

EtherNet/IP™

User Manual

EtherNet/IP®

Contents

Preface	3
Terms of use	4
Revision overview.....	5
Connection diagram	6
Applicable for: LA14, LA25, LA36, LA37, LA76 and LA77	6
Applicable for: LC3 IC.....	7
I/O specifications.....	8
Parallel.....	9
Getting started	11
Power supply.....	11
Configuration	11
Parameters to be verified by Actuator Connect™	12
Adapter settings	13
Command examples	14
General run prerequisites.....	14
Run the actuator outwards	14
Register overview.....	15
Command details	15
Class 1 implicit (IO) messaging.....	15
Feedback status details	16
Parallel feedback status details.....	18
Diagnostics data	19
Error codes	23
Parallel error codes.....	24
Contacts.....	26

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 2

Item number for cable kit added	Page 6-7
'Manual run' changed to 'Extends actuator' and 'Retracts actuator'	Page 6-8
'Service interface' changed to 'Parallel communication'	Page 6-8
'Service interface GND' changed to 'Parallel GND'	Page 6-8
'V DC' added	Page 6-8
Information about separate supplies added	Page 6-8
'Parallel' section updated	Page 9-10
Power supply table updated	Page 11
'Parameters to be verified by Actuator Connect™' updated	Page 12
'Run out command' changed to 'Command examples'	Page 14
'Communication sequence...' changed to 'Run the actuator outwards'	Page 14

Edition 1

New document

Connection diagram

Applicable for: LA14, LA25, LA36, LA37, LA76 and LA77

BROWN 24/48 V DC

BLUE GND



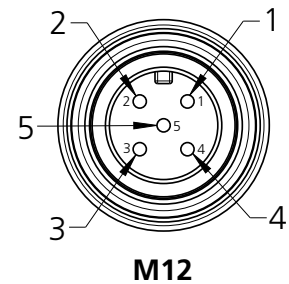
1 Extends the actuator

2 Retracts the actuator

4* Split power supply V DC

3 Parallel data

5 Parallel GND

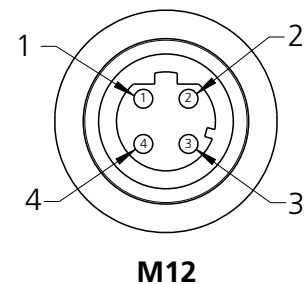


1 ETH_TX+

2 ETH_RX+

3 ETH_TX-

4 ETH_RX-



The physical layer conforms to the IEEE 802.3-2018 standard with communication speeds of 10 Mbps and 100 Mbps, respectively. Cable length is reduced to = 100 m without repeater, as determined by IEEE 802.3-2018.

* Split power supply and motor supply (Brown), which refer to a common GND (Blue).

This approach is used to maintain power on the intelligent part of the actuator. In case the main supply is disconnected, split power supply allows e.g. that the position is maintained. The main supply may be disconnected for reasons related to safety, maintenance or installation.



Actuator Connect™ is available for EtherNet/IP™ actuators and can be used for:

Diagnostics, manual run and configuration. The newest version is available online [here](#).



Connect the actuator to Actuator Connect via a USB adapter cable (must be purchased separately) to enable and configure various features.

Item number for cable kit: 0367996

Connection diagram

Applicable for: LC3 IC

BROWN 24/48 V DC

BLUE GND



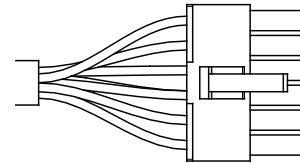
RED Extends the actuator

BLACK Retracts the actuator

ORANGE* Split power supply V DC

VIOLET Parallel data

WHITE Parallel GND



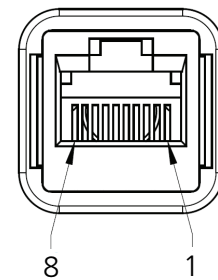
**Molex mini-fit
12-pin**

1 ETH_TX+

3 ETH_RX+

2 ETH_TX-

6 ETH_RX-



RJ45



The physical layer conforms to the IEEE 802.3-2018 standard with communication speeds of 10 Mbps and 100 Mbps, respectively. Cable length is reduced to = 100 m without repeater, as determined by IEEE 802.3-2018. The wiring conforms to the T-568A standard.

* Split power supply and motor supply (Brown), which refer to a common GND (Blue).

This approach is used to maintain power on the intelligent part of the actuator. In case the main supply is disconnected, split power supply allows e.g. that the position is maintained. The main supply may be disconnected for reasons related to safety, maintenance or installation.



Actuator Connect™ is available for EtherNet/IP™ actuators and can be used for:


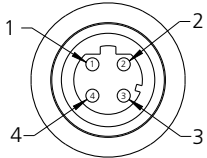
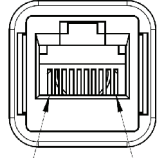
Diagnostics, manual run and configuration. The newest version is available online [here](#).



Connect the actuator to Actuator Connect via a USB adapter cable (must be purchased separately) to enable and configure various features.

Item number for cable kit: 0367996

I/O specifications

Input/Output	Specification	Comments
Description	The communication protocol conforms to the IEEE 802.3-2018 Ethernet standard with communication speeds of 10 Mbps and 100 Mbps.	
Brown	Connect Brown to positive 24/48 V DC	Note: Do not change the power supply polarity on the Brown and Blue wires! Only for powering the motor driver module. Power supply GND is electrically connected to the housing through a capacitor and resistor in parallel.
Blue	Connect Blue to negative GND	
PIN out	Data cable M12 - 5-pin male	
Pin 1	Extends the actuator	The signal becomes active at: $V_{IN} > 67\%$ of V DC The signal becomes inactive at: $V_{IN} < 33\%$ of V DC Input current: 10 mA
Pin 2	Retracts the actuator	
Pin 4	Split power supply V DC	Split power supply: 24 V DC with ≈ 28 mA current consumption. 48 V DC with ≈ 16 mA current consumption. The split power supply uses the common GND from the power supply (Blue). Split power supply is only for powering the communication of the integrated controller.
Pin 3	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.
Pin 5	Parallel GND	
PIN in	Data cable M12 - 4-pin female	
Pin 1	ETH_TX+	
Pin 2	ETH_RX+	
Pin 3	ETH_TX-	
Pin 4	ETH_RX-	
PIN in	RJ45 (Only for LC3 IC)	
Pin 1	ETH_TX+	
Pin 3	ETH_RX+	
Pin 2	ETH_TX-	
Pin 6	ETH_RX-	

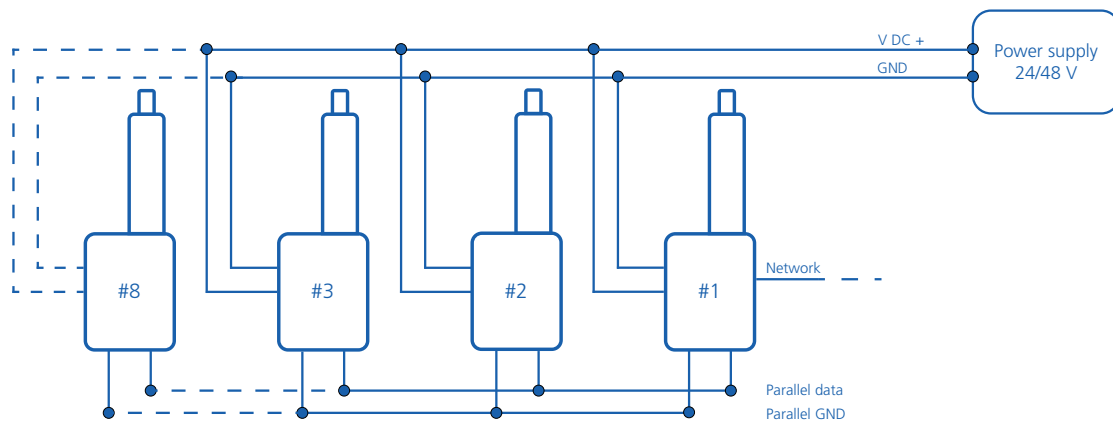
Parallel

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 Ethernet port 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.
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

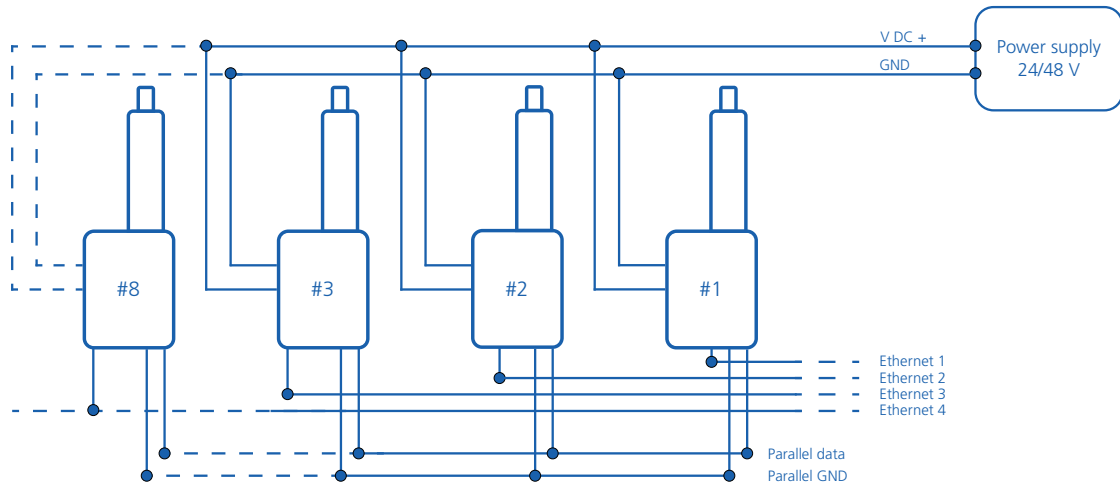


In a simple parallel setup there is only one actuator connected to the network. This actuator receives run commands and shares data with the controller. The remaining actuators in the system are only connected to internal parallel communication. This way, the internal communication ensures that the system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

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 network. 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® EtherNet/IP™ 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

EtherNet/IP actuators are available with the following supply voltage range: 24 and 48 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
	EtherNet/IP communication	10 V	24 V	39 V
48 V	Motor	36 V	48 V	58 V
	EtherNet/IP communication	10 V	48 V	60 V

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

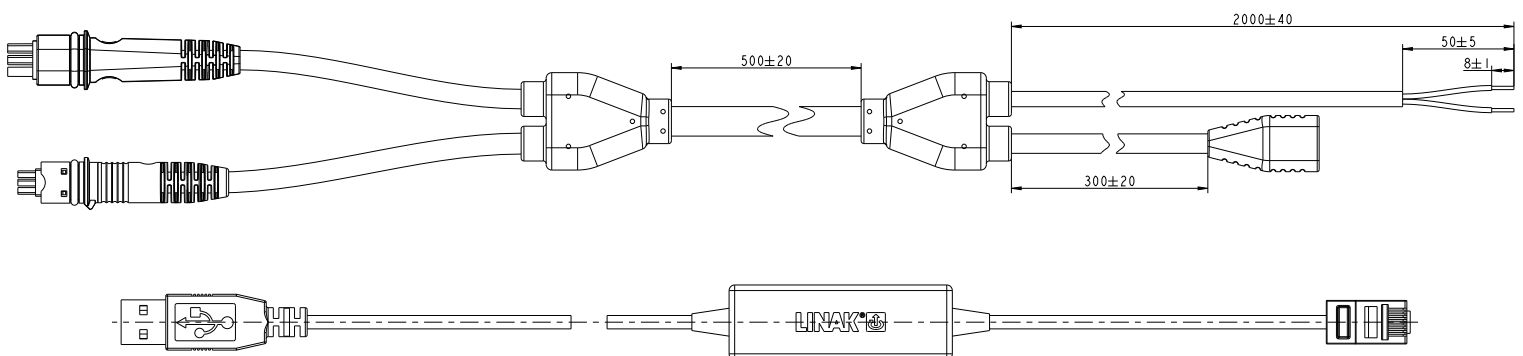
Configuration

Before being integrated into a EtherNet/IP 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 (item no. 0367996) is required to use Actuator Connect on a PC. This cable must be connected to the 6-pin and 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.

Parameters to be verified by Actuator Connect™

Parameters	Description
DHCP	DHCP is a client/server protocol that automatically provides an IP address. If enabled: below parameters are not configurable
IP Address	Set the device IP address to a unique address in the network. 192.168.1.10 (Default)
Subnet mask	Set the subnet mask. 255.255.255.0 (default)
Gateway	Set the gateway. 192.168.1.1 (default)

Adapter settings

Depending on controller (Scanner) there are different ways to configure the adapter settings (Actuator). Some may accept EDS files, and others will need you to input the values manually. EDS file is downloadable at www.LINAK.com

Setting up the scanner for adapter manually

Follow the example on the next page to complete the startup procedures necessary for successful communication with a LA36 EtherNet/IP™. Output and Input Assembly are run by Implicit commands, while Configuration Assembly and Diagnostics are run by Explicit commands.

All necessary adapter settings written in the table below can be found in the EDS file.

Adapter Settings (Startup Procedures)		
Parameters	Value	Description
Adapter IP address	192.168.1.10	IP address of the actuator
Vendor ID	1538	LINAK
Product Type	12	Communication adapter
Product Code	36	LA36
Major Revision	1	Revision of adapter
Minor Revision	4	Revision of adapter
RPI (Requested Packet Interval)	100 ms	Update rate
Configuration AssemblyID	151 (0x97)	ID for configuration data
Configuration Assembly Size	0	Length of configuration data in bytes (None in this example)
O->T (Output) AssemblyID	150 (0x96)	ID for Output Assembly data
O->T (Output) Assembly Size	6	Length of Output Assembly data in bytes
T->O (Input) AssemblyID	100 (0x64)	ID for Input Assembly data
T->O (Input) Assembly Size	14	Length of Input Assembly data in bytes

O->T Organizer to Target

T->O Target to Organizer

When the Scanner is configured with the above values, communication should be established. You should now be able to access the "Command details" from AssemblyID 150 (0x96) and "Feedback details" from AssemblyID 100 (0x64).



Users are strongly advised against configuring their assets directly to the public internet. By taking this precautionary measure, the risk of unauthorized and malicious cyber activities from external threats is significantly reduced.

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	Assembly Instance ID	Action
1	AID* 150 (0x96) 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.
2	AID 100 (0x64) Byte 4	"Error Code" must be = 0.
3	AID 100 (0x64) Byte 3	"Status Flags" bit 2 (Overcurrent) must be = 0.
4	AID 100 (0x64) Byte 3	"Status Flags" bit 5 (Heartbeat needed) must be = 0.
5	AID 100 (0x64) Byte 3	"Status Flags" bit 6 (Actuator is running outside normal conditions) must be = 0.

* AID = AssemblyID

Run the actuator outwards

Step	Assembly Instance ID	Action
1	-	Check that general run prerequisites are fulfilled.
2	AID 150 (0x96) 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	AID 150 (0x96) 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	AID 150 (0x96) 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	AID 150 (0x96) 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	AID 150 (0x96) Byte 0-1	"Position" must be set to = 64257 for Run out.
7**	AID 100 (0x64) Byte 3	"Status Flags" bit 3 will change to 1 to indicate that the actuator is running out.

** Optional

Register overview

Command details

Class 1 implicit (IO) messaging					
Assembly Instance ID	Command	Data type	Details	Description	Unit
150 (0x96)	Position	UINT16	0–64255	Run to position	0.1 mm/bit
			64256	Clear error register (see 0x1001)	
			64257	Run out	
			64258	Run in	
			64259	Stop	
			64260	Recovery run out	
			64261	Recovery run in	
			64262–65535	Invalid value, actuator will not run	
	Current	UINT8	0–250	Maximum current limit	0.25 A/bit
			251	Use default current value	
			252–255	Invalid value, actuator will not run	
	Speed	UINT8	0–200	Speed to use	0.5 %/bit
			201–250	Use 100% speed	
			251	Use default speed value	
			252–255	Invalid value, actuator will not run	
	Soft Start	UINT8	0–250	Start ramping time	0.05 s/bit
			251	Use default soft start value	
			252–255	Invalid value, actuator will not run	
	Soft Stop	UINT8	0–250	Stop ramping time	0.05 s/bit
			251	Use default soft stop value	
			252–255	Invalid value, actuator will not run	

Feedback status details

Class 1 implicit (IO) messaging					
Assembly Instance ID	Command	Data type	Details	Description	Unit
100 (0x64)	Position	UINT16	0–64255	Position of the actuator piston	0.1 mm/bit
			64256–65023	Reserved	
			65024	Position lost	
			65025–65535	Reserved	
	Current	UINT8	0	Not running	
			1–250	Measured motor current	0.25 A/bit
			251–253	Reserved	
			254	Fault in current measurement circuit	
			255	Reserved	
	Status Flags	UINT8	b0	Endstop reached signal in	"8-bit independent status bit-indicators"
			b1	Endstop reached signal out	
			b2	Overcurrent	
			b3	Running out	
			b4	Running in	
			b5	Reserved	
			b6	Actuator is running outside nominal conditions	
b7			Reserved		

Feedback status details

Class 1 implicit (IO) messaging					
Assembly Instance ID	Command	Data type	Details	Description	Unit
100 (0x64)	Error Code	UINT8	0	No error detected	8-bit error code showing the currently active error with the highest priority only
			1	'Run' command overruled	
			2	Position sensor	
			3	Overvoltage	
			4	Undervoltage	
			5	Communication sync	
			6	Endstop switch	
			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	
			254	Other internal error (Not specified)	
	255	Other external error (Not specified)			
	Speed	UINT16	0-4015	Speed of actuator piston	0.1 mm/s / bit
			4016 - 65535	Reserved	
Input State	UINT8	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)		

Parallel feedback status details

Class 1 implicit (IO) messaging					
Assembly instance ID	Command	Data type	Details	Description	Unit
100 (0x64)	Error Source	UINT32	0	No error is active on any actuator in parallel system, or error source ID is irrelevant	32-bit IP address
			1-4294967295	IP address of the actuator with highest priority error	
	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 (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			
	Status Flags	UINT8	b0	Parallel Endstop Reached Signal out	"8-bit independent status bit-indicators"
			b1	Parallel Endstop Reached Signal in	
			b2	Parallel running outside nominal conditions	
			b2-b7	Reserved	

Diagnostics data

Class 3 explicit messaging							
Index [hex]	Index [dec]	Data type	Access	Name	Details	Description	Unit
0x01	1	UINT8	RW	Current Limit Out			0.25 A/bit
0x02	2	UINT8	RW	Current Limit In			0.25 A/bit
0x03	3	UINT16	RW	Soft Start Time Out			1 ms/bit
0x04	4	UINT16	RW	Soft Start Time In			1 ms/bit
0x05	5	UINT16	RW	Soft Stop Time Out			1 ms/bit
0x06	6	UINT16	RW	Soft Stop Time In			1 ms/bit
0x07	7	UINT8	RW	Maximum Speed	0–200		0.5 %/bit
					201–255		100%
0x08	8	UINT16	RW	Virtual Endstop Reached Out Position			0.1 mm/bit
0x09	9	UINT16	RW	Virtual Endstop Reached In Position			0.1 mm/bit
0x0A	10	UINT32	R	UIN			8 number format
0x0B	11	UINT32	R	SW Variant		Software number (e.g. 1050000)	SWxxxxxxxxVx-x
0x0C	12	UINT32	R	SW Version Major			SWxxxxxxxxVx-x
0x0D	13	UINT32	R	SW Version Minor			SWxxxxxxxxVx-x
0x0E	14	UINT32	R	Config. Production Order Number			
0x0F	15	UINT32	R	Production Date			yyyymmdd
0x10	16	UINT8	R	Maximum Current Seen			0.25 A/bit
0x11	17	UINT8	R	Maximum FET Temperature Seen			1 °C/bit - 40
0x12	18	UINT8	R	Maximum Ambient Temperature Seen			1 °C/bit - 40
0x13	19	UINT8	R	Minimum Ambient Temperature Seen			1 °C/bit - 40
0x14	20	UINT32	R	Current Usage			1 As/bit
0x15	21	UINT32	R	Runtime			1 s/bit
0x16	22	UINT8	R	Number of Stops Due to Overvoltage			
0x17	23	UINT8	R	Number of Stops Due to FET Overtemperature			
0x18	24	UINT8	R	Number of Stops Due to Ambient Overtemperature			

Diagnostics data

Class 3 explicit messaging							
Index [hex]	Index [dec]	Data type	Access	Name	Details	Description	Unit
0x19	25	UINT8	R	Number of Stops Due to Low Voltage			
0x1A	26	UINT8	R	Number of Stops Due to Hall Errors			
0x1B	27	UINT8	R	Number of Stops Due to Endstop Switch Errors			
0x1C	28	UINT8	R	LINAK Current Overload Out Stops			
0x1D	29	UINT8	R	LINAK Current Overload in Stops			
0x1E	30	UINT8	RW	Resettable Custom Current Overload Out Stops			
0x1F	31	UINT8	RW	Resettable Custom Current Overload in Stops			
0x20	32	UINT16	R	Communication Errors			
0x21	33	UINT32	R	Number of Endstop Reached Out			
0x22	34	UINT32	R	Number of Endstop Reached In			
0x23	35	UINT32	R	Number of Starts Out			
0x24	36	UINT32	R	Number of Starts In			
0x25	37	UINT32	R	Total Piston Distance			5 m/bit
0x26	38	UINT16	R	Last Stop Reason ID 0		Stop reason ID	
0x27	39	UINT8	R	Last Stop Count ID 0		Number of consecutive stop reasons of the same type	
0x28	40	UINT32	R	Last Stop Powered Time ID 0		Powered time when the last stop occurred	1 s/bit
0x29	41	UINT16	R	Last Stop Reason ID 1		Stop reason ID	
0x2A	42	UINT8	R	Last Stop Count ID 1		Number of consecutive stop reasons of the same type	
0x2B	43	UINT32	R	Last Stop Powered Time ID 1		Powered time when the last stop occurred	1 s/bit
0x2C	44	UINT16	R	Last Stop Reason ID 2		Stop reason ID	

Diagnostics data

Class 3 explicit messaging							
Index [hex]	Index [dec]	Data type	Access	Name	Details	Description	Unit
0x2D	45	UINT8	R	Last Stop Count ID 2		Number of consecutive stop reasons of the same type	
0x2E	46	UINT32	R	Last Stop Powered Time ID 2		Powered time when the last stop occurred	1 s/bit
0x2F	47	UINT16	R	Last Stop Reason ID 3		Stop reason ID	
0x30	48	UINT8	R	Last Stop Count ID 3		Number of consecutive stop reasons of the same type	
0x31	49	UINT32	R	Last Stop Powered Time ID 3		Powered time when the last stop occurred	1 s/bit
0x32	50	UINT16	R	Last Stop Reason ID 4		Stop reason ID	
0x33	51	UINT8	R	Last Stop Count ID 4		Number of consecutive stop reasons of the same type	
0x34	52	UINT32	R	Last Stop Powered Time ID 4		Powered time when the last stop occurred	1 s/bit
0x35	53	UINT32	R	Total Corrected Distance			1 mm/bit
0x36	54	UINT8	R	FET Temperature			1 °C/bit - 40
0x37	55	UINT8	R	Ambient Temperature			1 °C/bit - 40
0x38	56	UINT16	R	Stroke Length			0.1 mm/bit
0x39	57	UINT16	R	Zero Point Offset			0.1 mm/bit
0x3A	58	UINT32	R	Actuator PO Number			
0x3B	59	UINT8	RW	LINAK Special Function	0		Reserved
					1	Restart actuator	
					2-255		Reserved
0x3C	60	UINT32	R	IP Address 1 in Parallel System		Sorted in descending order	
0x3D	61	UINT32	R	IP Address 2 in Parallel System			
0x3E	62	UINT32	R	IP Address 3 in Parallel System			
0x3F	63	UINT32	R	IP Address 4 in Parallel System			

Diagnostics data

Class 3 explicit messaging							
Index [hex]	Index [dec]	Data type	Access	Name	Details	Description	Unit
0x40	64	UINT32	R	IP Address 5 in Parallel System			
0x41	65	UINT32	R	IP Address 6 in Parallel System			
0x42	66	UINT32	R	IP Address 7 in Parallel System			
0x43	67	UINT32	R	IP Address 8 in Parallel System			

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. 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. 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. Example: 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.
11	Parallel arbitration Start-up parallel configuration procedure in progress.

Error codes

Error	Description
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.

Parallel error codes

Error	Description
6	<p>Analogue input out of range (N/A for bus interfaces)</p> <p>Analogue input signal is outside operating limits. Servo or Proportional. Consult the documentation for correct input signal.</p>
7	<p>Position not changing</p> <p>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.</p>
8	<p>Run signal overruled</p> <p>Communication has been overruled by a higher priority input. Communication is split into the following priorities:</p> <ol style="list-style-type: none"> 1. Bus communication (CAN bus, EtherNet/IP™, etc.) 2. LINAK service tool (Actuator Connect™) 3. Manual run using Red and Black wires <p>Send a 'Clear error' command to continue.</p>
9	<p>Position initialisation not possible</p> <p>Internal initialisation parameters missing. Contact LINAK.</p>
10	<p>Parallel start-up</p> <p>Error in parallel setup. The number of connected actuators does not match your configuration. Check the configuration by using the LINAK tool Actuator Connect.</p>
11	<p>Parallel running</p> <p>The actuators are performing the internal setup and are not ready for operation.</p>
12	<p>BLDC motor</p> <p>Internal hardware error. Send 'Clear error' command to clear error. If the error persists, contact LINAK or replace the product.</p>
13	<p>Endstop switch (N/A for bus interfaces)</p> <p>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.</p>
14	<p>Parallel communication</p> <p>Error in internal parallel communication. More than 5 communication errors in 500 ms. Please check the wire connections and re-power the complete setup.</p>
15	<p>Parallel setup stopped</p> <p>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.</p>
24	<p>Other error</p> <p>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.</p>
25	<p>Position lost</p> <p>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.</p>

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