data (ISDU) Acyclic data exchange						
Index	**Parameter**	**Data type**	**Details**	**Description**	**Scaling**	**Access**
4103	Virtual Endstop - Outwards	UINT16	0	Sets the Virtual Endstop Outwards position	Disabled	R/W
			1-699		Do NOT set below 70 mm*	
			700-65535		0.1 mm/bit	
4104	Virtual Endstop - Inwards		0	Sets the Virtual Endstop In position	Disabled	
			1-350		0.1 mm/bit	
			351-65535		Do NOT set above 35 mm	

* Virtual limits set in the Initialisation zone will make initialisation impossible.

Diagnosis

Diagnosis Service Data (ISDU) Acyclic data exchange						
Index	**Parameter**	**Data type**	**Details**	**Description**	**Scaling**	**Access**
4105	UIN	UINT32		Unique 8-digit identification number		R
Software						
4106	Variant	UINT32		SW**xxxxxxx**Vx-x		R
4107	Version Major			SWxxxxxxxV**x**-x		
4108	Version Minor			SWxxxxxxxVx-**x**		
4109	Config. production order no.	UINT32		Unique 8-digit identification number		R
4110	Production date			yyyymmdd		
4111	Max. current seen	UINT8		0.25 A/bit		
4112	Max. FET temperature seen			1°C /bit - 40°C		
4113	Max. ambient temperature seen					
4114	Min. ambient temperature seen					
4115	Total current usage	UINT32		1 (Ampere*seconds)/bit		
4116	Total runtime			1 s/bit		
Number of stops due to						
4117	Overvoltage	UINT8		Number of stops		R
4118	FET overtemperature					
4119	Ambient overtemperature					
4120	Undervoltage					
4121	Hall error					
4122	Endstop switch error					
4123	Default current limit overload - out					
4124	Default current limit overload - in					
Number of resettable stops due to						
4125	Custom current limit overload - out	UINT8		Can be used to keep track of current overload stops from the last reset. Can only be set to 0.		R/W
4126	Custom current limit overload - in					

Diagnosis

Diagnosis Service Data (ISDU) Acyclic data exchange						
Index	**Parameter**	**Data type**	**Details**	**Description**	**Scaling**	**Access**
Number of						
4127	Communication errors	UINT16		Number of		R
4128	Endstops reached - out	UINT32				
4129	Endstops reached - in					
4130	Starts - out					
4131	Starts - in					
4132	Total piston distance travelled	UINT32		5 m/bit		R
Reason for last stop - ID 0: See Reason for Last Stop definitions in section below						
4133	Reason	UINT16		Reason for stop		R
4134	Count	UINT8		Number of stops in a row		
4135	Powered time	UINT32			1 s/bit	
Reason for last stop - ID 1: See Reason for Last Stop definitions in section below						
4136	Reason	UINT16		Reason for stop		R
4137	Count	UINT8		Number of stops in a row		
4138	Powered time	UINT32		Powered time when the last stop occurred	1 s/bit	
Reason for last stop - ID 2: See Reason for Last Stop definitions in section below						
4139	Reason	UINT16		Reason for stop		R
4140	Count	UINT8		Number of stops in a row		
4141	Powered time	UINT32		Powered time when the last stop occurred	1 s/bit	
Reason for last stop - ID 3: See Reason for Last Stop definitions in section below						
4142	Reason	UINT16		Reason for stop		R
4143	Count	UINT8		Number of stops in a row		
4144	Powered time	UINT32		Powered time when the last stop occurred	1 s/bit	
Reason for last stop - ID 4: See Reason for Last Stop definitions in section below						
4145	Reason	UINT16		Reason for stop		R
4146	Count	UINT8		Number of stops in a row		
4147	Powered time	UINT32		Powered time when the last stop occurred	1 s/bit	

Diagnosis

Diagnosis Service Data (ISDU) Acyclic data exchange						
Index	**Parameter**	**Data type**	**Details**	**Description**	**Scaling**	**Access**
4148	Total corrected distance	UINT32		1 mm/bit		R
4149	FET temperature	UINT8		1°C /bit - 40°C		
4150	Ambient temperature					
4151	Number of Hall shifts at learn	UINT16		0.1 mm/bit		
4152	Zero Point offset at learn					
4153	Production order no.	UINT32		Unique 8-digit identification number		
LINAK special functions						
4154	Functions	UINT8	0	Reserved		R/W
			1	Restart actuator		
			2-255	Reserved		
UIN in parallel system						
4155	UIN 1	UINT32		Sorted in descending order		R
4156	UIN 2					
4157	UIN 3					
4158	UIN 4					
4159	UIN 5					
4160	UIN 6					
4161	UIN 7					
4162	UIN 8					

Parallel feedback

Diagnosis (Parallel feedback) Service Data (ISDU) Acyclic data exchange					
Index	**Command**	**Data type**	**Details**	**Description**	**Scaling**
4352	Parallel Error Source	UINT32	0	No error detected	
			1-4.294.967.295	UIN of actuator with highest priority error	
4353	Parallel Error Group	UINT8	0	No error detected	8-bit error code indicating the currently active error of highest priority on any actuator in the parallel system
			1	Current overload	
			2	Hardware	
			3	Temperature	
			4	Overvoltage	
			5	Undervoltage	
			6	Analogue input out of range error	
			7	Position not changing	
			8	Power on block state	
			9	Position initialisation not possible	
			10	Parallel start-up	
			11	Parallel running	
			12	BLDC motor	
			13	Endstop switch	
			14	Parallel communication	
			15	Parallel setup stopped	
			24	Other error	
			25	Position lost	
4354	Parallel Status Flags	UINT8	b0	Parallel endstop reached out	Bit-independent status indicators
			b1	Parallel endstop reached in	
			b2	Parallel running outside nominal conditions	
			b3-b7	Reserved. Always high	

* See parallel error code descriptions in section: Parallel error codes

Reason for last stop definition

Reason for Last Stop	Function	Description
1	H-bridge fault	There is a hardware problem causing the system to malfunction or the gate driver to not respond correctly.
2	Overtemperature	The device or the surrounding temperature got too hot while it was running.
4	Undervoltage	The voltage dropped below the required level while it was running.
8	Overcurrent	Current consumption exceeded the limit, resulting in a time-out or an actuator stall.
16	SMPS fault	The 12 V and/or 5 V levels are not within the normal range.
32	EOS fault	Both EOS switches were turned on at the same time while running.
64	Hall fault	One Hall sensor changed more than 10 times while the motor voltage was high, but the other sensor did not change.
256	Overvoltage	The voltage went too high while it was running, probably because of the braking.
512	Position not changing	Even though power is above the level needed for the motor to turn, the position doesn't change.
1024	HW fault	A hardware problem has occurred. Possible reasons include issues with gate driver, incorrect current measurements, or a malfunctioning motor sensor.
2048	Communication drop-out	The source of the request stopped or the signal was lost.
4096	Change of interface	The actuator is connected to a more important system than the one that made the request.
4097	Parallel master detected a change in the number of connected followers	The parallel system stopped because a registered device disconnected, or a new device connected.
4098	Parallel master was stopped by follower	A parallel master stopped running because a follower requested the master to hard stop.
4099	Parallel follower lost connection to master	A parallel follower stopped running because the connection to the master was lost.
4100	Parallel communication fault	An actuator in the parallel system stopped working because it had too many communication errors in a short time.

FAQ

Problem	Cause / Solution
Why is the actuator not running despite giving it a 'Run' command?	1. Make sure that power is applied from the power supply. 2. Send a 'Clear error' 0xFB00 (64256) command before sending a 'Run' command.
Feedback data is available but the actuator is not able to run?	An IO-Link master can receive data from the actuator despite not supplying 24 V DC to the motor itself from a power supply. (Class A) Make sure that power is applied from the power supply to the Brown and Blue wires. If the actuator is powered directly from the master this must meet the amp. requirements as specified on the product label. The max. current draw from most masters is 2,000 mA. (Class B)
Does the actuator support data storage?	Yes.
IODD finder is not working.	Make sure that you have downloaded the version of the file that corresponds to your product.
Where can I find the latest IODD file?	On the official IODD finder you can always find the latest version here.
Why does the PLC show a reversed data order?	On most PLCs and IO-Link masters, the IODD file will ensure the correct order of data input/output bytes according to the 'Process data' table. However, some controllers may reverse the data order. Please make sure the correct Most Significant Byte [MSB] and Least Significant Byte [LSB] are matching your configuration. If you experience maximum feedback data values (position, current and/or speed), 0xFF (255) for byte data types and 0xFFFF (65535) for integer data types, the order is most likely reversed.
What is the highest priority process or parameter and diagnostic data?	Commonly referred to as cyclic and acyclic data. For example, current limit value in amps can be set in both cyclic and acyclic data. In this case, the lowest value determines when the actuator will stop.
Is the data order of received "Feedback" correct? or Do I have a working connection?	If you are unsure whether you have a working connection or if your data order is correct, you can look for the Status Flags byte in the feedback data. The Status Flags byte will always have a value higher than "0", because bit 7 is always "1". Typically, the byte value will be "1000 0001" Binary or "81" Decimal, indication "Endstop reached in". This value should show in byte 3 of received feedback bytes.

Error codes

All error codes apply to the entire TECHLINE® interface portfolio; some may not relate to your specific interface or product type.

Error	Description
0	**No error detected** No LINAK defined error detected.
1	**Power on block state** As a safety precaution to prevent unintentional movement at power-up, the actuator will not run until a 'Stop' command or 'Clear error' command has been sent.
2	**Position sensor** Position sensors are outside of expected operating range. Example: 10 pulses were reported on one Hall sensor and no Hall pulses on the other. Send 'Clear error' command to clear error. If the error persists, contact LINAK or replace the product.
3	**Overvoltage** Input supply voltage is above operating voltage level. Consult the documentation for correct voltage levels. The error will automatically be cleared when voltage is within operating limits.
4	**Undervoltage** Input supply voltage is below operating voltage level. The error can only be cleared by sending a 'Clear error' command once the voltage is within the acceptable range. Consult the documentation for correct voltage levels.
5	**Communication sync.** Heartbeat from the master is not within the expected heartbeat interval. Consult the documentation for minimum requirements for heartbeat interval.
6	**Endstop switch** Endstop switches are behaving unexpectedly. Example: Both endstop switches have been activated simultaneously for more than 100 ms. Perform the initialisation process by running the actuator fully extended and retracted.
7	**Temperature** Internal actuator temperature is above operating limit. Consult the documentation for correct temperature levels. The error will automatically be cleared when the temperature is within operating limits.
8	**Internal motor controller** Internal motor controller hardware error. Send 'Clear error' command to clear error. If the error persists, contact LINAK or replace the product.
9	**Internal power supply** The internal power supply is behaving unexpectedly. Send 'Clear error' command to clear error. If the error persists, contact LINAK or replace the product.
10	**Internal current measurement** Internal current reference is outside the expected limits. Send 'Clear error' command to clear error. If the error persists, contact LINAK or replace the product.
11	**Parallel arbitration** Start-up parallel configuration procedure in progress.
12	**Position not changing** Internal position sensor is behaving unexpectedly and motor might stall. Please check your application for blockage or other irregularities. If the error persists, contact LINAK or replace the product.
13	**Position initialisation not possible** Internal initialisation parameters missing. Contact LINAK.

Error codes

Error	Description
14	**Alone in parallel system** Incorrect number of actuators in parallel system.
15	**Incorrect number in parallel system** Incorrect number of actuators in parallel system or wrongly configured.
16	**Hardware** There is an internal motor controller malfunction affecting the actuator's ability to operate correctly. Contact LINAK.
17	**BLDC motor** Position sensors are outside of expected operating range. Example: 10 pulses were reported on one Hall sensor and no Hall pulses on the other. Send 'Clear error' command to clear error. If the error persists, contact LINAK or replace the product.
18	**Parallel communication** There are issues with the communication setup among the master and the follower devices. Make sure all cables are secured properly in the connectors.
19	**Parallel running** Parallel out of sync.
20	**Parallel setup stopped** The parallel master was stopped by a follower with some fault. To diagnose the specific issue, refer to the separate parallel feedback where the error codes from the followers can be read for more detailed information.
254	**Other internal error (Not specified)** Unspecified internal hardware/software error. Send 'Clear error' command to clear error. If the error persists, contact LINAK or replace the product.
255	**Other external error (Not specified)** Unspecified external hardware/software error. Please inspect your application for possible issues. Send 'Clear error' command to clear error.

Parallel error codes

All error codes apply to the entire TECHLINE interface portfolio; some may not relate to your specific interface or product type.

Error	Description
0	**No error detected** No LINAK defined error detected.
1	**Current overload** Current draw is above allowed operating limit. Reduce load, send a 'Clear error' command, and run the actuator in the opposite direction.
2	**Hardware** Internal hardware error. Send 'Clear error' command to clear error. If the error persists, contact LINAK or replace the product.
3	**Temperature** Internal actuator temperature is above operating limit. Consult the documentation for correct temperature levels. The error will automatically be cleared when the temperature is within operating limits.
4	**Overvoltage** Input supply voltage is above operating voltage level. Consult the documentation for correct voltage levels. The error will automatically be cleared when voltage is within operating limits.
5	**Undervoltage** Input supply voltage is below operating voltage level. Consult the documentation for correct voltage levels. The error will automatically be cleared when voltage is within operating limits.
6	**Analogue input out of range** Analogue input signal is outside operating limits. Servo or Proportional. Consult the documentation for correct input signal.
7	**Position not changing** Internal position sensor is behaving unexpectedly and motor might stall. Please check your application for blockage or other irregularities. If the error persists, contact LINAK or replace the product.
8	**Power on block state** Communication has been overruled by a higher priority input. Communication is split into the following priorities: 1. Bus communication (CAN bus, EtherNet/IP, etc.) 2. LINAK service tool (Actuator Connect™) 3. Manual run using Red and Black wires Send a 'Clear error' command to continue.
9	**Position initialisation not possible** Internal initialisation parameters missing. Contact LINAK.
10	**Parallel start-up** Error in parallel setup. The number of connected actuators does not match your configuration. Check the configuration by using the LINAK tool Actuator Connect.

Parallel error codes

Error	Description
11	**Parallel running** The actuators are performing the internal setup and are not ready for operation.
12	**BLDC motor** Internal hardware error. Send 'Clear error' command to clear error. If the error persists, contact LINAK or replace the product.
13	**Endstop switch** Endstop switches are behaving unexpectedly. Both endstop switches have been activated simultaneously for more than 100 ms. Perform the initialisation process by running the actuator fully extended and retracted.
14	**Parallel communication** Error in internal parallel communication. More than 5 communication errors in 500 ms. Please check the wire connections and re-power the complete setup.
15	**Parallel setup stopped** One or more actuators cannot comply with commands and stop. Master commands 'Stop' to other actuators in the network. Send 'Clear error' command to clear error. If the error persists, check your application and wire connections and re-power your complete setup.
24	**Other error** Actuator receives an undefined error code. This can be due to outdated firmware. Send 'Clear error' command to clear error. If the error persists, contact LINAK or replace the product.
25	**Position lost** The actuator has lost track of its position. Please run the actuator completely inwards and run outwards past the area from 35-70 mm to initialise the actuator.

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