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LA25 IO-Link
Quick Guide

v1.2

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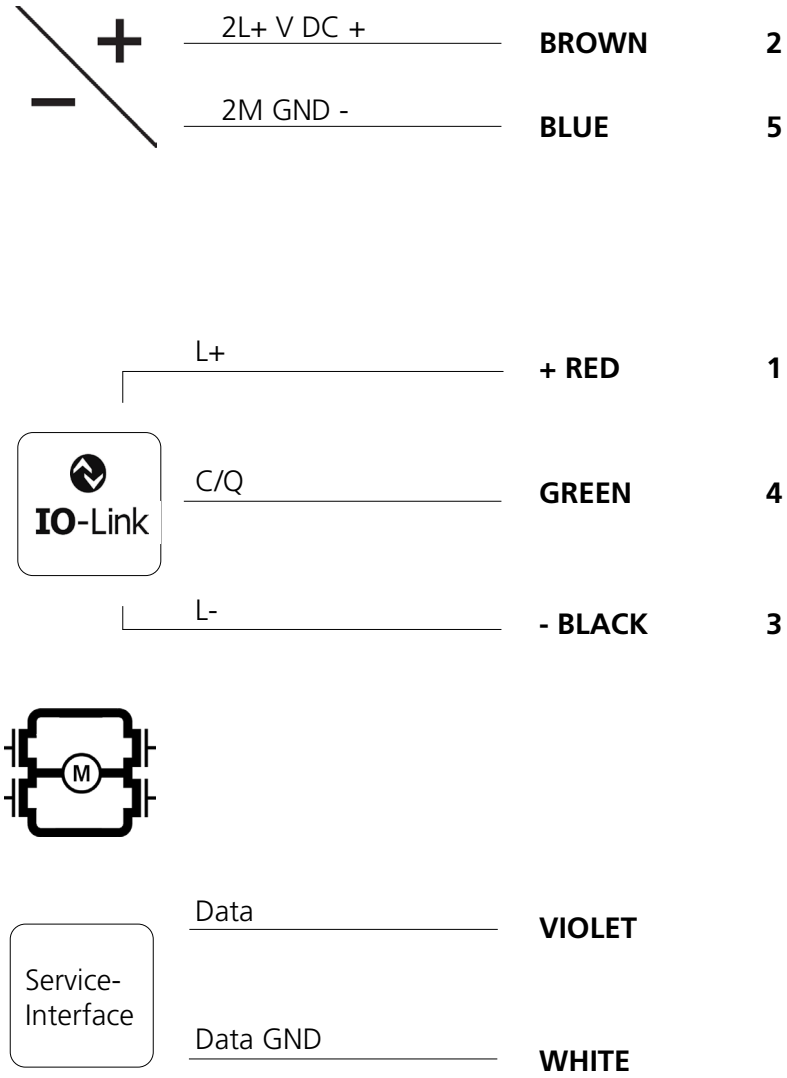
Connection Diagram

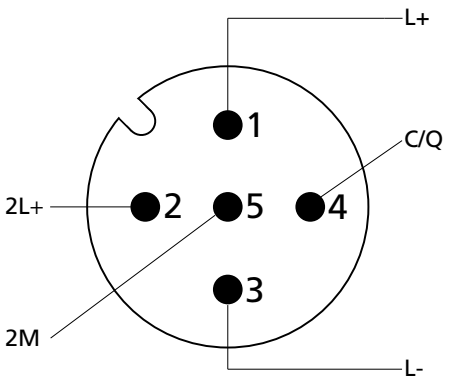
Fig. 1: 25xxxxxxxxxxAB1x=xxxxxxxxxxxxx



M12 connector

The LA25 with 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.

Connects to	Actuator	M12 Port Class B
2L+	Brown	2
2M	Blue	5
L+	Red	1
C/Q	Green	4
L-	Black	3

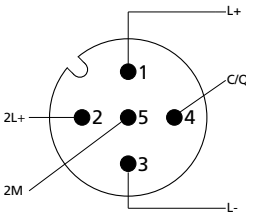


M12 Plug on device

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

An IODD file describes the IO-Link parameters for easy PLC configuration. The newest version is available online at the official IO-Link IODDfinder.

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.	
Brown (M12 port 2) 2L+	Power supply motor + 24 V DC + (VCC) Connect Brown to positive	Note: Do not change the power supply polarity on the Brown and Blue wires! Power supply GND (-) is electrically connected to the housing. Current limit levels can be adjusted through BusLink. If the temperature drops below 0°C, all current limits will automatically increase to 6 A for 24 V. 24 V ± 10% - 2.5 A at max load 24 V, current limit 4 A
Blue (M12 port 5) 2M	Power supply motor - 24 V DC - (GND) Connect Blue to negative	
Red (M12 port 1) L+	IO-Link supply + 18 - 30 V DC +	On voltage: 18 to 30 V  M12 plug on device - pin numbering and connections.
Black (M12 port 3) L-	IO-Link supply - 18 - 30 V DC - (GND)	
Green (M12 port 4) C/Q	IO-Link C/Q (data communication)	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 - find it here.
Violet	Service interface	Only BusLink can be used as service interface. Make sure that the Violet and White wires are not short-circuited
White	Service interface GND	
Yellow	Not used	

PD - Process Data

Process data includes both input and output data, and these are typically cyclically exchanged between the IO-Link master and the LA25 actuator. The tables below provide an overview of the input and output data.

PD - Input							
Byte 7	**Byte 6**	**Byte 5**	**Byte 4**	**Byte 3**	**Byte 2**	**Byte 1**	**Byte 0**
0xFF	*0xFF*	*0xFF*	Errors	Status	Actual current	Actual position	

Data name:	Byte	Field size	Details	
Actual position	0-1	16 bit	0x0000 - 0xFFEF [0-65519]: 0xFFFF [65535]:	Actual position *(0.1 mm/bit)* Position lost
Actual current consumption	2	8 bit	0x00 - 0xFF [0-255]:	Measured current *(0.25 A/bit)*
Status	3	8 bit	B0: Endstop signal out B1: Endstop signal in B2: Overcurrent	B3: Running out B4: Running in *Bitwise encoding*
Errors	4	8 bit	0 = No error 1 = Hall error 2 = Overvoltage 3 = Undervoltage 4 = Communication sync error 5 = Endstop signal error	6 = Need stop command 7 = Temperature error 8 = Heartbeat error (internal) 9 = SMPS error (internal) 10 = Current measurement *Numerical encoded*
Reserved	*5-7*	*8 bit*	*Always 0xFF*	

PD - Output							
Byte 7	**Byte 6**	**Byte 5**	**Byte 4**	**Byte 3**	**Byte 2**	**Byte 1**	**Byte 0**
0xFF	*0xFF*	*0xFF*	*0xFF*	Set speed	Set current	Set position	

Data name	Byte	Field size	Details	
Set position (Run command)	0-1	16 bit	0x0000 - 0xFFEF [0-65519]: 0xFFFB - 0XFFF0 [65520-65531]: 0xFFFC [65532]: 0xFFFD [65533]: 0xFFFE [65534]: 0xFFFF [65535]:	Run to position *(0.1 mm/bit)* Reserved Clear error Run out Run in Stop
Set maximum current	2	8 bit	0x00 - 0xFF [0-255]: *255 = default*	Max. current *(0.25 A/bit)*
Set speed	3	8 bit	0x00 - 0xFF [0-255]: *≥ 200 = max*	Speed *(0.5 %/bit)*
Reserved	*4-7*	*8 bit*	*Always 0xFF*	

Parameter and diagnostic data

On the IO-Link master, there are standard IO-Link parameters available, e.g. Product ID and firmware revision. There are also LINAK® specific parameters available - these include configuration of the behaviour in outwards and inwards direction and historic usage data used for diagnostics.

LINAK specific parameters				
Index	**Field size**	**Description**	**Comment**	**Resolution/encoding**
READ AND WRITE				
4096	U8	Current limit out	Set a default current limit	0.25 A/bit
4097	U8	Current limit in		
4098	U16	Soft start time out	Set ramp-up speed settings	1 ms/bit
4099	U16	Soft start time in		
4100	U16	Soft stop time out	Set ramp-down speed settings *(0 = instant stop or set a value ≥ 300 ms)*	1 ms/bit
4101	U16	Soft stop time in		
4103	U16	Virtual limit - outwards	Set a virtual limit to stop before the physical endstop	0.1 mm/bit
4104	U16	Virtual limit - inwards		
READ ONLY				
4107	U32	Unique identification number	General information	U32 number
4111	U32	Software configuration number		
4113	U8	Max. current seen	Monitor the max. current level (A)	0.25 A/bit
4115	U8	Max. temperature seen	Monitor the min. and max. temperature level (°C)	1 °C/bit (-40 °C offset)
4116	U8	Lowest temperature seen		
4118	U32	Total runtime	Monitor the total runtime (s)	1 s/bit
4119	U16	Reason for last stop (error codes)	0 = none, 1 = H-bridge fault, 2 = Temperature error, 4 = Undervoltage, 8 = Overcurrent, 16 = Internal PSU failure, 32 = EOS fault, 64 = Hall fault, 256 = Overvoltage, 512 = Position not changing, 1024 = Current measurement HW failure	
4126	U8	Number of LINAK current overloads out	Monitor the number of times the actuator has stopped on the factory set current limit	1 time/bit
4127	U8	Number of LINAK current overloads in		
4128	U8	Number of customer overloads out	Monitor the number of times the actuator has stopped on the customer specific current limit	
4129	U8	Number of customer overloads in		
4131	U32	Number of endstop reached out	Monitor the number of endstop signals in each direction	
4132	U32	Number of endstop reached in		
4133	U32	Number of starts out	Monitor the number of starts in each direction	
4134	U32	Number of starts in		
4135	U32	Total piston distance	Monitor the distance travelled (m)	5 m/bit
4136	U32	Actuator production order number	General information	U32 number

Checklist - First time installation

To guide you through the process of integrating the first LA25 IO-Link into your system, the following check-list provides the most important steps to consider:

- ☐ **Configure the IO-Link master to "Type B / Class B"**
- ☐ **Make sure that the amperage rating of the IO-Link master port is sufficient (min. 2 A)**
  If not, we strongly recommend powering the motor separately
- ☐ **Plug in the M12 connector or wire up the actuator with flying leads to the master**
- ☐ **Make sure you receive data from the actuator**
  Indicating that communication is OK
- ☐ **Make sure that the data order is correct**
- ☐ **Send a "clear error command"**
  0xFFFC or 65532

Start moving!

FAQ - Troubleshooting

Based on previous input from our customers, the following answers to frequently asked questions may help you troubleshoot an actuator in an IO-Link network.

Does the actuator support data storage?

The current version (v.1.1) of LA25 IO-Link does not support data storage.

Where can I find the latest IODD file?

On the official IODD Finder, you can always find the latest version for LA25 - visit ioddfinder.io-link.com

Why is the actuator not running despite giving it a run command?

If the actuator is not running when applying a run command (0xFFFD/65533 for out and 0xFFFE/65534 for in), please check the following:

1. Make sure power is applied from the power supply
2. Send a "clear error" (0xFFFC/65532) command before sending a run command

Why do I get feedback (data) but the actuator is unable to run?

The LA25 is 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.

1. Make sure power is applied from the power supply to the Brown and Blue wires - see port configuration (Class B)
2. If the actuator is powered directly from the master, this must meet the amp requirements as specified on the product label (max. 2.5 amps on a standard LA25)

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 table above. However, some controllers may reverse the data order. Please make sure the correct Most Significant Byte [MSB] and Least Significant Byte [LSB] is 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 has 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.

Still experiencing problems with your actuator?

Please contact your local LINAK® office for technical support.

Declaration of Conformity

IO-Link

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We:

LINAK A/S

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DK-6430 Nordborg, Denmark

declare under our own responsibility that the product(s):

LINAK® LA25

"IO-Link Device"

to which this declaration refers conform to:

☒
- IO-Link Interface and System Specification, V1.1, July 2013 (NOTE 1,2)
- IO Device Description, V1.1, August 2011

☒
- IO-Link Interface and System Specification, V1.0, January 2009 (NOTE 1)
- IO Device Description, V1.0.1, March 2010

The conformity tests are documented in the test report:

LA25IO Physical layer test report

LA25IO Device test

Issued at LINAK HQ, 14/12-20

Authorized signatory

Name: Jens Lorenzen

Title: *Senior Project Manager R&D*

Signature:

NOTE 1 Relevant Test specification is V1.1, July 2014

NOTE 2 Additional validity in Corrigendum Package 2015

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