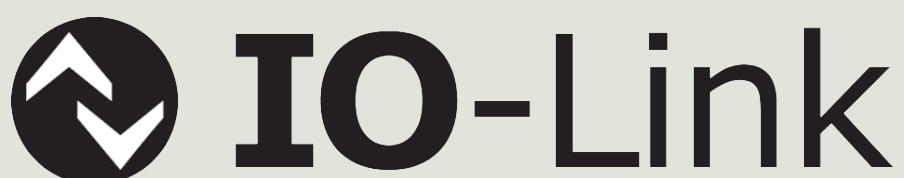


IO-Link

User Manual



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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.

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Revision overview

Edition 3

LA14 and LA25 removed	Page 6
LA33 added	Page 6
Information about separate supplies added	Page 10
'Command examples' section updated	Page 12-21
'Process data' section added	Page 16-20
Process data (PD) and IODD data removed	

Edition 2

Connection diagram applicable for LA25 removed	Page 5
'V DC' added	Page 6-7
'Service interface' changed to 'Parallel data'	Page 6-8
'Service interface GND' changed to 'Parallel GND'	Page 6-8
Yellow and Green added to connection diagram	Page 6
Max. cable length changed from 15 to 20 metres	Page 7
Information about separate supplies added	Page 8
'Parallel' section updated	Page 9-10
'BUS communication' changed to 'point-to-point communication'	Page 9-10
'Configuration' updated	Page 11
Power supply table updated	Page 11
Mentions of LA25 removed	Page 11 + 20
'Run out command' changed to 'Command examples'	Page 12
'Communication sequence...' changed to 'Run the actuator outwards'	Page 12
Soft Stop and Soft Start / B4 and B5 corrected	Page 13
Endstop reached in/out corrected	Page 14
'FAQ' updated	Page 20
'B' changed to 'Byte'	All over the document
'R/O' changed to 'R'	All over the document

Edition 1

New document

Connection diagram

Applicable for: LA33, LA36, LA37, LA76 and LA77

Power

BROWN

24 V DC

BLUE

GND



Control

ORANGE

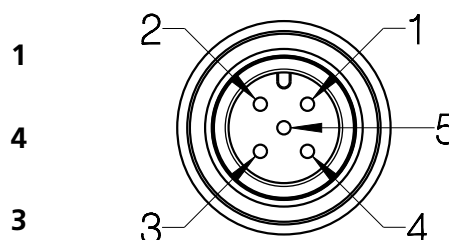
L+ IO-Link Supply V DC

GREY

C/Q IO-Link

LIGHT BLUE

L- IO-Link Supply GND



M12 connector

Communication

RED*

Extends the actuator

BLACK*

Retracts the actuator

VIOLET*

Parallel data

WHITE*

Parallel GND

GREEN

Not to be connected

YELLOW

Not to be connected

* Only available with flying leads



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.


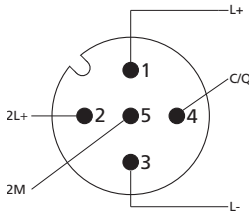
The cable colours from the actuator and the M12 port numbers are specified in the table below.

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	<p>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.</p> <p>IO-Link is no fieldbus but the further development of the existing, tried-and-tested connection technology for actuators.</p>	
Brown	Connect Brown to positive Power supply motor 24 V DC	<p>Note:</p> <p>Do not change the power supply polarity on the Brown and Blue wires!</p> <p>Power supply GND is electrically connected to the housing through a capacitor and resistor in parallel.</p>
Blue	Connect Blue to negative Power supply motor (GND)	
PIN out	M12 Flying leads	
Pin 1 Orange	L+ IO-Link supply V DC	
Pin 4 Grey	C/Q IO-Link	
Pin 3 Light Blue	L- IO-Link supply GND	 <p>M12 plug on device - pin numbering and connections.</p> <p>IO-Link is fieldbus independent and can be integrated into all fieldbus systems worldwide.</p> <p>Transmission rate: 38.4 kbaud (COM 2)</p> <p>Max cable length: 20 meters</p> <p>The IODD file describes the parameters and can be found here: https://ioddfinder.io-link.com</p>

I/O specifications

Input/Output	Specification	Comments
Red*	Extends the actuator	<p>The signal becomes active at: $V_{IN} > 67\%$ of V DC = ON</p> <p>The signal becomes inactive at: $V_{IN} < 33\%$ of V DC = OFF</p> <p>Input current: 10 mA</p> <p>Manual run uses the common GND from the power supply (Blue wire)</p>
Black*	Retracts the actuator	
Violet*	Parallel data	<p>The Parallel drive function will support up to 8 actuators running simultaneously.</p> <p>It is possible to run Parallel with a main power supply or separate power supplies.</p> <p>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.</p>
White*	Parallel GND	

*Only available with flying leads

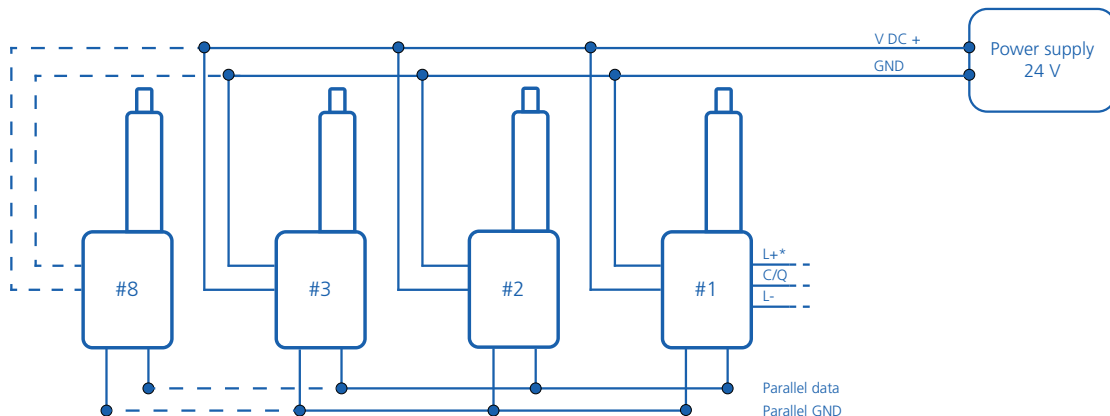
Parallel

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. <i>Please note: In some cases this is pre-configured from factory.</i>
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	The system can be designed with either one main power supply or it can be supplied by individual supplies corresponding to the number of actuators in the system. Please respect actuator specifications regarding voltage level and current consumption! Make sure that the power supplies have a common GND and the same potential.

Option 1 - A simple parallel setup



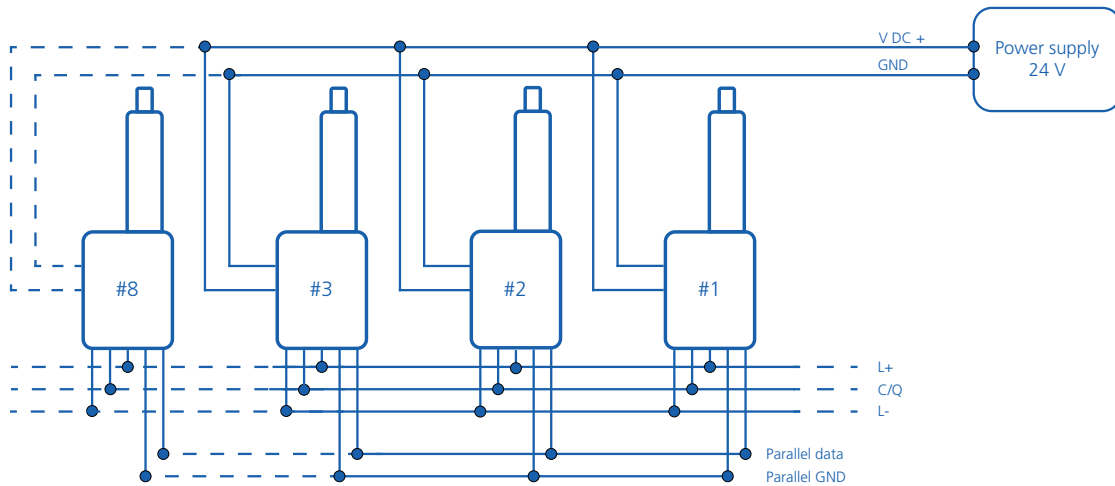
In a simple parallel setup there is only one actuator connected to the point-to-point communication. This actuator receives run commands and shares data with the BUS controller. The remaining actuators in the system are only connected to internal parallel communication. This way, the internal communication 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.

Parallel

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.

Power supply

IO-Link actuators are available with the following supply voltage range: 24 V DC. The accepted supply voltage range is specified for the version as shown below:

Supply voltage	Function	Voltage range		
		V _{IN}	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, we are not able to power the motor part of the actuator (Brown and Blue wires) from the IO port of the master. (LA36, LA37, LA76, LA77)

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.

Most masters allow you to configure the Process data structure and parameters by importing an IODD file. Download the IODD file corresponding to your product at [IODDfinder](#).

Process data includes both input and output data, and these are typically cyclically exchanged between the IO-Link master and the actuator.

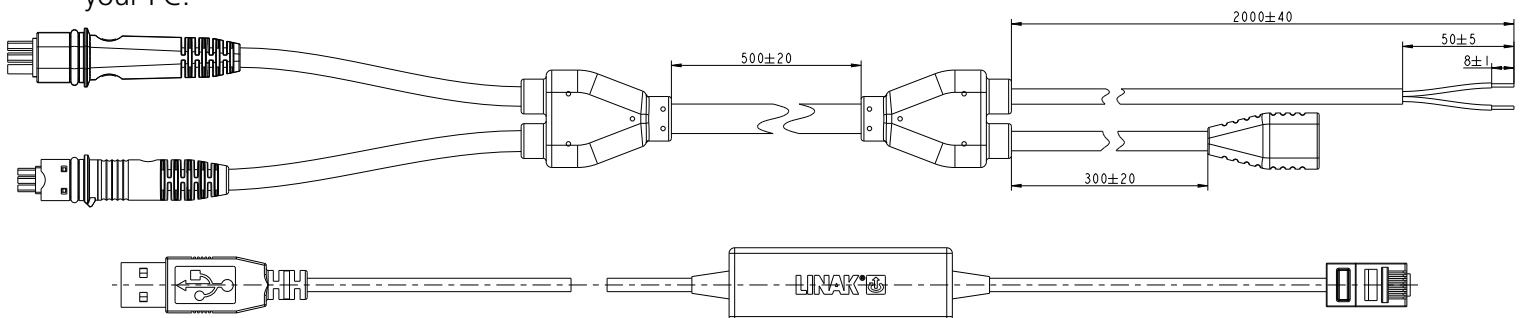
Configuration

Before being integrated into a 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 LA33, LA36, LA37, LA76 and LA77:

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 9-pin connector on the actuator side. 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	Write	PDO Byte 0 Byte 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	Read	PDI Byte 4	"Error Code" must be = 0 [0x00]
3	Read	PDI Byte 3	"Status Flags" bit 2 (Overcurrent) must be = 0
4	Read	PDI Byte 3	"Status Flags" bit 5 (Heartbeat needed) must be = 0
5	Read	PDI Byte 3	"Status Flags" bit 6 (Actuator is running outside normal 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	Write	PDO Byte 2	<p>"Current" must be set to a value</p> <p>0-250 [0x00-FA] = Current limit 0.25 A/bit</p> <p>251 [0xFB] = Default current limit set via Actuator Connect™</p> <p>252-255 [0xFC-FF] = Reserved</p>
3	Write	PDO Byte 3	<p>"Speed" must be set to a value</p> <p>0-200 [0x00-FA] = Speed 0.5% /bit</p> <p>201-250 [0xC9-FA] = 100% speed</p> <p>251 [0xFB] = Default speed set via Actuator Connect</p> <p>252-255 [0xFC-FF] = Reserved</p>
4	Write	PDO Byte 4	<p>"Soft Start" must be set to a value</p> <p>0-200 [0x00-FA] = Start ramp time 0.05 s/bit</p> <p>251 [0xFB] = Default speed set via Actuator Connect</p> <p>252-255 [0xFC-FF] = Reserved</p>
5	Write	PDO Byte 5	<p>"Soft Stop" must be set to a value</p> <p>0-200 [0x00-FA] = Stop ramp time 0.05 s/bit</p> <p>251 [0xFB] = Default speed set via Actuator Connect</p> <p>252-255 [0xFC-FF] = Reserved</p>
6	Write	PDO Byte 0 Byte 1	<p>"Position" must be set to =</p> <p>64257 [0xFB01] for 'Run out'</p>
7**	Read	PDI Byte 3	<p>"Status Flags" bit 3 and bit 1 change to 1, to indicate that:</p> <p>Bit 3 = Actuator is running out</p> <p>Bit 1 = Endstop reached out</p>

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

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

** Optional

Clear error in overcurrent situation

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	Read	PDI Byte 3	Confirm that "Status Flags" bit 2 is = 1 for 'Overcurrent'
2	Write	PDO Byte 0 Byte 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**	Read	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

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

** Optional

Process Data

When controlling the actuator from the IO-Link master, it is important to understand the input and output data. For IO-Link this is predefined by the official protocol (and IODD file). The specific data is described in the tables below.

Process Data Out

Process Data Out (PDO) Real-time cyclic data exchange					
Byte 5 [MSB]	Byte 4	Byte 3	Byte 2	Byte 1	Byte 0 [LSB]
Soft Stop	Soft Start	Speed	Current	Position	

Byte(s)	Command	Data type	Details	Description	Scaling
Byte 0 Byte 1	Position	UINT16	0–64255 [0x0000-FAFF]	Run to position	0.1 mm/bit
			64256 [0xFB00]	Clear Error Codes (see PDI Byte 4)	
			64257 [0xFB01]	Run out	
			64258 [0xFB02]	Run in	
			64259 [0xFB03]	Stop	
			64260 [0xFB04]	Recovery run out	
			64261 [0xFB05]	Recovery run in	
			64262– 65535 [0xFB06-FFFF]	Invalid value, actuator will not run	
Byte 2	Current	UINT8	0–250 [0x00-FA]	Maximum current limit	0.25 A/bit
			251 [0xFB]	Use default current value	
			252–255 [0xFC-FF]	Invalid value, actuator will not run	

Process Data Out

Byte(s)	Command	Data type	Details	Description	Scaling
Byte 3	Speed	UINT8	0–200 [0x00-C8]	Speed	0.5% /bit
			201–250 [0xC9-FA]	Use 100% speed	
			251 [0xFB]	Use default speed value	
			252–255 [0xFC-FF]	Invalid value, actuator will not run	
Byte 4	Soft Start	UINT8	0–250 [0x00-FA]	Start ramping time	0.05 s/bit
			251 [0xFB]	Use default soft start value	
			252–255 [0xFC-FF]	Invalid value, actuator will not run	
Byte 5	Soft Stop	UINT8	0–250 [0x00-FA]	Stop ramping time	0.05 s/bit
			251 [0xFB]	Use default soft stop value	
			252–255 [0xFC-FF]	Invalid value, actuator will not run	

Process Data In

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]
AUX Input	Speed		Error Codes	Status Flag	Current	Position feedback	

Byte(s)	Status	Data type	Details	Description	Scaling
Byte 0 Byte 1	Position	UINT16	0–64255 [0x0000-FAFF]	Position of the actuator piston	0.1 mm/bit
			64256– 65023 [0xFB00-FDFF]	Reserved	
			65024 [0xFE00]	Position lost	
			65025– 65535 [0xFE01-FFFF]	Reserved	
Byte 2	Current	UINT8	0 [0x00]	Not running	0.25 A/bit
			1–250 [0x00-FA]	Measured motor current	
			251–253 [0xFB-FD]	Reserved	
			254 [0xFE]	Fault in current measurement circuit	
			255 [0xFF]	Reserved	
Byte 3	Status Flags	UINT8	b0	Endstop reached in	8-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	

Process Data In

Byte(s)	Status	Data type	Details	Description	Scaling
Byte 4	Error Code	UINT8	0 [0x00]	No error detected	8-bit error code showing the currently active error with the highest priority only
			1 [0x01]	'Run' command overruled	
			2 [0x02]	Position sensor	
			3 [0x03]	Overvoltage	
			4 [0x04]	Undervoltage	
			5 [0x05]	Communication sync.	
			6 [0x06]	Endstop switch	
			7 [0x07]	Temperature	
			8 [0x08]	Motor controller	
			9 [0x09]	Internal power supply	
			10 [0x0A]	Internal current measurement	
			11 [0x0B]	Parallel arbitration	
			12 [0x0C]	Position not changing	
			13 [0x0D]	Position initialisation not possible	
			14 [0x0E]	Alone in parallel system	
			15 [0x0F]	Incorrect number in parallel system	
			254 [0xFE]	Other internal error (Not specified)	
			255 [0xFF]	Other external error (Not specified)	

Process Data In

Byte(s)	Status	Data type	Details	Description	Scaling
Byte 5 Byte 6	Speed	UINT16	0–4015 [0x0000-0FAF]	Speed of actuator piston	0.1 mm/s
			4016-65535 [0x0FB0-FFFF]	Reserved	
Byte 7	AUX Input	UINT8	b0-b1	Input 1 level	25% VCC /bit
			b2-b3	Input 2 level	25% VCC /bit
			b4-b5	Reserved	
			b6-b7	Reserved	Always high

Diagnosis Data (Parallel feedback)

Diagnosis Data, Service Data (SD) Non-cyclic data exchanged Only for Parallel feedback						
Index	Data type	Status	Access	Details	Description	Scaling
4352	UINT32	Error Source	Read	0 [0x00000000]	No error is active on any actuator in parallel system, or error source ID is irrelevant ("Parallel start-up" error is reported by an actuator still connected to the system)	32-bit IP address
				1-4294967295 [0x00000001-FFFFFFFF]	UIN of actuator with highest priority error	
4353	UINT8	Error Group	Read	0 [0x00]	No error detected	8-bit error code indicating the currently active error of highest priority on any actuator in the parallel system
				1 [0x01]	Current overload	
				2 [0x02]	Hardware	
				3 [0x03]	Temperature	
				4 [0x04]	Overvoltage	
				5 [0x05]	Undervoltage	
				6 [0x06]	Analogue input out of range error (N/A for bus interfaces)	

Diagnosis Data (Parallel feedback)

Diagnosis Data, Service Data (SD) Non-cyclic data exchanged Only for Parallel feedback						
Index	Data type	Status	Access	Details	Description	Scaling
4353	UINT8	Error Group	Read	7 [0x07]	Position not changing	8-bit error code indicating the currently active error of highest priority on any actuator in the parallel system
				8 [0x08]	Run signal overruled	
				9 [0x09]	Position initialisation not possible	
				10 [0x0A]	Parallel start-up	
				11 [0x0B]	Parallel running	
				12 [0x0C]	BLDC motor	
				13 [0x0D]	Endstop switch	
				14 [0x0E]	Parallel communication	
				15 [0x0F]	Parallel setup stopped	
				24 [0x18]	Other error	
				25 [0x19]	Position lost	
4354	UINT8	Status Flags	Read	b0	Parallel endstop reached out	8-bit independent status indicators
				b1	Parallel endstop reached in	
				b2	Parallel running outside nominal conditions	
				b3-b7	Reserved	

FAQ

Problem	Cause / Solution
Why is the actuator not running despite giving it a 'Run' command?	<ol style="list-style-type: none"> 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?	<p>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)</p> <p>Make sure that power is applied from the power supply to the Brown and Blue wires.</p> <p>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)</p>
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.

Error codes

Error	Description
0	No error detected No LINAK defined error detected
1	'Run' command overruled 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. VCC motor OK. 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. Consult the documentation for correct voltage levels. The error will automatically be cleared when voltage is within operating limits.
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 (N/A for bus interfaces) Endstop switches are behaving unexpectedly. Both endstop switches have been activated simultaneously for more than 100 ms. Perform the initialization 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	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.

Error codes

Error	Description
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.
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
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

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 error (N/A for bus interfaces) 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	Run signal overruled Communication has been overruled by a higher priority input. Communication is split into the following priorities: <ol style="list-style-type: none"> 1. Bus communication (CAN bus, Ethernet, 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 (N/A for bus interfaces) Endstop switches are behaving unexpectedly. Both endstop switches have been activated simultaneously for more than 100ms. Perform the initialization 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 Follow the relevant initialisation procedures by running the actuators from fully retracted to fully extended. If the error persists, contact LINAK or replace the product.

Contacts

FACTORIES

Denmark - Headquarters
LINAK A/S
Phone: +45 73 15 15 15
Fax: +45 74 45 80 48
Fax (Sales): +45 73 15 16 13
Web: www.linak.com

China
LINAK (Shenzhen) Actuator Systems, Ltd.
Phone: +86 755 8610 6656
Phone: +86 755 8610 6990
Web: www.linak.cn

Slovakia
LINAK Slovakia s.r.o.
Phone: +421 51 7563 444
Web: www.linak.sk

Thailand
LINAK APAC Ltd.
Phone: +66 33 265 400
Web: www.linak.com

USA
LINAK U.S. Inc.
Americas Headquarters
Phone: +1 502 253 5595
Fax: +1 502 253 5596
Web: www.linak-us.com
www.linak-latinamerica.com

SUBSIDIARIES

Australia
LINAK Australia Pty. Ltd
Phone: +61 3 8796 9777
Fax: +61 3 8796 9778
E-mail: sales@linak.com.au
Web: www.linak.com.au

Austria
LINAK Zweigniederlassung - Österreich (Wien)
Phone: +43 (1) 890 7446
Fax: +43 (1) 890 744615
E-mail: info@linak.de
Web: www.linak.at - www.linak.hu

Belgium
LINAK Actuator-Systems NV/SA
(Belgium & Luxembourg)
Phone: +32 (0)9 230 01 09
E-mail: beinfo@linak.be
Web: www.linak.be - www.fr.linak.be

Brazil
LINAK Do Brasil Comércio De Atuadores Ltda.
Phone: +55 (11) 2832 7070
Fax: +55 (11) 2832 7060
E-mail: info@linak.com.br
Web: www.linak.com.br

Canada
LINAK Canada Inc.
Phone: +1 502 253 5595
Fax: +1 416 255 7720
E-mail: info@linak.ca
Web: www.linak-us.com

Czech Republic
LINAK C&S s.r.o.
Phone: +42 058 174 1814
Fax: +42 058 170 2452
E-mail: info@linak.cz
Web: www.linak.cz - www.linak.sk

Denmark - International
LINAK International
Phone: +45 73 15 15 15
E-mail: info@linak.com
Web: www.linak.com

Denmark - Sales
LINAK Danmark A/S
Phone: +45 86 80 36 11
Fax: +45 86 82 90 51
E-mail: linak@linak-silkeborg.dk
Web: www.linak.dk

Finland
LINAK OY
Phone: +358 10 841 8700
E-mail: linak@linak.fi
Web: www.linak.fi

France
LINAK France E.U.R.L
Phone: +33 (0) 2 41 36 34 34
Fax: +33 (0) 2 41 36 35 00
E-mail: linak@linak.fr
Web: www.linak.fr

Germany
LINAK GmbH
Phone: +49 6043 9655 0
Fax: +49 6043 9655 60
E-mail: info@linak.de
Web: www.linak.de

India
LINAK A/S India Liaison Office
Phone: +91 120 4531797
Fax: +91 120 4786428
E-mail: info@linak.in
Web: www.linak.in

Ireland
LINAK UK Limited (Ireland)
Phone: +44 (0)121 544 2211
Fax: +44 (0)121 544 2552
+44 (0)796 855 1606 (UK Mobile)
+35 387 634 6554 (Rep.of Ireland Mobile)
E-mail: sales@linak.co.uk
Web: www.linak.co.uk

Italy
LINAK ITALIA S.r.l.
Phone: +39 02 48 46 33 66
Fax: +39 02 48 46 82 52
E-mail: info@linak.it
Web: www.linak.it

Japan
LINAK K.K.
Phone: 81-45-533-0802
Fax: 81-45-533-0803
E-mail: linak@linak.jp
Web: www.linak.jp

Malaysia
LINAK Actuators Sdn. Bhd.
Phone: +60 4 210 6500
Fax: +60 4 226 8901
E-mail: info@linak-asia.com
Web: www.linak.my

Netherlands
LINAK Actuator-Systems B.V.
Phone: +31 76 5 42 44 40 /
+31 76 200 11 10
E-mail: info@linak.nl
Web: www.linak.nl

New Zealand
LINAK New Zealand Ltd
Phone: +64 9580 2071
Fax: +64 9580 2072
E-mail: nzsales@linak.com.au
Web: www.linak.com.au

Norway
LINAK Norge AS
Phone: +47 32 82 90 90
E-mail: info@linak.no
Web: www.linak.no

Poland
LINAK Polska
LINAK Danmark A/S (Spółka Akcyjna)
Phone: +48 22 295 09 70 /
+48 22 295 09 71
E-mail: info@linak.pl
Web: www.linak.pl

Republic of Korea
LINAK Korea Ltd.
Phone: +82 2 6231 1515
Fax: +82 2 6231 1516
E-mail: info@linak.kr
Web: www.linak.kr

Slovakia
LINAK Slovakia S.R.O.
Phone: +421 51 7563 444
Web: www.linak.sk

Spain
LINAK Actuadores, S.L.u
Phone: +34 93 588 27 77
Fax: +34 93 588 27 85
E-mail: esma@linak.es
Web: www.linak.es

Sweden
LINAK Scandinavia AB
Phone: +46 8 732 20 00
Fax: +46 8 732 20 50
E-mail: info@linak.se
Web: www.linak.se

Switzerland
LINAK AG
Phone: +41 43 388 31 88
Fax: +41 43 388 31 87
E-mail: info@linak.ch
Web: www.linak.ch - www.fr.linak.ch
www.it.linak.ch

Taiwan
LINAK (Shenzhen) Actuator systems Ltd.
Taiwan Representative office
Phone: +886 2 272 90068
Fax: +886 2 272 90096
E-mail: sales@linak.com.tw
Web: www.linak.com.tw

Turkey
LINAK İth. İhr. San. ve Tic. A.Ş.
Phone: +90 312 4726338
Fax: +90 312 4726635
E-mail: info@linak.com.tr
Web: www.linak.com.tr

United Kingdom
LINAK UK Limited
Phone: +44 (0)121 544 2211
Fax: +44 (0)121 544 2552
E-mail: sales@linak.co.uk
Web: www.linak.co.uk

DISTRIBUTORS

Argentina
Novotec Argentina SRL
Phone: 011-4303-8989 / 8900
Fax: 011-4032-0184
E-mail: info@novotecargentina.com
Web: www.novotecargentina.com

Colombia
MEM Ltda
Phone: +[57] (1) 334-7666
Fax: +[57] (1) 282-1684
E-mail: servicioalcliente@memltda.com.co
Web: www.mem.net.co

India
Mechatronics Control Equipments India Pvt Ltd
Phone: +91-44-28558484, 85
E-mail: bala@mechatronicscontrol.com
Web: www.mechatronicscontrol.com

Indonesia
PT. Himalaya Everest Jaya
Phone: +6 221 544 8956 /+6 221 544 8965
Fax: +6 221 619 1925
Fax (Sales): +6 221 619 4658
E-mail: hejplastic-div@centrin.net.id
Web: www.hej.co.id

Israel
NetivTech LTD
Phone: +972 55-2266-535
Fax: +972 2-9900-560
Email: info@NetivTech.com
Web: www.netivtech.com

Singapore
Servo Dynamics Pte Ltd
Phone: +65 6844 0288
Fax: +65 6844 0070
E-mail: servodynamics@servo.com.sg

South Africa
Industrial Specialised Applications CC
Phone: +27 011 466 0346
E-mail: gartht@isagroup.co.za
Web: www.isaza.co.za

United Arab Emirates
Mechatronics
Phone: +971 4 267 4311
Fax: +971 4 267 4312
E-mail: mecatron@emirates.net.ae