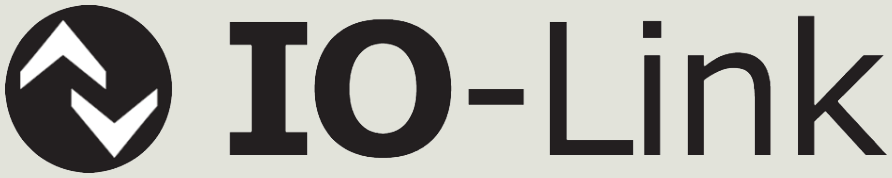
IO-Link

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.

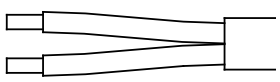
LINAK uses its best efforts to fulfil orders. However, for the reasons mentioned above, LINAK cannot guarantee availability of any particular product at any given time. LINAK reserves the right to discontinue the sale of any product displayed on its website or listed in its catalogues or in other written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

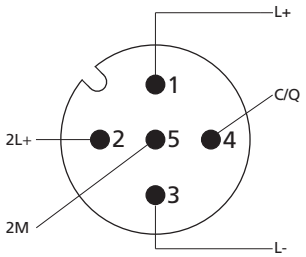
All sales are subject to the 'Standard Terms of Sale and Delivery for LINAK A/S' available on LINAK websites.

Connection diagram

Applicable for: LA25

BROWN	24 V DC	2
BLUE	GND	5
ORANGE	L+ IO-Link Supply V DC	1
GREY	C/Q IO-Link Data communication	4
LIGHT BLUE	L- IO-Link Supply GND	3
RED*	Extends the actuator	
BLACK*	Retracts the actuator	
VIOLET*	Service interface OR Parallel communication	
WHITE*	Service interface GND OR Signal GND	





M12 connector

* Only available with flying leads

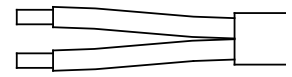
IO-Link and M12 connector is a plug-and-play solution. If flying leads is the preferred option, please be aware that the LINAK® cable colours differ from the IO-Link standard.
The cable colours from the actuator and the M12 port numbers are specified in the table below.
In a setup where the Violet and White wires are not used, we strongly recommend insulating these to avoid short circuits and eventually damaging the actuator.

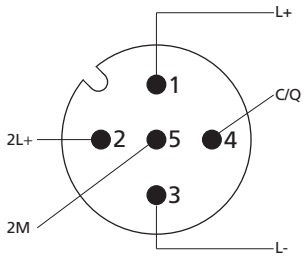
Please be aware that if the power supply is not properly connected, you might damage the actuator!

Connection diagram

Applicable for: LA36, LA37, LA76, LA77 and LC3 IC

BROWN	24 V DC	
BLUE	GND	
ORANGE	L+ IO-Link Supply V DC	1
GREY	C/Q IO-Link Data communication	4
LIGHT BLUE	L- IO-Link Supply GND	3
RED*	Extends the actuator	
BLACK*	Retracts the actuator	
VIOLET*	Service interface OR Parallel communication	
WHITE*	Service interface GND OR Signal GND	

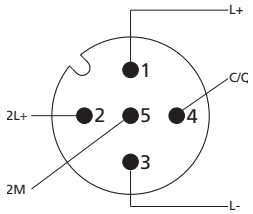




M12 connector

* Only available with flying leads

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 24 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	On voltage: 18 to 30 V  M12 plug on device - pin numbering and connections. IO-Link is fieldbus independent and can be integrated into all fieldbus systems worldwide. Transmission rate: 38.4 kbaud (COM 2) Max cable length: 15 meters The IODD file describes the parameters and can be found here: https://ioddfinder.io-link.com
Pin 4 Grey	C/Q IO-Link data communication	
Pin 3 Light Blue	L- IO-Link supply GND	

Please note that version up to 1.2 of IO-Link does not support data storage. Therefore, it is recommended to disable the data storage feature on the PLC/IO-Link master.

I/O specifications

Input/Output	Specification	Comments
Red*	Extends the actuator	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 m Manual run uses the common GND from the power supply (Blue wire)
Black*	Retracts the actuator	
Violet*	Service interface OR Parallel communication	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. LIN bus communication.
White*	Service interface GND OR Signal GND	

*Only available with flying leads

Please note that version up to 1.2 of IO-Link does not support data storage. Therefore, it is recommended to disable the data storage feature on the PLC/IO-Link master.

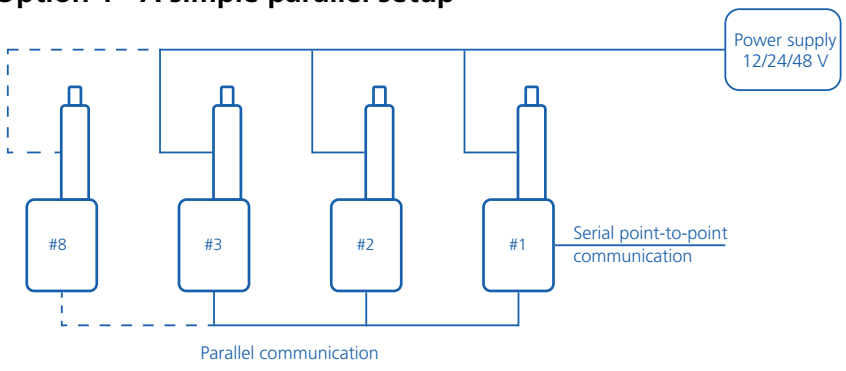
Parallel

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	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

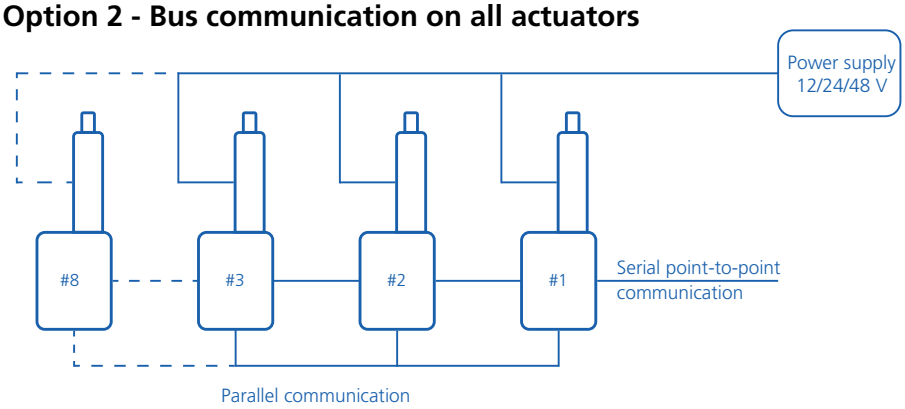


In a simple parallel setup there is only one actuator connected to the BUS communication. This actuator receives run commands and shares data with the BUS controller. The remaining actuators in the system are only connected to internal parallel communication. This way, the internal communication ensures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

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 BUS 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.

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	Note	V_{IN}	V_{TYPE}	V_{MAX}
24 V	Motor running	18 V	24 V	32 V
	Motor not running IO-Link communication possible	10 V	24 V	39 V

For more information about wiring/connector, please see the connection diagram.

Configuration

Before being integrated into a IO-Link system, a few of the actuator parameters must be checked and eventually changed. Further fine-tuning may be required to fulfil system or application requirements.

This interface is also compatible with the configuration tool Actuator Connect™, which grants access to parameters including historical usage data and real-time monitoring.

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 "Type A".

When "Type 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 "Type B" and changing the wiring accordingly. (LA25)

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.

Be aware that there are 2 versions for LA25.

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

Run out command

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

General run prerequisites

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

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

Communication sequence to run the actuator outwards

Step	Process data*	Action
1	-	Check that general run prerequisites are fulfilled.
2	PDO Byte 2	"Current" must be set to a value. 0-250 = Current limit 0.25 A/bit 251 = Default current limit set via Actuator Connect™ 252-255 = Reserved
3	PDO Byte 3	"Speed" must be set to a value. 0-200 = Speed 0.5% /bit 201-250 = 100% speed 251 = Default speed set via Actuator Connect 252-255 = Reserved
4	PDO Byte 4	"Soft Start" must be set to a value. 0-250 = Start ramp time 0.05 s/bit 251 = Default speed set via Actuator Connect 252-255 = Reserved
5	PDO Byte 5	"Soft Stop" must be set to a value. 0-250 = Stop ramp time 0.05 s/bit 251 = Default speed set via Actuator Connect 252-255 = Reserved
6	PDO Byte 0-1	"Position" must be set to = 64257 for Run out.
7**	PDI Byte 3	"Status Flags" bit 3 will change to 1 to indicate that the actuator is running out.

** Optional

Process data (PD) and IODD data

When controlling the actuator from the IO-Link master, it is important to understand the data output and input. 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 is presented in the following structure:

B7 [MSB]	B6	B5	B4	B3	B2	B1	B0 [LSB]
Reserved		Soft Start	Soft Stop	Speed	Current	Position	

Byte(s)	Name	Details	Description	Scaling
B0-B1	Position	0-64255	Run to position (0.1 mm/bit)	Position: 0.1 mm/bit
		64256	Clear Error Codes register	
		64257	Command run actuator out	
		64258	Command run actuator in	
		64259	Command stop actuator	
		64260	Command run to actuator out, Recovery mode	
		64261	Command run to actuator in, Recovery mode	
		64262-65535	Reserved. Do not run, regardless of other bytes in request	
B2	Current	0-250	Maximum current to use (250 mA/bit)	0.25 A/bit
		251	Actuator default value	
		252-255	Reserved. Do not run, regardless of other bytes in request	
B3	Speed	0-199	Speed to use (0.5% /bit: 0% - 99.5%)	0.5% /bit
		200-250	Use 100% speed	
		251	Actuator default value	
		252-255	Reserved. Do not run, regardless of other bytes in request	
B4	Soft Stop*	0-250	Start ramping time (50 ms/bit)	0.05 s/bit
		251	Actuator default value	Command
		252-255	Reserved. Do not run, regardless of other bytes in request	Reserved
B5	Soft Start*	0-250	Start ramping time (50 ms/bit)	0.05 s/bit
		251	Actuator default value	Command
		252-255	Reserved. Do not run, regardless of other bytes in request	Reserved
B6	Reserved		Always write 0xFF	
B7	Reserved		Always write 0xFF	

*Not available on V1.1. Write 0xFF in byte.

Process data (PD) and IODD data

Process data IN is presented in the following structure:

B7 [MSB]	B6	B5	B4	B3	B2	B1	B0 [LSB]
Input State	Speed		Error Codes	Status Flag	Current	Position feedback	

Byte(s)	Name	Details	Description	SLOT
B0-B1	Position Feedback	0-64255	Position of actuator piston	0.1 mm/bit
		64256-65023	Reserved	
		65024	Position lost	
		65025-65535	Reserved	
B2	Motor Current	0	Not running	0.25 A/bit
		1-250	Measured motor current	
		251-253	Reserved	
		254	Fault in current measurement circuit	
		255	Reserved	
B3	Status Flags		8 independent status bit-indicators	Not defined
		b0	Endstop reached out	
		b1	Endstop reached in	
		b2	Overcurrent	
		b3	Running out	
		b4	Running in	
		b5	Communication heartbeat timeout	
		b6	Actuator is running outside normal conditions	
		b7	Reserved	

Process data (PD) and IODD data

Byte(s)	Name	Details	Description	SLOT
B4	Error Codes		8-bit error code indicating the currently active error of highest priority	Not defined
		0	No error detected	
		1	'Run' command overruled	
		2	Position sensor	
		3	Overvoltage	
		4	Undervoltage	
		5	Communication sync	
		6	Endstop switch	
		7	Temperature	
		8	Motor controller error	
		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	
		254	Other internal error (Not specified)	
		255	Other external error (Not specified)	
B5-B6	Speed*	0-4015	Speed of actuator piston	(0.1 mm/s)
		4016-65535	Reserved	
B7	Input State*	b0-b1	Input 1 level	25% /bit
		b2-b3	Input 2 level	25% /bit
		b4-b5	Input 3 level	25% /bit
		b6-b7	Reserved (always 1)	Reserved

*Not available on V1.1. Write 0xFF in byte.

IODD Parameters

Index	Data size	Description	Scaling	Access	Support data storage
4096	U8	Current limit out	0.25 A/bit	R/W	x
4097	U8	Current limit in	0.25 A/bit	R/W	x
4098	U16	Soft start time out	1ms/bit	R/W	x
4099	U16	Soft start time in	1ms/bit	R/W	x
4100	U16	Soft stop time out	1ms/bit	R/W	x
4101	U16	Soft stop time in	1ms/bit	R/W	x
4102	U8	Max. speed	(0-200) 0.5%/bit (201-255) 100%	R/W	x
4103	U16	Virtual Endstop reached out	0.1 mm/bit	R/W	x
4104	U16	Virtual Endstop reached in	0.1 mm/bit	R/W	x

IODD Diagnostics

Index	Data size	Description	Scaling	Access
4105	U32	UIN	U32 number	R/O
4106	U32	App. SW number	1/bit	R/O
4107	U32	App. SW major	1/bit	R/O
4108	U32	App. SW minor	1/bit	R/O
4109	U32	Config. PO number	U32 number	R/O
4110	U32	Production date	yyyymmdd	R/O
4111	U8	Max. current seen	0.25 A/bit	R/O
4112	U8	Max. FET temperature seen	-40°C in offset, 1°C/bit	R/O
4113	U8	Max. ambient temperature seen	-40°C in offset, 1°C/bit	R/O
4114	U8	Min. ambient temperature seen	-40°C in offset, 1°C/bit	R/O
4115	U32	Motor current * Runtime [A/S]	1 A*s/bit	R/O
4116	U32	Runtime	1 s/bit	R/O
4117	U8	Number of stops due to overvoltage	1/bit	R/O
4118	U8	Number of stops due to FET temp.	1/bit	R/O
4119	U8	Number of stops due to ambient temp.	1/bit	R/O
4120	U8	Number of stops due to low voltage	1/bit	R/O
4121	U8	Number of stops due to Hall error	1/bit	R/O
4122	U8	Number of stops due to Endstop switch error	1/bit	R/O
4123	U8	Number of LINAK current overloads out	1 time/bit	R/O
4124	U8	Number of LINAK current overloads in	1time/bit	R/O

IODD Diagnostics

Index	Data size	Description	Scaling	Access
4125	U8	Resettable custom current overload out	1 time/bit	R/W
4126	U8	Resettable custom current overload in	1 time/bit	R/W
4127	U16	Number of communication errors	1/bit	R/O
4128	U32	Number of Endstop reached out	1 time/bit	R/O
4129	U32	Number of Endstop reached in	1 time/bit	R/O
4130	U32	Number of starts out	1 time/bit	R/O
4131	U32	Number of start in	1 time/bit	R/O
4132	U32	Total piston distance	5 m/bit	R/O
4133	U16	Reason for last stop 0	0 = None 1 = H-Bridge fault 2 = Temperature error 4 = Undervoltage 8 = Overcurrent 16 = Internal PSU failure 32 = Endstop reached fault 64 = Hall fault 256 = Overvoltage 512 = Position not changing 1024 = Current measurement HW failure 2048 = Communication dropout 4096 = Change of interface 4097 = Parallel master detected changed number of slaves 4098 = Parallel master stopped by slave 4099 = Parallel slave lost connection to master 4100 = Communication fault	R/O
4134	U8	Last stop count 0	1/bit	R/O
4135	U32	Last stop powered time 0	1/bit	R/O
4136	U16	Reason for last stop 1	1/bit	R/O
4137	U8	Last stop count 1	1/bit	R/O
4138	U32	Last stop powered time 1	1/bit	R/O
4139	U16	Reason for last stop 2	1/bit	R/O

IODD Diagnostics

Index	Data size	Description	Scaling	Access
4140	U8	Last stop count 2	1/bit	R/O
4141	U32	Last stop powered time 2	1/bit	R/O
4142	U16	Reason for last stop 3	1/bit	R/O
4143	U8	Last stop count 3	1/bit	R/O
4144	U32	Last stop powered time 3	1/bit	R/O
4145	U16	Reason for last stop 4	1/bit	R/O
4146	U8	Last stop count 4	1/bit	R/O
4147	U32	Last stop powered time 4	1/bit	R/O
4148	U32	Total position adjusted	1mm/bit	R/O
4149	U8	FET temperature	-40°C in offset, 1°C/bit	R/O
4150	U8	Ambient temperature	-40°C in offset, 1°C/bit	R/O
4151	U16	Number of Hall shift at learn	0.1 mm/bit	R/O
4152	U16	Zero Point offset at learn	0.1 mm/bit	R/O
4153	U32	Actuator production order number	1/bit	R/O
4154	U8	LINAK special function	0 = Reserved 1 = Restart actuator 2-255 = Reserved	R/W
4155	U32	UIN 1 in parallel system	1/bit	R/O
4156	U32	UIN 2 in parallel system	1/bit	R/O
4157	U32	UIN 3 in parallel system	1/bit	R/O
4158	U32	UIN 4 in parallel system	1/bit	R/O
4159	U32	UIN 5 in parallel system	1/bit	R/O
4160	U32	UIN 6 in parallel system	1/bit	R/O
4161	U32	UIN 7 in parallel system	1/bit	R/O
4162	U32	UIN 8 in parallel system	1/bit	R/O

IODD Parallel feedback

Index	Data size	Name	Value	Description	Unit	Access
4163	U32	Error Source	0	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 UIN	R/O
			1-255	UIN of actuator with highest priority error		
4164	U8	Error Group	0	No error detected	8-bit error code indicating the currently active error of highest priority on any actuator in the parallel system	R/O
			1	Current overload		
			2	Hardware		
			3	Temperature		
			4	Overvoltage		
			5	Undervoltage		
			6	Analogue input out of range error (N/A for bus interfaces)		
			7	Position not changing		
			8	Run signal overruled		
			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		
4165	U8	Status Flags	b0	Parallel Endstop reached out	8-bit independent status bit-indicators	R/O
			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?	1. Make sure that power is applied from the power supply. 2. Send a 'Clear error' (0xFFFC) command before sending a 'Run' command.
Feedback data is available but the actuator is not able to run?	IO-Link actuators are designed with a split supply PCB. This means that 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?	V1.1 does not support data storage, but all future versions do.
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: 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.

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