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HANDBUCH FÜR INSTALLATION, GEBRAUCH UND WARTUNG

ART. 0610 – ART. 0611 ELEKTRISCHER 12V STELLANTRIEB, KOMPLETT MIT HALTERUNG

ART. 0612 – ART. 0613 ELEKTRISCHER 24V STELLANTRIEB, KOMPLETT MIT HALTERUNG

ISTR 0610_IT	AUSGABE 1/2020

INHALTSVERZEICHNIS

1. Beschreibung

Elektrischer linearer Stellantrieb, komplett mit Halterung, ideal zum Öffnen und Schließen von Keil- und Plattenschiebern.

1.1 Produkttypen

ART. 0610
Elektrischer Stellantrieb 12V DC (typ LINAK® LA35 Artikelnummer 3522A0+00**150**A22 / 3522A0+00**200**A22), komplett mit Halterung und Steuereinheit mit spezifischer Einstellung zur Anwendung an Keilschiebern. Mögliche Läufe: **150** – **200** mm.

ART. 0611
Elektrischer Stellantrieb 12V DC (typ LINAK® LA35 Artikelnummer 3522A0+00**150**A22 / 3522A0+00**200**A22), komplett mit Halterung und Schieberblatt zur Anwendung an Plattenschiebern. Mögliche Läufe: **150** – **200** mm.

ART. 0612
Elektrischer Stellantrieb 24V DC (typ LINAK® LA35 Artikelnummer 3522A0+00**150**B22 / 3522A0+00**200**B22), komplett mit Halterung und Steuereinheit mit spezifischer Einstellung zur Anwendung an Keilschiebern. Mögliche Läufe: **150** – **200** mm.

ART. 0613
Elektrischer Stellantrieb 24V DC (typ LINAK® LA35 Artikelnummer 3522A0+00**150**B22 / 3522A0+00**200**B22), komplett mit Halterung und Schieberblatt zur Anwendung an Plattenschiebern. Mögliche Läufe: **150** – **200** mm.

1.2 Symbole und Konventionen

⚠ Dieses Symbol weist auf wichtige Informationen und/oder Anweisungen hin, die für die Verhütung schwerer Körperverletzungen des Benutzers und/oder schwerer Schäden an Anlage und Umwelt zu beachten sind.

2. Lagerung, Transport, Installation und Entsorgung

- Falls die Stellantriebe vor der Installation oder über einen längeren Zeitraum gelagert werden müssen, sollten sie an einem kühlen und belüfteten Ort (max. 40°C) und vor direkter Sonneneinstrahlung, anderen Wärmequellen und Feuchtigkeit geschützt gelagert werden.
- Beim Erhalt des Materials sollte der Stellantrieb überprüft werden, wobei zu kontrollieren ist, dass der Antrieb vollständig ist und die Maße sowie die elektrischen und mechanischen Eigenschaften mit den Anforderungen der Anlage übereinstimmen.
- Beim Transport ist darauf zu achten, Stöße und Beschädigungen des Stellantriebs zu vermeiden.
- ⚠ Bei der Installation des Stellantriebs am Schieber und während der anschließenden Installation des Schiebers mit dem montierten Stellantrieb sind geeignete persönliche Schutzausrüstungen zu verwenden (Handschuhe, Schutzbrille, Sicherheitsschuhe usw.).

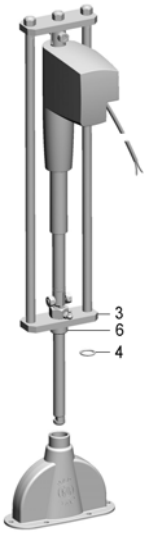
- Bei der Installation des Schiebers mit dem montierten Stellantrieb sind die Anweisungen in den entsprechenden Installations-, Betriebs- und Wartungsanleitungen zu befolgen.
- Nach beendeter Installation mehrere Öffnungs- und Schließzyklen im Leerlauf durchführen und den Stellantrieb dann in Betrieb nehmen.
- Bei der Entsorgung den Schieber reinigen und die wiederverwertbaren Materialien (Metallteile, Kunststoffteile) von den Teilen trennen, die nach den geltenden örtlichen Vorschriften als Sonderabfall zu entsorgen sind (elektrische Teile, PTFE-Dichtungen, Gummiteile usw.).

⚠ **Die Verschrottung des montierten, ungereinigten Schiebers kann umweltschädliche Emissionen zur Folge haben.**

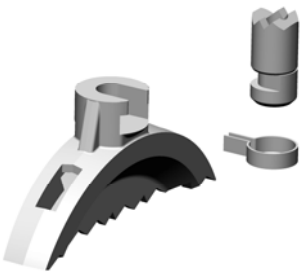
2.1 Verfahren zur Montage des Stellantriebs - Keilschieber.

Das Verfahren bezieht sich auf die Montage des von Metaltecnica gelieferten Stellantriebs mit Halterung an Keilschiebern (Art. 0070÷0075) in „zerlegter" Ausführung, d. h. ohne Stange, Gabel und Stopfbuchse.

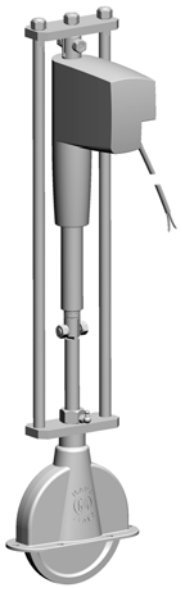
• Schließen Sie das Kabel des Stellantriebs an ein Netzteil an, damit der Schaft vollständig ausgefahren werden kann. Danach muss das Netzteil wieder getrennt werden.	

• Lösen Sie die Schrauben und nehmen Sie den Kopf vom Schiebergehäuse ab. • Bringen Sie den O-Ring (4) an der Basis der Stopfbuchse (6) an. Vergewissern Sie sich, dass die Stopfbuchse vollständig mit dem Flansch (3) verschraubt ist.	

- Positionieren Sie die Befestigungsschelle am Endstück der Stange und setzen Sie das Stangenende in die entsprechende Nut am Keil ein. Das Endstück ist so geformt, dass eine Drehung der Stange verhindert wird.
- Verbiegen Sie die beiden Schenkel der Schelle, um die Befestigung zwischen Stange und Keil abzuschließen.



- Schließen Sie das Kabel des Stellantriebs an ein Netzteil an und kehren Sie die Polarität um, um den Schaft wieder vollständig einzufahren und den Keil in das Kopfstück einzusetzen. Danach muss das Netzteil wieder getrennt werden.



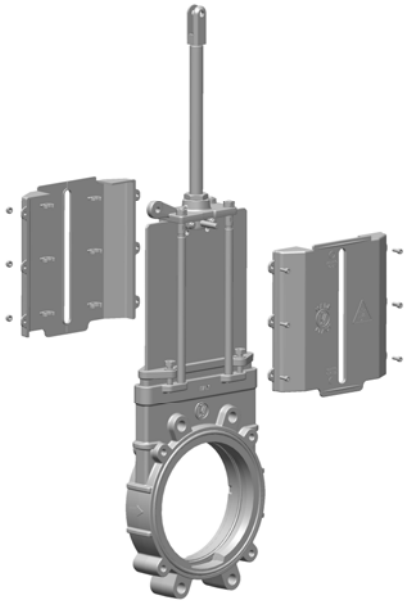
- Bringen Sie die Dichtung (2) am Schiebergehäuse (1) an, positionieren Sie das Kopfteil (5) am Gehäuse (1) und befestigen Sie es mit den entsprechenden Schrauben (7).
- Stellen Sie die endgültigen elektrischen Anschlüsse zwischen Stromversorgung, Stellantrieb und elektronischer Steuereinheit her, wie im beigefügten Plan dargestellt (siehe Punkt 6).
- Führen Sie einige Öffnungs- und Schließzyklen durch, bevor Sie den Schieber in Betrieb nehmen.

2.1.1 Elektronische Steuereinheit TR-EM-288-H

Die elektronische Steuereinheit (Motorsteuerung) ist unerlässlich, wenn der Stellantrieb an Keilschiebern installiert werden soll. Die Steuereinheit wird vom Hersteller (LINAK®) gemäß den Angaben von Metaltecnica eingestellt und hat die Funktion, die Schließkraft auf ca. 2.000 N zu begrenzen und gleichzeitig eine Öffnungskraft von 4.000 N beizubehalten. Dadurch kann verhindert werden, dass der Keil im Schiebersitz blockiert. Die Steuereinheit erfasst zudem die vom Motor beim Schließvorgang aufgenommene Leistung, sodass sie außerdem als Endschalter fungiert und den Strom unterbricht, wenn der Keil mit der festgelegten Kraft von 2.000 N in den Sitz geschoben wurde.
Mithilfe der speziellen Programmiereinheit TR-EM-236 lässt sich die Steuereinheit neu konfigurieren, und es können 17 Parameter eingestellt werden. Dies muss von Fachpersonal vorgenommen werden, das über sehr gute Sachkenntnisse verfügt und sich bewusst ist, welche Auswirkungen die Parameteränderungen auf die Anwendung haben können.

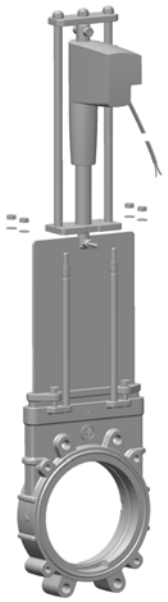
2.2 Verfahren zur Montage des Stellantriebs - Plattenschieber.

Das Verfahren bezieht sich auf die Montage des von Metaltecnica gelieferten Stellantriebs mit Halterung an Plattenschiebern (Art. 0090÷0120) in manueller Standardausführung.

• Schließen Sie das Kabel des Stellantriebs an ein Netzteil an, damit der Schaft vollständig eingefahren werden kann. Danach muss das Netzteil wieder getrennt werden. • Öffnen Sie den Schieber, an dem der elektrische Stellantrieb installiert werden soll, vollständig. Lösen Sie die Befestigungsschrauben und entfernen Sie die Schutzkappen aus Kunststoff oder Stahl. Lösen Sie dann die Druckmuttern der Stopfbuchse (ca. 1.5 Umdrehungen).	

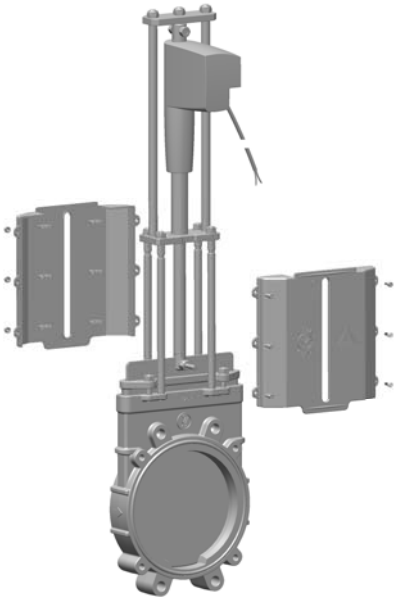
• Lösen Sie die Klemmmuttern des Kopfs an den 4 Säulen und ziehen Sie die Einheit bestehend aus Schieberblatt, Indikatorklemme, Stange, Kopf, Stopfbuchse und Gabel nach oben ab.	

- Positionieren Sie den Antriebssatz und setzen Sie das Schieberblatt in die Stopfbuchse und den Flansch in die 4 Säulen ein.
- Bringen Sie die Unterlegscheiben an den vier Gewinde-Endstücken der Säulen an und verschrauben Sie die entsprechenden Muttern.



- Stellen Sie die endgültigen elektrischen Anschlüsse zwischen Stromversorgung und elektrischem Stellantrieb her und führen Sie einen Schließvorgang des Schiebers durch. Justieren Sie nun die Druckmuttern der Stopfbuchse.
- **Je nachdem, welche Merkmale die Anwendung aufweist, ist gegebenenfalls die externe Steuereinheit zur Abschaltung TR-EM-208 zu installieren (siehe Angaben unter dem folgenden Punkt und im technischen Datenblatt, das als Anhang zu Punkt 6 beigefügt ist).**

- Führen Sie einige Öffnungs- und Schließzyklen durch und montieren Sie die Schutzkappen wieder, bevor Sie den Schieber in Betrieb nehmen.



2.3 Elektronische Steuereinheit TR-EM-208-H - Arbeitszyklus des Stellantriebs

Bei Plattenschiebern (z. B. Artikel 0090 – 0100) ist die Anwendung einer elektronischen Steuereinheit mit Abschaltfunktion (Stromunterbrechung) nicht erforderlich, wenn der Schieber zur Aufbereitung von sauberen oder verunreinigten Flüssigkeiten und/oder zur Aufbereitung von Abwässern/Gülle verwendet wird, die geringe Mengen an Fremdkörpern enthalten und eine derartige Konsistenz aufweisen, dass das vollständige Absinken des Schieberblatts nicht behindert wird.
In diesen Fällen muss sich das Schieberblatt nur zwischen der Position der vollständigen Öffnung und der Position der vollständigen Schließung bewegen; daher wird die Motorabschaltung in den zwei verschiedenen Positionen durch die eingebauten Endschalter des Stellantriebs sichergestellt. Die Hublänge zur Öffnung und Schließung entspricht somit der Hublänge des Stellantriebs.

Bei Anwendungen, die zur kontinuierlichen Regulierung der Verteilung von Abwässern/Gülle vor Ort bestimmt sind, erfolgt die Stromunterbrechung in der Regel direkt über die entwickelte Elektronik des Unternehmens, das das Verteilersystem konzipiert hat.

Bei anderen Anwendungen sehen die Planer des elektrischen/elektronischen Stromkreises die Verwendung von Sicherungen vor, um den Motor zu schützen. Im beigefügten Datenblatt von LINAK finden Sie die Merkmale der Sicherungen, die für Stellantriebe ohne integrierte Kontrolle wie der Antrieb LA 35 empfohlen werden.

Falls Abwässer aufbereitet werden, die besonders verkrusten und/oder große feste Körper enthalten, wird empfohlen, die elektronische Steuereinheit LINAK TR-EM-208-H (unsere Artikelnummer ELET 0611200000) zu verwenden, mit der es möglich ist, die Stromunterbrechung einzustellen und einen Motorschaden zu verhindern, wenn das Schieberblatt durch feste Körper behindert wird. Das Gleiche gilt auch für den Fall, dass ein Stellantrieb mit einer höheren Hublänge als erforderlich verwendet wird, um den Schieber vollständig zu öffnen und zu schließen (zum Beispiel ein Stellantrieb mit einer Hublänge von 150, der an einem 5-Zoll-Schieber mit einer Hublänge von 125 montiert wird).

Die häufigste Ursache für einen Motorschaden ist in jedem Fall die Nichteinhaltung der Einschaltdauer (DUTY CYCLE). Die an den Stellantrieben und im Katalog von Metaltecnica enthaltenen Angaben sind zu beachten, um eine Überhitzung und eine daraus folgende Beschädigung der internen Motorteile zu verhindern.

3. Abmessungen - Materialien - Betriebsbedingungen

Die technischen Informationen in Bezug auf Außenmaße, verwendete Materialien und Betriebsbedingungen sind aus dem Firmenkatalog oder aus der Internetseite www.metaltecnicazanolo.com. Die spezifischen Datenblätter für die einzelnen Artikel können bei der technischen Abteilung der Firma Metaltecnica angefordert werden.

4. Einsatzgrenzen

- Die angegebene Einschaltdauer nicht überschreiten: max. 10 % oder 2 Minuten Dauerbetrieb, gefolgt von 18 Minuten Pause bei einer Temperatur von 25°C.
  In der Praxis muss folgendes Verhältnis beachtet werden:

  Einschaltdauer = (Betriebszeit des Stellantriebs) / (Betriebszeit + Stillstandszeit) = 0.1 **(d. h. 10%)**

  Beispiel für die maximale Betriebszeit:
  Betriebszeit: 2 min.
  Stillstandszeit: 18 min.
  Einschaltdauer = 2 / (2+18) = 2/20 = 0.1 (10 %)

- Die Stellantriebe nur bei Umgebungstemperaturen zwischen -25°C bis +60°C verwenden.
- Die Stellantriebe dürfen nicht in explosionsgefährdeten Umgebungen eingesetzt werden.

5. Wartung

An elektrischen Stellantrieben sind nur wenige und einfache Wartungsarbeiten erforderlich, die von Fachpersonal auszuführen sind.

5.1 Planmäßige Wartung

- Die Stange muss regelmäßig geschmiert werden, indem geringe Mengen Schmierfett (Artikel 610-612) über die Schmierbüchse in die Stopfbuchse gegeben werden.
- Die Außenflächen der Stellantriebe bei Bedarf reinigen. Der Stellantrieb kann mit einem Hochdruckreiniger gereinigt werden (Schutzart des Stellantriebs IP69K statisch - IP66 dynamisch).
- Je nach Umgebungsbedingungen ist in unterschiedlichen Abständen der äußere Zustand der Schieber-Zylinder-Einheit zu kontrollieren, wobei sicherzustellen ist, dass keine mit Rost befallenen Teile vorhanden sind.
- In regelmäßigen Abständen die Unversehrtheit der elektrischen Anschlüsse überprüfen.

5.2 Außerplanmäßige Wartung

Im Allgemeinen sind keine außerplanmäßigen Wartungsarbeiten an den elektrischen Stellantrieben erforderlich. Hinsichtlich aller außerplanmäßigen Wartungsarbeiten an den Schiebern wird auf die spezifischen Betriebsanleitungen verwiesen.

6. Anhänge

Technisches Datenblatt Stellantrieb LA35
Technisches Datenblatt Motorsteuerung TR-EM-288-H
Technisches Datenblatt Motorsteuerung TR-EM-208-H

TECHLINE®
IMPROVING FLEXIBILITY

Actuator LA35
Data sheet

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LA35

The LA35 is a very quiet and powerful actuator, and provides a practical and cost-effective solution with low power consumption. The actuator is designed for a variety of both indoor and outdoor applications.

INTEGRATED CONTROLLER

This **TECHLINE®** actuator comes with IC - Integrated controller.
For more information on our IC options, please see: www.linak.com/techline

Features:
- 12 or 24 V DC Permanent magnetic motor
- Thrust 6000 N in push and 4000 in pull
- Max. speed up to 19.5 mm/sec. depending on load and spindle pitch
- Stroke length from 100 to 600 mm
- Built-in endstop switches
- Stainless steel inner tube
- Protection class: IP66 (dynamic) and IP69K (static)

Options in general:
- Large variety of back fixtures and piston rod eyes
- Anti rotating piston rod eye
- Guided nut (only with 2mm pitch)
- Integrated brake for high self-locking ability
- Exchangeable cables in different lengths
- Long life absolute feedback
- Safety nut in push
- Special anodised housing for extreme environments
- Potential free endstop signals
- IC options including:
  - IC - Integrated Controller
  - Hall sensor
  - Analogue or digital feedback for precise positioning
  - Endstop signals (not potential free)
  - Ready signal for diagnostics

Usage:
- Duty cycle at 6000N and 3mm pitch is max. 10%
- Ambient operating temperature: -25° to +60°C, full performance from +5°C to +40°C

Contents

Chapter 1

Specifications

Motor:	Permanent magnet motor 12 or 24V *
Cable:	Motor: 2 x 14 AWG PVC cable Control: 6 x 20 AWG PVC cable **
Housing:	The housing is made of casted aluminium, coated for outdoor use and in harsh conditions
Spindle part:	Outer tube: Powder coated steel Inner tube: Stainless steel AISI304/SS2333 Acme spindle: Trapezoidal spindle with high efficiency
Temperature range:	- 25° C to +60° C - 13° F to +140° F Full performance +5° C to +40° C
Weather protection:	Rated IP66 for outdoor use. Furthermore, the actuator can be washed down with a high-pressure cleaner (IP69K).
Noise level:	48dB (A) measuring method DS/EN ISO 3743-1 actuator not loaded.
Compatibility:	The LA35 IC is compatible with SMPS-T160 (For combination possibilities, please see the User Manual for SMPS-T160)

* Modbus actuators only 24V - please see the
Modbus installation guide http://www.linak.com/techline/?id3=2363.

** Special control cabels for the Modbus actuator - please see the
Modbus installation guide http://www.linak.com/techline/?id3=2363.

Be aware of the following two symbols throughout this product data sheet:

Recommendations
Failing to follow these instructions can result in the actuator suffering damage or being ruined.

Additional information
Usage tips or additional information that is important in connection with the use of the actuator.

Technical specifications

LA35 with 12V motor

Order number	Push Max. (N)	Pull Max. (N)	Self-lock min. (N) Push	Self-lock min. (N) Pull	Pitch (mm/ spindle rev.)	* Typical speed (mm/s)		Standard stroke lengths (mm) in steps of 50mm	* Typical amp. (A)	
						No load	Full load		No load	Full load
3510xx.	6000	4000	6000	4000	3	4.7	3.3	100-300	1.6	7.5
3520xx.	4000	4000	1500	1500	5	7.7	5.3	100-400	1.7	7.7
3521xx. push brake	4000	4000	2500	1500	5	7.2	5.4	100-400	3.2	7.8
3522xx. pull brake	4000	4000	1500	2500	5	6.9	5.9	100-400	4.2	8.4
3530xx.	1500	1500	750	750	9	14.0	12.3	100-500	1.7	5.9
3531xx. push brake	1500	1500	1000	750	9	14.2	12.6	100-500	2.9	5.5
3532xx. pull brake	1500	1500	750	1000	9	14.4	11.2	100-500	3.0	5.4
3540xx.	1000	1000	750	750	12	19.0	17.0	100-600	1.9	5.3
3541xx. push brake	1000	1000	1000	750	12	17.9	16.9	100-600	5.5	5.5
3542xx. pull brake	1000	1000	750	900	12	16.9	15.4	100-600	5.6	5.6

LA35 with 24V motor

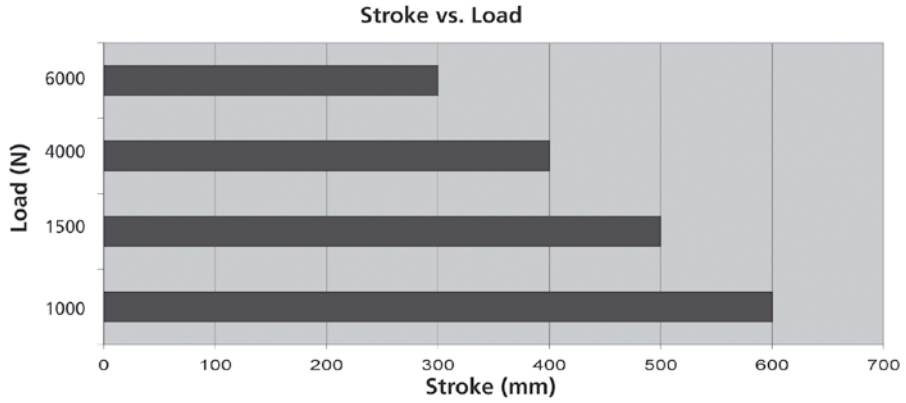
Order number	Push Max. (N)	Pull Max. (N)	Self-lock min. (N) Push	Self-lock min. (N) Pull	Pitch (mm/ spindle rev.)	* Typical speed (mm/s)		Standard stroke lengths (mm) in steps of 50mm	* Typical amp. (A)	
						No load	Full load		No load	Full load
3510xx.	6000	4000	6000	4000	3	5.1	4.0	100-300	0.9	4.2
3520xx.	4000	4000	1500	1500	5	8.3	6.6	100-400	0.8	4.8
3521xx. push brake	4000	4000	2500	1500	5	8.0	6.7	100-400	1.4	4.3
3522xx. pull brake	4000	4000	1500	2500	5	8.0	7.0	100-400	2.1	4.6
3530xx.	1500	1500	750	750	9	15.0	13.9	100-500	0.6	2.6
3531xx. push brake	1500	1500	1000	750	9	14.5	14.1	100-500	1.2	2.9
3532xx. pull brake	1500	1500	750	1000	9	14.7	13.9	100-500	1.5	3.0
3540xx.	1000	1000	750	750	12	19.5	18.9	100-600	0.9	2.8
3541xx. push brake	1000	1000	1000	750	12	18.9	17.8	100-600	1.3	2.8
3542xx. pull brake	1000	1000	750	900	12	18.7	18	100-600	1.5	2.9

* The typical values can have a variation of ± 20% on the current values and ± 10% on the speed values.
Measurements are made with an actuator in connection with a stable power supply and an ambient temperature at 20°C.

- **Self locking ability**
  To ensure maximum self-locking ability, please be sure that the motor is shorted when stopped.
  Actuators with integrated controller have this feature incorporated.

- When using soft stop on a DC-motor, a short peak of higher voltage will be sent back towards the power supply. It is important when selecting the power supply that it does not turn off the output, when this backwards load dump occurs.

Load versus Stroke Length

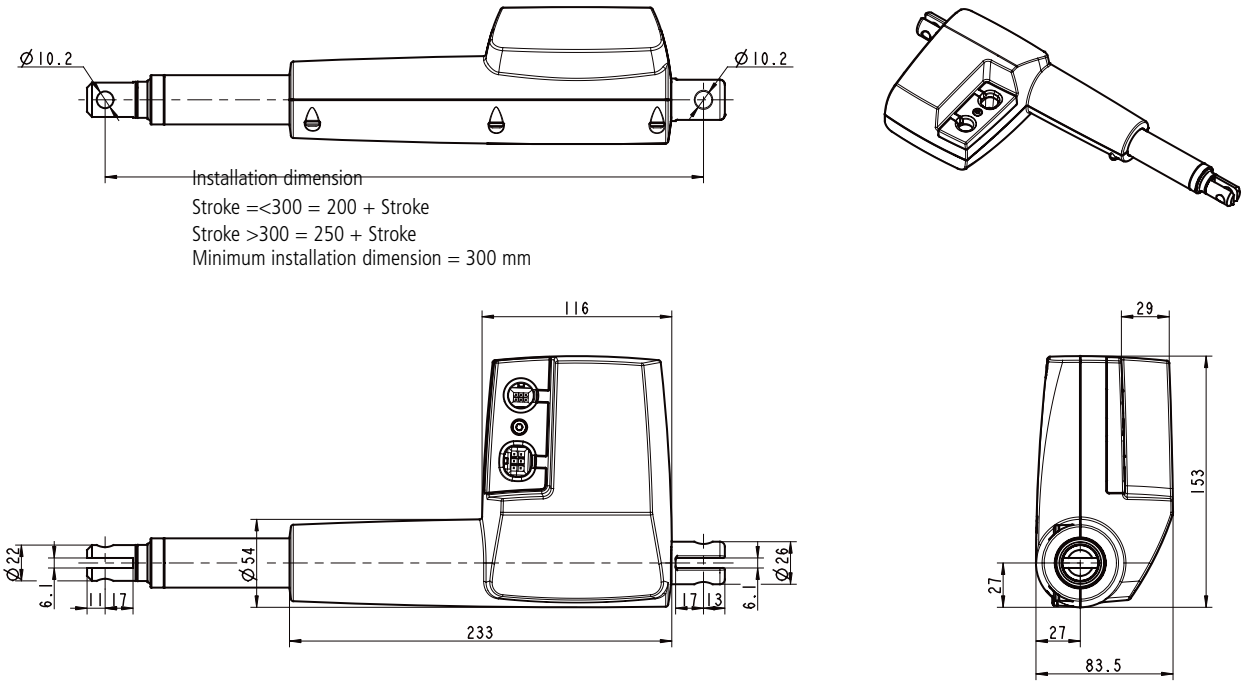


- Safety factor 2.

Stroke and built-in tolerances

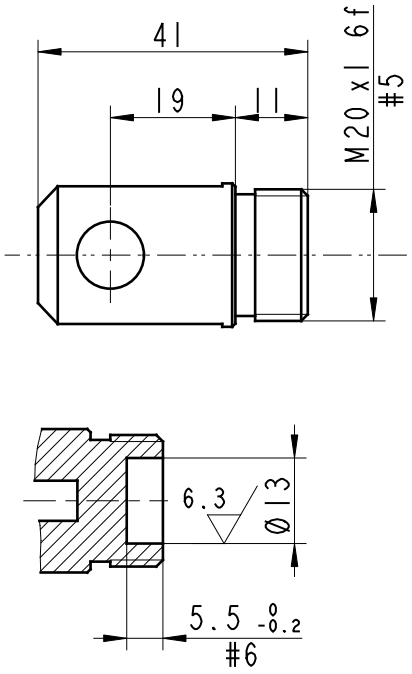
Platform options	Descriptions	Stroke tolerance	Example for 150 mm stroke	BID tolerance	Example for 350 mm BID
35XXXXXXXXXXXX	All variants	+2/-2 mm	148 to 152 mm	+2/-2 mm	348 to 352 mm

LA35 Dimensions

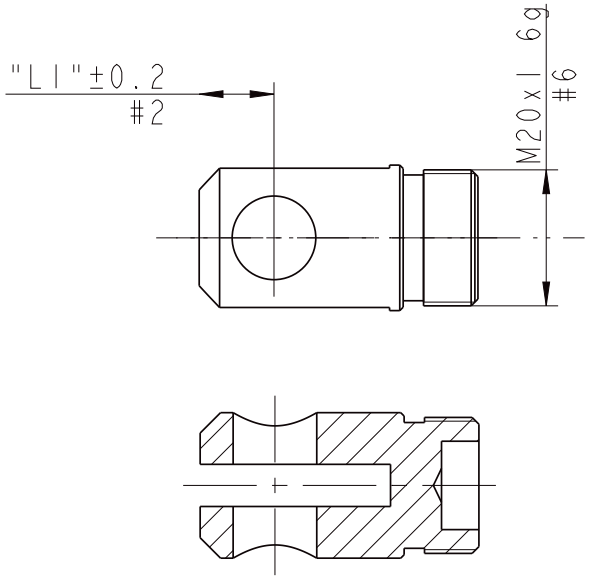


LA35 Piston rod eyes

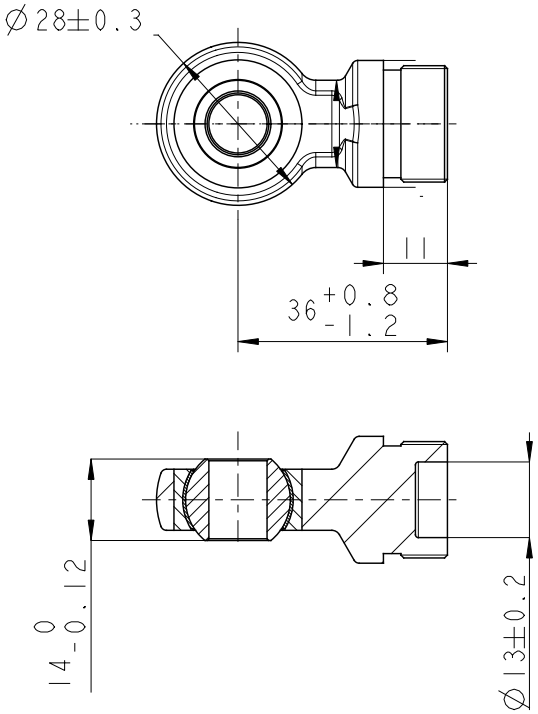
Option "0" and "2"



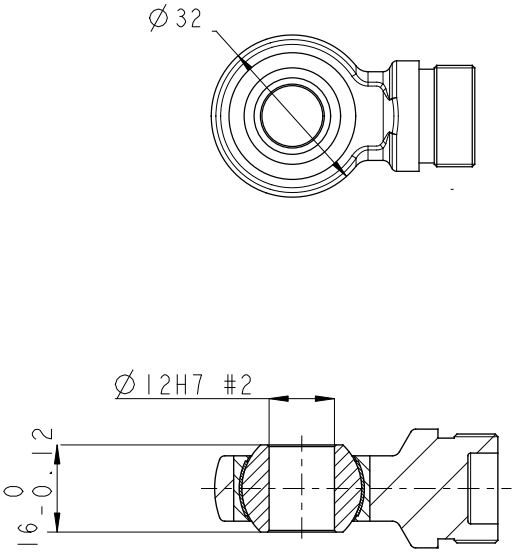
Option "1"
AISI 303



Option "3"
AISI 304



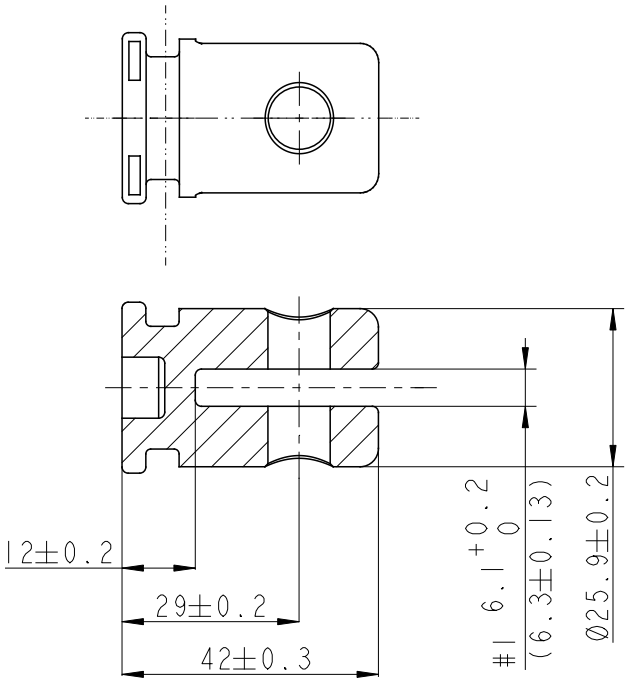
Option "4"
AISI 304



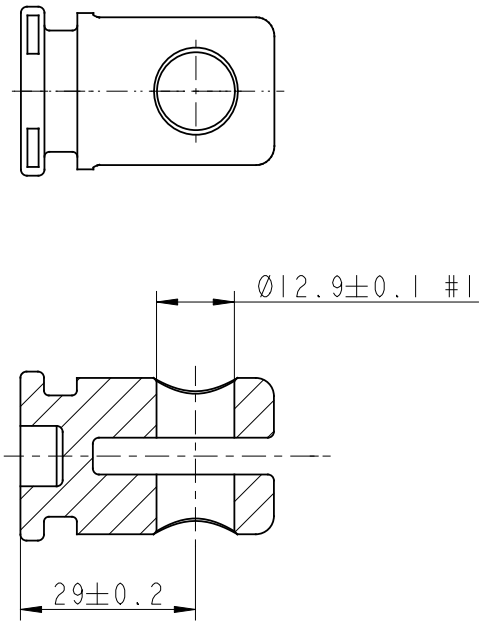
The Piston Rod Eye is only allowed to turn 0 - 90 degrees.

LA35 Back fixtures

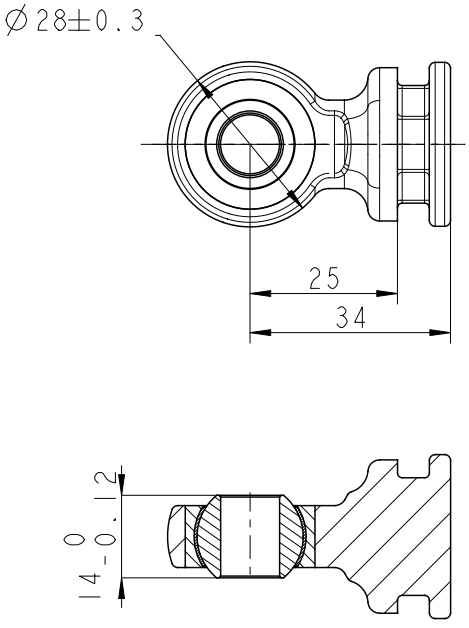
Option "A" and "B"
AISI 304



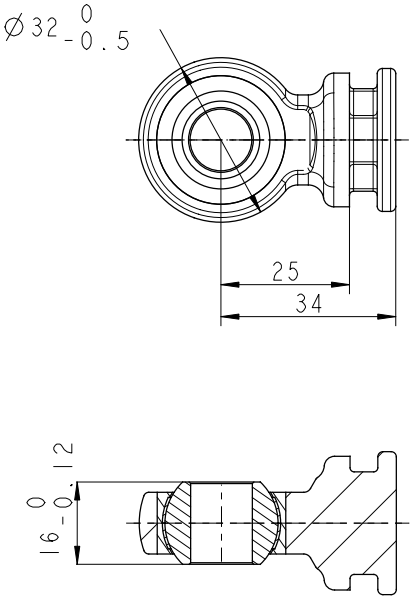
Option "C" and "D"
AISI 304



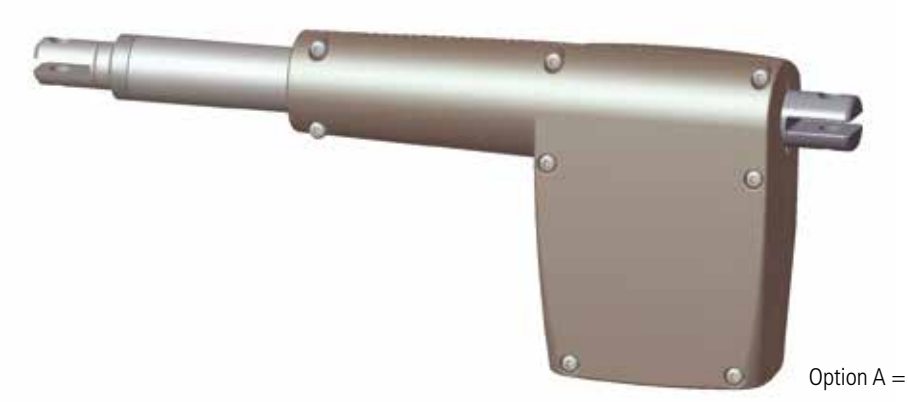
Option "E" and "F"
Stainless steel



Option "G" and "H"
Stainless steel



LA35 Back fixture orientation

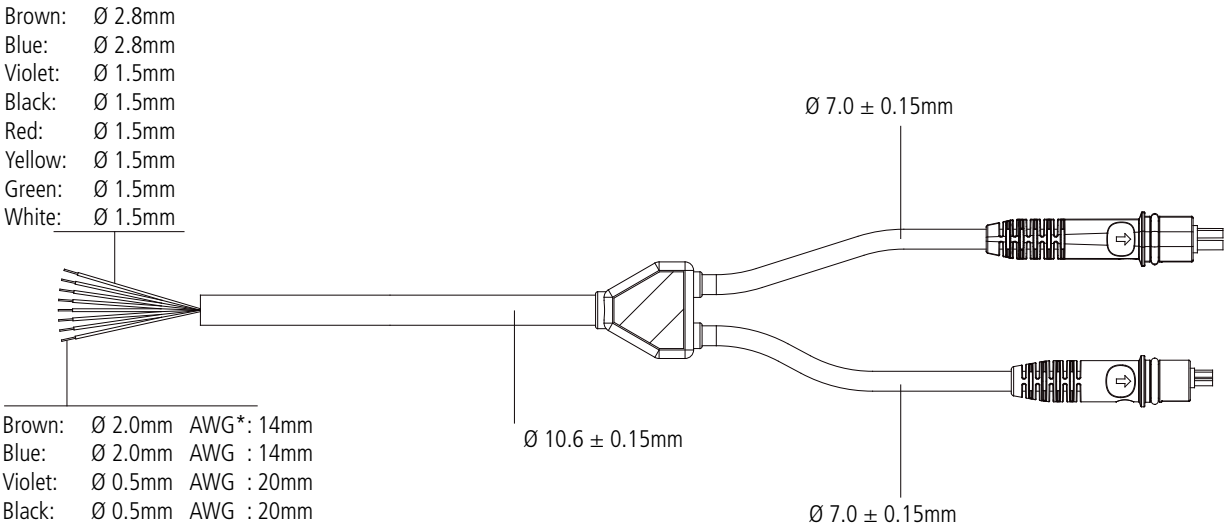


Option A = 0°

Option B = 90°

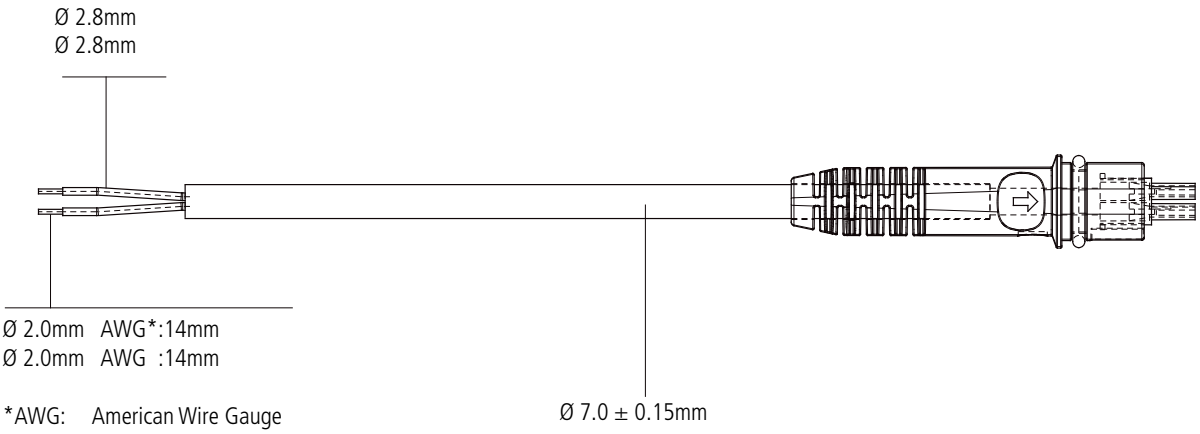
Cable dimensions

Y-cable dimensions:



*AWG: American Wire Gauge

Power cable dimensions:

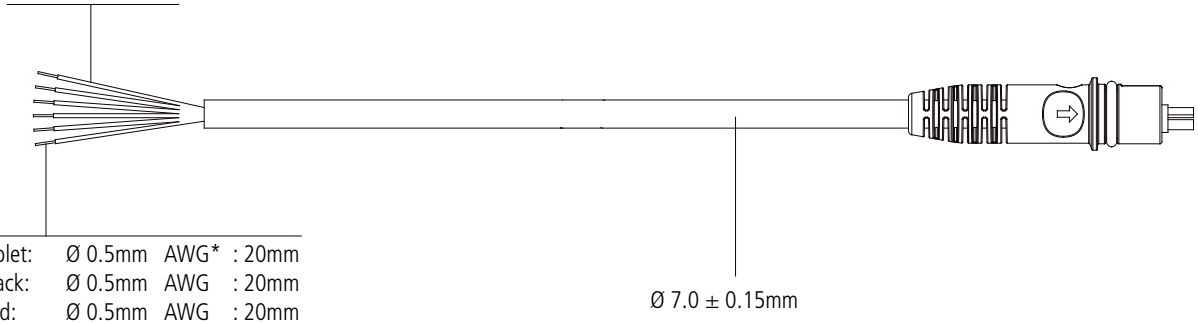


*AWG: American Wire Gauge

Cable dimensions

Signal cable dimensions:

Violet: Ø 1.5mm
Black: Ø 1.5mm
Red: Ø 1.5mm
Yellow: Ø 1.5mm
Green: Ø 1.5mm
White: Ø 1.5mm



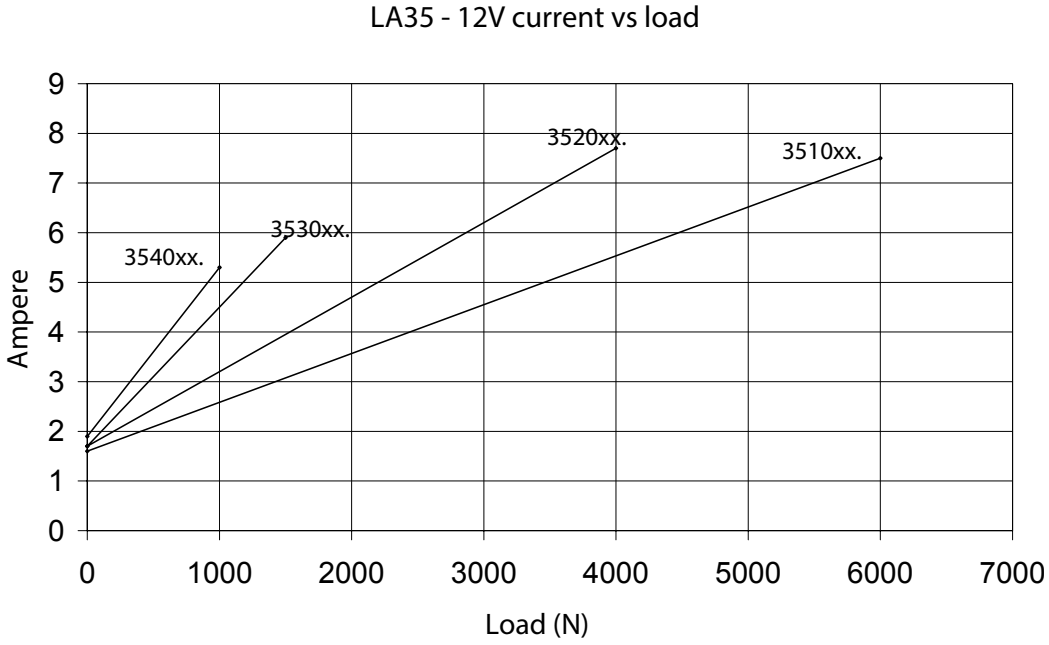
Violet: Ø 0.5mm AWG* : 20mm
Black: Ø 0.5mm AWG : 20mm
Red: Ø 0.5mm AWG : 20mm
Yellow: Ø 0.5mm AWG : 20mm
Green: Ø 0.5mm AWG : 20mm
White: Ø 0.5mm AWG : 20mm

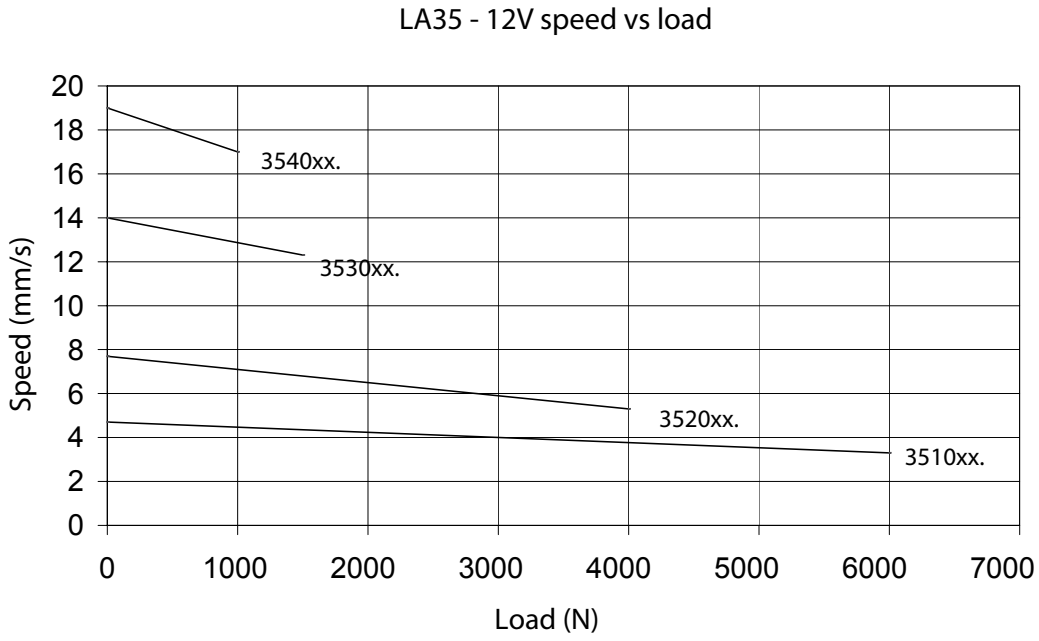
Ø 7.0 ± 0.15mm

*AWG: American Wire Gauge

Speed and current curves - 12V motor

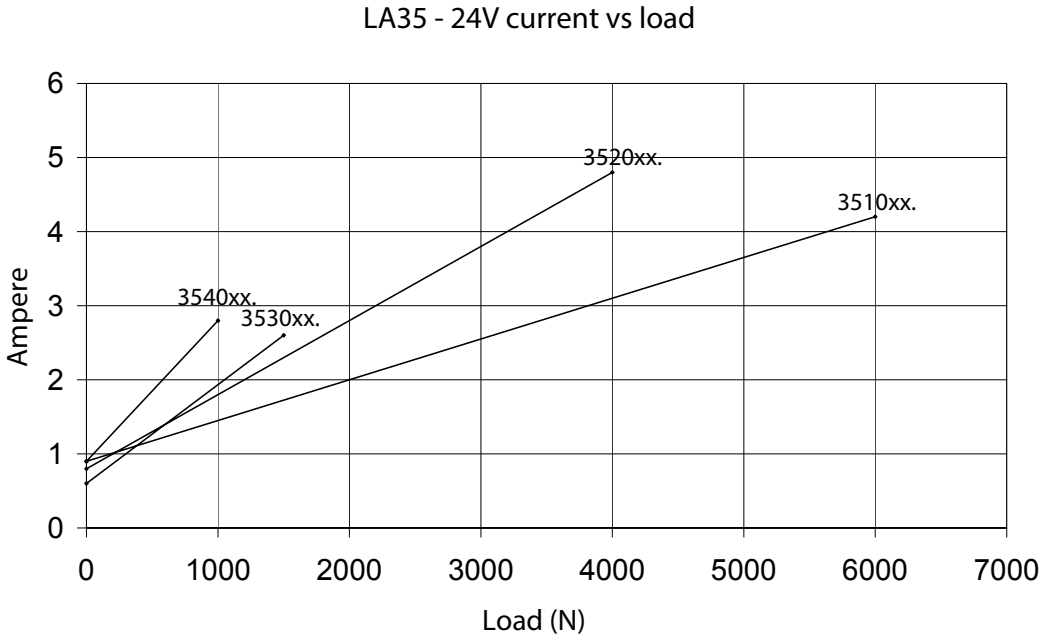
The values below are typical values and made with a stable power supply and an ambient temperature of 20˚C.

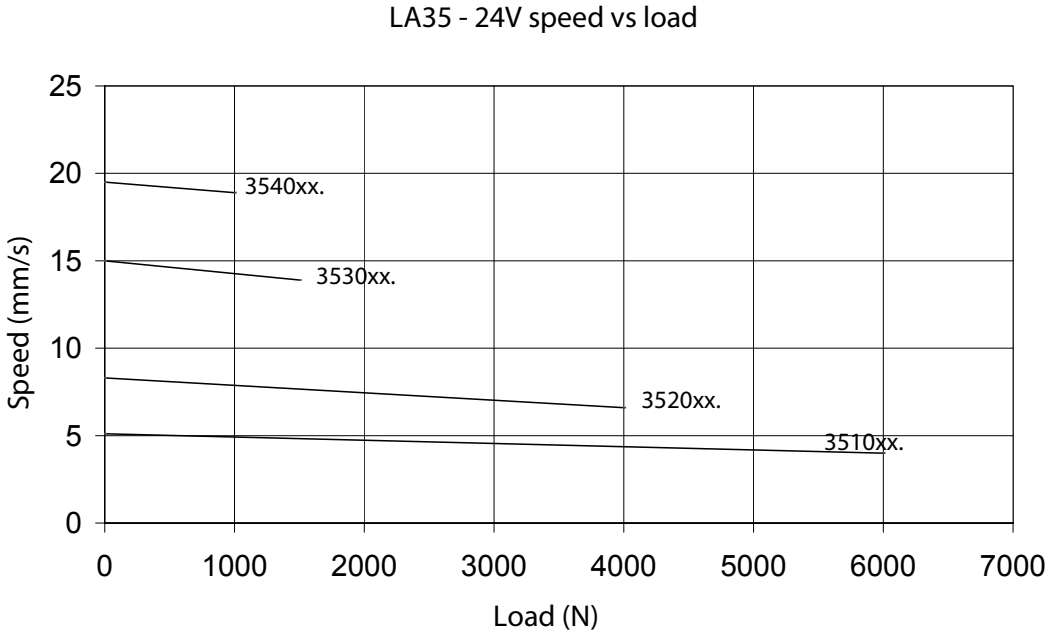




Speed and current curves - 24V motor

The values below are typical values and made with a stable power supply and an ambient temperature of 20˚C.



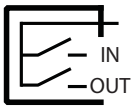


Chapter 2

I/O specifications: Actuator without feedback

<table>
<tr><th>Input/Output</th><th>Specification</th><th>Comments</th></tr>
<tr><td>Description</td><td>Permanent magnetic DC motor.</td><td>  </td></tr>
<tr><td>Brown</td><td rowspan="2">12 or 24VDC (+/-)
12V ± 20%
24V ± 10%
Under normal conditions:
12V, max. 10A depending on load
24V, max. 5A depending on load</td><td>To extend actuator:
Connect Brown to positive
To retract actuator:
Connect Brown to negative</td></tr>
<tr><td>Blue</td><td>To extend actuator:
Connect Blue to negative
To retract actuator:
Connect Blue to positive</td></tr>
<tr><td>Red</td><td colspan="2">Not to be connected</td></tr>
<tr><td>Black</td><td colspan="2">Not to be connected</td></tr>
<tr><td>Green</td><td colspan="2">Not to be connected</td></tr>
<tr><td>Yellow</td><td colspan="2">Not to be connected</td></tr>
<tr><td>Violet</td><td colspan="2">Not to be connected</td></tr>
<tr><td>White</td><td colspan="2">Not to be connected</td></tr>
</table>

I/O specifications: Actuator with potential free endstop signal output

<table>
<tr><th>Input/Output</th><th>Specification</th><th>Comments</th></tr>
<tr><td>Description</td><td>The actuator is equipped with potential free endstop signals out. The micro switches are normally open.</td><td> 
</td></tr>
<tr><td>Brown</td><td rowspan="2">12 or 24VDC (+/-)
12V ± 20%
24V ± 10%
Under normal conditions:
12V, max. 10A depending on load
24V, max. 5A depending on load</td><td>To extend actuator:
Connect Brown to positive
To retract actuator:
Connect Brown to negative</td></tr>
<tr><td>Blue</td><td>To extend actuator:
Connect Blue to negative
To retract actuator:
Connect Blue to positive</td></tr>
<tr><td>Red</td><td>Potential free signal power supply (+)
10-28VDC</td><td>Switching capacity:
Minimum 10mA
Maximum 1A</td></tr>
<tr><td>Black</td><td colspan="2">Not to be connected</td></tr>
<tr><td>Green</td><td>Endstop signal out</td><td rowspan="2">Output voltage is the same as the input voltage</td></tr>
<tr><td>Yellow</td><td>Endstop signal in</td></tr>
<tr><td>Violet</td><td colspan="2">Not to be connected</td></tr>
<tr><td>White</td><td colspan="2">Not to be connected</td></tr>
</table>

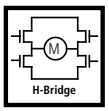
I/O specifications: Actuator with potential free endstop signals and relative positioning - Single Hall

Input/Output	Specification	Comments
Description	The actuator is equipped with potential free endstop signals and Single Hall that gives a relative positioning feedback signal when the actuator moves.	
Brown	12 or 24VDC (+/-) 12V ± 20% 24V ± 10% Under normal conditions: 12V, max. 10A depending on load 24V, max. 5A depending on load	To extend actuator: Connect Brown to positive To retract actuator: Connect Brown to negative
Blue		To extend actuator: Connect Blue to negative To retract actuator: Connect Blue to positive
White	Signal power supply (+) 10-28VDC	Current consumption: Max. 40mA, also when the actuator is not running
Black	Signal power supply GND (-)	
Green	Endstop signal out	Output voltage is the same as the input voltage
Yellow	Endstop signal in	
Violet	Single Hall output (PNP) Movement per Single Hall pulse: 3mm pitch = 0.38mm per pulse 5mm pitch = 0.63mm per pulse 9mm pitch = 1.13mm per pulse 12mm pitch = 1.5mm per pulse Frequency: Frequency is 30-125 Hz on Single Hall output depending on load and spindle. Overvoltage on the motor can result in shorter pulses.	Output voltage min. V_{IN} - 2V Max. current output: 12mA Max. 680nF N.B. For more precise measurements, please contact LINAK A/S. Low frequency with a high load.Higher frequency with no load.
Red	Potential free signal power supply (+) 10-28VDC	Switching capacity: Minimum 10mA Maximum 1A

I/O specifications: Actuator with potential free endstop signals and absolute positioning - Analogue feedback

Input/Output	Specification	Comments
Description	The actuator is equipped with potential free endstop signals and an electronic circuit that gives an analogue feedback signal when the actuator moves.	
Brown	12 or 24VDC (+/-) 12V ± 20% 24V ± 10% Under normal conditions: 12V, max. 10A depending on load 24V, max. 5A depending on load	To extend actuator: Connect Brown to positive To retract actuator: Connect Brown to negative
Blue		To extend actuator: Connect Blue to negative To retract actuator: Connect Blue to positive
White	Signal power supply (+) 10-28VDC	Current consumption: Max. 40mA, also when the actuator is not running
Black	Signal power supply GND (-)	
Green	Endstop signal out	Output voltage is the same as the input voltage
Yellow	Endstop signal in	
Violet	Analogue feedback 0-10V (Option A) 0.5-4.5V (Option B)	Tolerances +/- 0.5V Max. current output: 1mA Ripple max. 200mV Transaction delay 100ms Linear feedback 0.5% It is recommendable to have the actuator to activate its limit switches on a regular basis, to ensure more precise positioning
Red	Potential free signal power supply (+) 10-28VDC	Switching capacity: Minimum 10mA Maximum 1A

I/O specifications: Actuator with IC

Input/Output	Specification	Comments
Description	Easy to use interface with integrated power electronics (H-bridge). The actuator can also be equipped with electronic circuit that gives an absolute or relative feedback signal. The version with "IC option" cannot be operated with PWM (power supply).	
Brown	12-24VDC + (VCC) Connect Brown to positive 12V ± 20% 24V ± 10% 12V, current limit 18A 24V, current limit 9A	Note: Do not change the power supply polarity on the brown and blue wires! Power supply GND (-) is electrically connected to the housing If the temperature drops below 0°C, all current limits will automatically increase to maximum (no limits)
Blue	12-24VDC - (GND) Connect Blue to negative 12V ± 20% 24V ± 10% 12V, current limit 18A 24V, current limit 9A	
Red	Extends the actuator	On/off voltages: > 67% of V_{IN} = ON < 33% of V_{IN} = OFF Input current: 10mA
Black	Retracts the actuator	
Green	Endstop signal out	Output voltage min. V_{IN} - 2V Source current max. 100mA Endstop signals are NOT potential free
Yellow	Endstop signal in	
Violet	Analogue feedback: Configure any high/low combination between 0-10V or 0.5-4.5V 0-10V (Option A) 0.5-4.5V (Option B)	Tolerances +/- 0.5V Max. current output: 1mA Ripple max. 200mV Transaction delay 100ms Linear feedback 0.5% It is recommendable to have the actuator to activate its limit switches on a regular basis, to ensure more precise positioning
	Single Hall output (PNP) Movement per Single Hall pulse: 3mm pitch = 0.38mm per pulse 5mm pitch = 0.63mm per pulse 9mm pitch = 1.13mm per pulse 12mm pitch = 1.5mm per pulse Frequency: Frequency is 30-125 Hz on Single Hall output depending on load and spindle. Overvoltage on the motor can result in shorter pulses.	Output voltage min. V_{IN} - 2V Max. current output: 12mA Max. 680nF N.B. For more precise measurements, please contact LINAK A/S. Low frequency with a high load.Higher frequency with no load.
White	Ready	The signal is constantly high when the actuator is in ready mode. Failure modes: The signal goes low when: - The current cuts off - The temperature is out of range (high duty cycle protection)

Chapter 3

Environmental tests - Climatic

Test	Specification	Comment
Cold test	EN60068-2-1 (Ab)	Storage at low temperature: Temperature: -40°C Duration: 72h Not connected Tested at room temperature.
	EN60068-2-1 (Ad)	Storage at low temperature: Temperature: -25°C Duration: 12h Tested at low temperature.
Dry Heat	EN60068-2-2 (Bb)	Storage at high temperature: Temperature: +90°C Duration: 72h Actuator is not powered during test Tested at room temperature. Storage at high temperature: Temperature: +70°C Duration: 1,000h Actuator is not powered during test Tested at high temperature.
	EN60068-2-2 (Bd)	Operating at high temperature: Temperature: +60°C Int. max. 17% Duration: 700h Actuator is activated Tested at high temperature.
Change of temperature	EN60068-2-14 (Na)	Rapid change of temperature: High temperature: +100°C in 60 minutes Low temperature: -30°C in 60 minutes Transition time: <10 seconds Duration: 100 cycles Actuator is not powered during test Tested at room temperature.
	EN60068-2-14 (Nb)	Controlled change of temperature: Temperature change 5°C pr. minute High temperature: +70°C in 60 minutes Low temperature: -30°C in 30 minutes 130 minutes pr. cycle Duration: 1,000 cycles (90 days) Actuator is not powered during test. Tested at 250, 500 and 1,000 cycles at low and high temperatures.
Damp heat	EN60068-2-30 (Db)	Damp heat, Cyclic: Relative humidity: 93-98% High temperature: +55°C in 12 hours Low temperature: +25°C in 12 hours Duration: 21 cycles * 24 hours Actuator is not powered during test Tested within 1 hour after condensation That means after the upper temperature has been reached.
	EN60068-2-3 (Ca)	Damp heat, Steady state: Relative humidity: 93-95% Temperature: +40 ±2°C Duration: 56 days Actuator is not powered during test Tested within one hour after exposure.
Salt mist.	EN60068-2-52 (Kb)	Salt spray test: Salt solution: 5% sodium chloride (NaCl) 4 spraying periods, each of 2 hours Humidity storage 7 days after each Actuator not powered during test Exposure time: 500 hours

Environmental tests - Climatic

Degrees of protection	EN60529 – IP66	<u>IP6X - Dust:</u> Dust-tight, No ingress of dust Actuator is not activated during test. <u>IPX6 – Water:</u> Ingress of water in quantities causing harmful effects is not allowed Duration: 100 litres pr. minute in 3 minutes Actuator is not activated during test. <u>IPX6 – Connected actuator:</u> Actuator is driving out and in for 3 min. 100(l/min) jet of water is placed at the wiper ring for 3 min. <u>IPX6 – Connected actuator and push 6000 (N)</u> Actuator is driving out and in for 3 min. and push 6000(N) at the end-pos. 100 (l/min.) jet of water is placed at the wiper ring for 3 min.
	DIN40050 – IP69K	<u>High pressure cleaner:</u> Water temperature: +80°C Water pressure: 80 bar Spray angle: 45° Spray distance: 100mm Duration: From any direction in 4x30 seconds Actuator is not activated during test Ingress of water in quantities causing harmful effects is not allowed.
	DUNK test	The actuator has been warmed up to 85ºC for 4 hours After this it is cooled down in 20ºC saltwater Cooling time: 2 hours Opened for checking salt deposit and water.
Chemicals	BS7691 / 96hours	Diesel 100% Hydraulic oil 100% Ethylene Glucol 50% Urea Nitrogen saturated solution Liquid lime 10% (Super-Cal) NPK Fertilizer (NPK 16-4-12) saturated Tested for corrosion.

Environmental tests - Mechanical

Test	Specification	Comment
Free fall		Free fall from all sides: Height of fall: 0.8 meter onto linoleum covered concrete Actuator notpowered during test.
Vibration	EN60068-2-64 EN 60068-2-6 (Fc)	Random vibration: Short time test: 6.29g RMS Actuator is not connected Long time test: 7.21g RMS Actuator is not powered during test Duration: 2 hours in each direction Sinus vibration: Frequency 5-200Hz Displacement: 3.3mm pp, B 25Hz Acceleration 4g Number of directions: 3 (X-Z-Y) Duration: 2 hours in each direction Actuator is not powered during test.
Bump	EN60068-2-29 (Eb)	Bump test: Level: 25g Duration: 6 milliseconds x 1000 times in each direction pr. axis Actuator is not powered during test.
Shock	EN60068-2-27 (Ea)	Shock test: Level: Half sinus 100g Duration: 6 milliseconds Number of bumps: 3 shocks in each of 6 directions Actuator is not powered during test.

Environmental tests - Electrical

Test	Specification	Comment
Power supply		Operating voltages +7V - +27V Over voltage +29(V) / 5min. Reverse polarity +7 and +27(V) / 5min.
Electromagnetic fields	EN61000-4-3	30 V/m, 80%AM, 1 kHz 20 - 2.700 Mhz 10 V/m, 80% AM, 1kHz 80 - 1000 Mh 3 V/m, 80% AM, 1 kHz 1.4 - 2.0 GHz 1 V/m, 80% AM 2.0 - 2.7 GHz
Fast transients	EN61000-4-4	± 2 kV
Surge transients	EN61000-4-5	± 2 kV (42Ω output)
Radio frequency	EN61000-4-6	10 Vrms, 80% AM 0.15 - 80 MHz

All electrical tests are conducted and radiated emission (EMC) tests.

TECHLINE
IMPROVING FLEXIBILITY

Actuator LA35
User manual

LINAK.COM/TECHLINE

LINAK®
WE IMPROVE YOUR LIFE

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Preface

Dear User,

We are delighted that you have chosen a product from LINAK®.
LINAK systems are high-tech products based on many years of experience in the manufacture and development of actuators, electric control boxes, controls, and chargers.

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

We are sure that your LINAK product/system will give you many years of problem-free operation. Before our products leave the factory they undergo full function and quality testing. Should you nevertheless experience problems with your LINAK product/system, you are always welcome to contact your local dealer. LINAK subsidiaries and some distributors situated all over the world have authorised service centres, which are always ready to help you.

LINAK provides a warranty on all its products. 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 products/systems can affect their operation and durability. The products are not to be opened by unauthorised personnel.

The User Manual has been written based on our present technical knowledge. We are constantly working on updating the information and we therefore reserve the right to carry out technical modifications.

LINAK A/S

LINAK application policy

The purpose of the application policy is to define areas of responsibilities in relation to applying a LINAK product defined as hardware, software, technical advice, etc. related to an existing or a new customer application.

LINAK products as defined above are applicable for a wide range of applications within Medical, Furniture, Desk, and Industry areas. Yet, LINAK cannot know all the conditions under which LINAK products will be installed, used, and operated, as each individual application is unique.

The suitability and functionality of the LINAK product and its performance under varying conditions (application, vibration, load, humidity, temperature, frequency, etc.) can only be verified by testing, and shall ultimately be the responsibility of the LINAK customer using any LINAK product.

LINAK shall be responsible solely that LINAK products comply with the specifications set out by LINAK and it shall be the responsibility of the LINAK customer to ensure that the specific LINAK product can be used for the application in question.

Chapter 1

Safety instructions

Please read this safety information carefully:

Be aware of the following three symbols throughout the user manual:

Warning!
Failing to follow these instructions can cause accidents resulting in serious personal injury.

Recommendations
Failing to follow these instructions can result in the actuator suffering damage or being ruined.

Additional information
Usage tips or additional information that is important in connection with the use of the actuator.

Furthermore, ensure that all staff who are to connect, mount, or use the actuator are in possession of the necessary information and that they have access to this user manual.

Persons who do not have the necessary experience or knowledge of the product/products must not use the product/products. Besides, persons with reduced physical or mental abilities must not use the product/products, unless they are under surveillance or they have been thoroughly instructed in the use of the apparatus by a person who is responsible for the safety of these persons.

Moreover, children must be under surveillance to ensure that they do not play with the product.

Before you start mounting/dismounting, ensure that the following points are observed:

- The actuator is not in operation.
- The actuator is free from loads that could be released during this work.

Before you put the actuator into operation, check the following:

- The actuator is correctly mounted as indicated in the relevant user instructions.
- The equipment can be freely moved over the actuator's whole working area.
- The actuator is connected to a mains electricity supply/transformer with the correct voltage and which is dimensioned and adapted to the actuator in question.
- Ensure that the voltage applied matches to the voltage specified on the actuator label.
- Ensure that the connection bolts can withstand the wear.
- Ensure that the connection bolts are secured safely.

During operation, please be aware of the following:

- Listen for unusual sounds and watch out for uneven running. Stop the actuator immediately if anything unusual is observed.
- Do not sideload the actuator.
- Only use the actuator within the specified working limits.
- Do not step or kick on the actuator.

When the equipment is not in use:

- Switch off the mains supply in order to prevent unintentional operation.
- Check regularly for extraordinary wear.

Classification

The equipment is not suitable for use in the presence of a flammable anaesthetic mixture with air or with oxygen or nitrous oxide.

Warnings

- Do not sideload the actuator.
- When mounting the LA35 in the application ensure that the bolts can withstand the wear and that they are secured safely.
- If irregularities are observed, the actuator must be replaced.

Recommendations

- Do not place load on the actuator housing and do prevent impact or blows, or any other form of stress to the housing.
- Ensure that the cable cover is mounted correctly. Use 3.5Nm torque.
- Ensure that the duty cycle and the usage temperatures for LA35 actuators are respected.
- Ensure that the cable cannot be squeezed, pulled or subjected to any other stress.
- Furthermore, it will be good practice to ensure that the actuator is fully retracted in the "normal" position. The reason is that there will be a vacuum inside the actuator if it is extended which over time can lead to water entering the actuator.
- If the actuator (without integrated controller) is mounted in an application where a mechanical stop prevents the endstop switches in the actuator from being activated, the actuator must be equipped with an electrical safety device (current monitoring) or external limit switch.

Chapter 2

Mounting guidelines

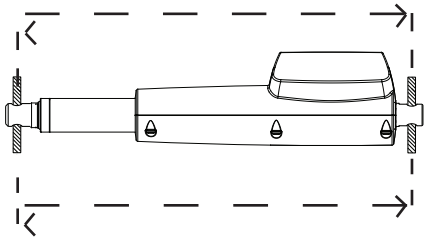
LINAK® linear actuators are quickly and easily mounted by slipping pins through the holes on each end of the units and into brackets on the machine frame and the load.

The mounting pins must be parallel to each other as shown in Figure 1. Pins, which are not parallel to each other, may cause the actuator to bend and be damaged.

The load should act along the stroke axis of the actuator as off-centre loads may cause bending and lead to premature failure. See Figure 2.

Make sure the mounting pins are supported in both ends. Failure to do so could shorten the life of the actuator. Also, avoid applying a skew load on the actuator.

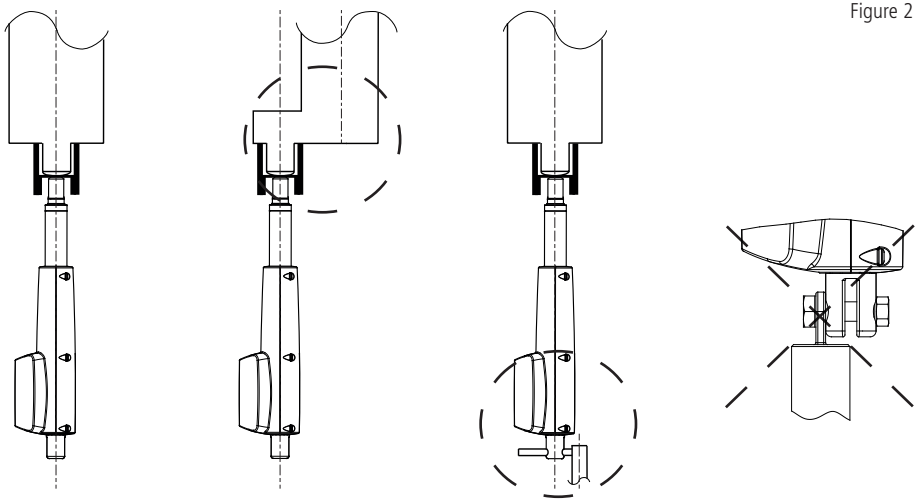
Figure 1



The actuator can rotate around the pivot point in the front and rear end. If this is the case it is of high importance that the actuator is able to move freely over the full stroke length, both during the development and daily operation. Please pay special attention to the area around the housing where parts can be trapped and cause damage to the application and actuator.

In applications with high dynamic forces LINAK recommends not to use the fully extended or retracted position over longer time, as this can damage the endstop system permanently.

Figure 2



Please be aware that if the LA35 is used for solar applications the actuator must be mounted with the motor housing turned upwards and the wires pointing downwards.

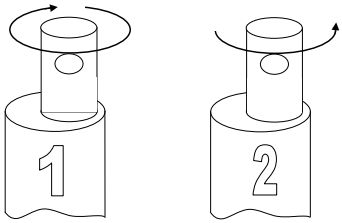
Mounting guidelines

- The mounting pins must have the correct dimension.
- The bolts and nuts must be made of a high quality steel grade (e.g. 10.8). No thread on the bolt inside the back fixture or the piston rod eye.
- Bolts and nuts must be protected so there is no risk for them to fall out.
- Do not use a torque that is too high when mounting the bolts for the back fixture or the piston rod eye. This will stress the fixtures.

Please note:
The piston rod eye is only allowed to turn 0-90 degrees.

Instruction concerning the turning of the piston rod eye and inner tube:

- When mounting and taking into use, it is not permitted to make excessive turns of the piston rod eye. In cases where the eye is not positioned correctly, it is permitted to first screw the eye down to its bottom position, at a maximum torque of 2Nm (1), and thereafter a maximum 90 degrees turn outwards again (2).
- As the piston rod eye can turn freely, it is important to ensure that the eye cannot rotate if the actuator is used in a pull application. If this happens, the actuator will be pulled apart and destroyed.

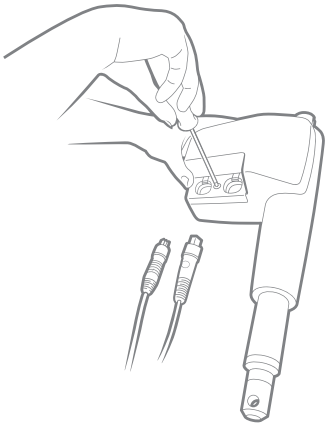


Warning!
If the actuator is used for pull in an application where personal injury can occur, the following is valid:
It is the application manufacturer's responsibility to incorporate a suitable safety arrangement, which will prevent personal injury from occurring, if the actuator should fail.

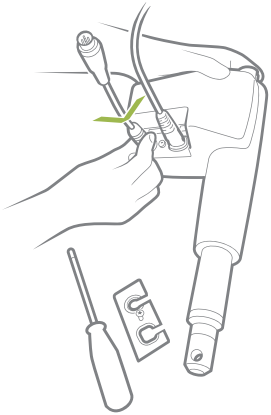
Warning!
LINAK's actuators are not designed for use within the following fields:

- Offshore installations
- Aeroplanes and other aircraft
- Explosive environments
- Nuclear power generation

Mounting of cables



1. Unscrew the cover and remove the two cables and/or blind plugs.

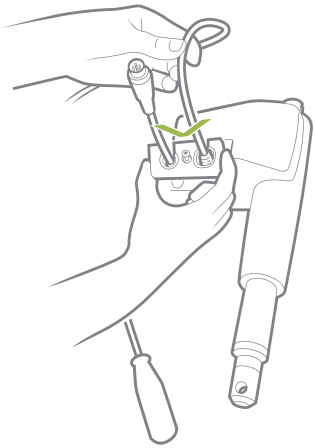


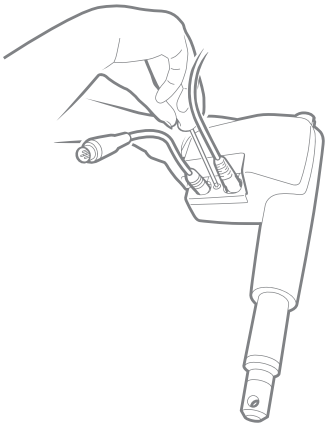
2. Plug in the power cable and/or the signal cable.

3. Slide the cover onto the actuator.

   The torque of the cover screw is approx. 3.5 ± 0.2 Nm

   TORX 25IP





When changing the cables on a LINAK actuator, it is important that this is done carefully, in order to protect the plugs and pins. Before the new cable is mounted, we recommend that the socket is greased with vaseline, to keep the high IP protection and ensure an easy mounting. Please be sure that the plug is in the right location and fully pressed in before the cable lid is mounted.

Please note that if the cables are mounted and dismounted more than 3 times the plugs can be damaged. Therefore, we recommend that such cables are discarded and replaced.
Also note that the cables should not be used for carrying the actuator.

We recommend to take some precaution and design the wire connection in a way, where the cable end is kept inside a closed, protected area to guarantee the high IP protection.

Electrical installation

- To ensure maximum self-locking ability, please be sure that the motor is shorted when stopped. Actuators with integrated controller provide this feature, as long as the actuator is powered.
- When using soft stop on a DC-motor, a short peak of higher voltage will be sent back towards the power supply. It is important when selecting the power supply that it does not turn off the output, when this backwards load dump occurs.

The power supply for actuators without integrated controller must be monitored externally and cut off in case of current overload.

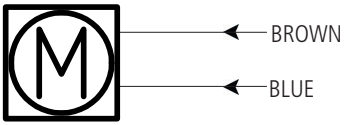
Recommended fuse for actuators without integrated controller

Type	Spindle Pitch (mm)	Thrust max. Push/Pull (N)	Typical Amp. at full load (A)		Recommended fuse	
			24V	12V	24V	12V
3510xx...	3	6000 / 4000	4.2	7.5	8.4	15.0
3520xx...	5	4000	4.8	7.7	9.6	15.4
3521xx... push brake	5	4000	4.3	7.8	8.6	15.6
3522xx... pull brake	5	4000	4.6	8.4	9.2	16.8
3530xx...	9	1500	2.6	5.9	5.2	11.8
3531xx... push brake	9	1500	2.9	5.5	5.8	11.0
3532xx... pull brake	9	1500	3.0	5.4	6.0	10.8
3540xx...	12	1000	2.8	5.3	5.6	10.6
3541xx... push brake	12	1000	2.8	5.5	5.6	11.0
3542xx... pull brake	12	1000	2.9	5.6	5.8	11.2

Actuator without feedback

Connection diagram:

Fig. 1 : 35xxxxx00xxxxxx



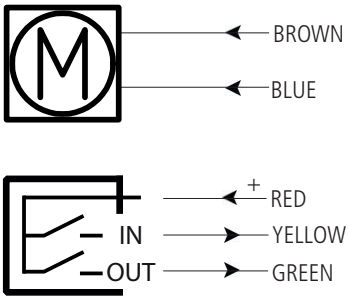
I/O specifications:

Input/Output	Specification	Comments
Description	Permanent magnetic DC motor. See connection diagram, fig. 1 above	
Brown	12 or 24VDC (+/-) 12V ± 20% 24V ± 10% Under normal conditions: 12V, max. 10A depending on load 24V, max. 5A depending on load	To extend actuator: Connect Brown to positive To retract actuator: Connect Brown to negative
Blue		To extend actuator: Connect Blue to negative To retract actuator: Connect Blue to positive
Red	Not to be connected	
Black	Not to be connected	
Green	Not to be connected	
Yellow	Not to be connected	
Violet	Not to be connected	
White	Not to be connected	

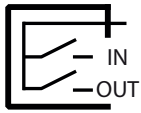
Actuator with potential free endstop signal output

Connection diagram:

Fig. 2 : 35xxxxx10xxxxxx



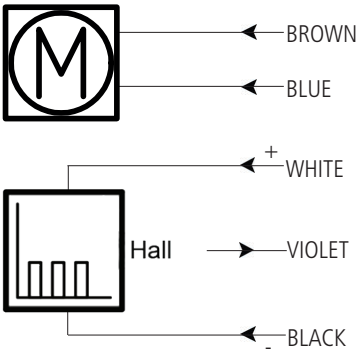
I/O specifications:

Input/Output	Specification	Comments
Description	The actuator is equipped with potential free endstop signals out. The micro switches are normally open. See connection diagram, fig. 2 above	
Brown	12 or 24VDC (+/-) 12V ± 20% 24V ± 10% Under normal conditions: 12V, max. 10A depending on load 24V, max. 5A depending on load	To extend actuator: Connect Brown to positive To retract actuator: Connect Brown to negative
Blue		To extend actuator: Connect Blue to negative To retract actuator: Connect Blue to positive
Red	Potential free signal power supply (+) 10-28VDC	Switching capacity: Minimum 10mA Maximum 1A
Black	Not to be connected	
Green	Endstop signal out	Output voltage is the same as the input voltage
Yellow	Endstop signal in	
Violet	Not to be connected	
White	Not to be connected	

Actuator with relative positioning - Single Hall

Connection diagram:

Fig. 3 : 35xxxxx0Hxxxxxx



Actuator with relative positioning - Single Hall

I/O specifications:

<table>
<tr><th>Input/Output</th><th>Specification</th><th>Comments</th></tr>
<tr><td>Description</td><td>The actuator is equipped with Single Hall that gives a relative positioning feedback signal when the actuator moves.
See connection diagram, fig. 3, page 15</td><td> 
</td></tr>
<tr><td>Brown</td><td rowspan="2">12-24VDC (+/-)
12V ± 20%
24V ± 10%

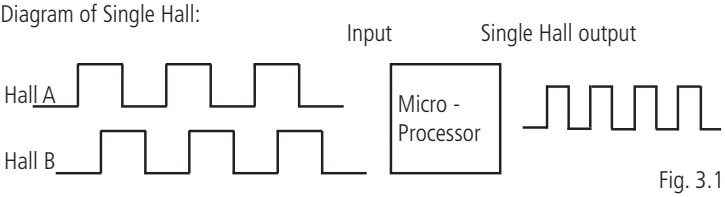
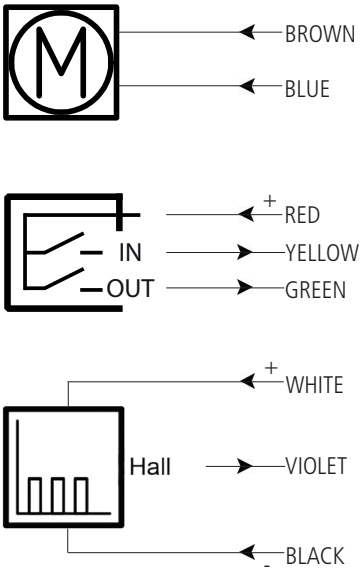
Under normal conditions:
12V, max. 10A depending on load
24V, max. 5A depending on load</td><td>To extend actuator:
Connect Brown to positive
To retract actuator:
Connect Brown to negative</td></tr>
<tr><td>Blue</td><td>To extend actuator:
Connect Blue to negative
To retract actuator:
Connect Blue to positive</td></tr>
<tr><td>White</td><td>Signal power supply (+)
10-28VDC</td><td rowspan="2">Current consumption:
Max. 40mA, also when the actuator is not running</td></tr>
<tr><td>Black</td><td>Signal power supply GND (-)</td></tr>
<tr><td>Green</td><td colspan="2">Not to be connected</td></tr>
<tr><td>Yellow</td><td colspan="2">Not to be connected</td></tr>
<tr><td rowspan="2">Violet</td><td>Single Hall output (PNP)
Movement per single Hall pulse:
3mm pitch = 0.38mm per pulse
5mm pitch = 0.63mm per pulse
9mm pitch = 1.13mm per pulse
12mm pitch = 1.5mm per pulse
Frequency:
Frequency is 30-125 Hz on Single Hall output depending on load.
Every pulse is “ON” for minimum 3ms.
Overvoltage on the motor can result in shorter pulses.</td><td>Output voltage min. V_{IN} - 2V
Max. current output: 12mA
Max. 680nF
N.B. For more precise measurements, please contact LINAK A/S.
Low frequency with a high load.
Higher frequency with no load.</td></tr>
<tr><td colspan="2">Diagram of Single Hall:
 

Fig. 3.1</td></tr>
<tr><td>Red</td><td colspan="2">Not to be connected</td></tr>
</table>

Actuator with potential free endstop signals and relative positioning - Single Hall

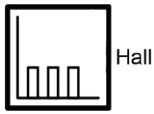
Connection diagram:

Fig. 4 : 35xxxxx1Hxxxxxx



Actuator with potential free endstop signals and relative positioning - Single Hall

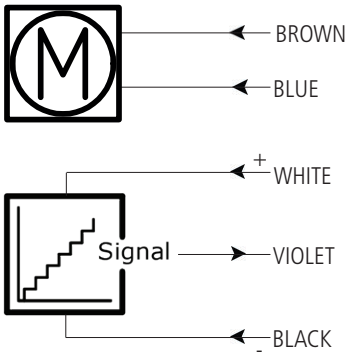
I/O specifications:

Input/Output	Specification	Comments
Description	The actuator is equipped with potential free endstop signals and Single Hall that gives a relative positioning feedback signal when the actuator moves. See connection diagram, fig. 4, page 17	
Brown	12-24VDC (+/-) 12V ± 20% 24V ± 10%	To extend actuator: Connect Brown to positive To retract actuator: Connect Brown to negative
Blue	Under normal conditions: 12V, max. 10A depending on load 24V, max. 5A depending on load	To extend actuator: Connect Blue to negative To retract actuator: Connect Blue to positive
White	Signal power supply (+) 10-28VDC	Current consumption: Max. 40mA, also when the actuator is not running
Black	Signal power supply GND (-)	
Green	Endstop signal out	Output voltage min. V_{IN} - 2V Source current max. 100mA NOT potential free
Yellow	Endstop signal in	
Violet	Single Hall output (PNP) Movement per Single Hall pulse: 3mm pitch = 0.38mm per pulse 5mm pitch = 0.63mm per pulse 9mm pitch = 1.13mm per pulse 12mm pitch = 1.5mm per pulse Frequency: Frequency is 30-125 Hz on Single Hall output depending on load and spindle. Overvoltage on the motor can result in shorter pulses.	Output voltage min. V_{IN} - 2V Max. current output: 12mA Max. 680nF N.B. For more precise measurements, please contact LINAK A/S. Low frequency with a high load. Higher frequency with no load.
Red	Potential free signal power supply (+) 10-28VDC	Switching capacity: Minimum 10mA Maximum 1A

Actuator with absolute positioning - Analogue feedback

Connection diagram:

Fig. 5 : 35xxxxx0xxxxxxx



Actuator with absolute positioning - Analogue feedback

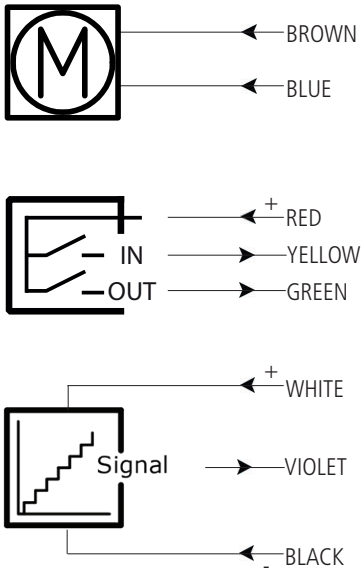
I/O specifications:

Input/Output	Specification	Comments
Description	The actuator is equipped with electronic circuit that gives an analogue feedback signal when the actuator moves. See connection diagram, fig. 5, page 19	
Brown	12-24VDC (+/-) 12V ± 20% 24V ± 10%	To extend actuator: Connect Brown to positive To retract actuator: Connect Brown to negative
Blue	Under normal conditions: 12V, max. 10A depending on load 24V, max. 5A depending on load	To extend actuator: Connect Blue to negative To retract actuator: Connect Blue to positive
White	Signal power supply (+) 10-28VDC	Current consumption: Max. 40mA, also when the actuator is not running
Black	Signal power supply GND (-)	
Green	Not to be connected	
Yellow	Not to be connected	
Violet	Analogue feedback 0-10V (Option A) 0.5-4.5V (Option B)	Tolerances +/- 0.5V Max. current output: 1mA Ripple max. 200mV Transaction delay 100ms Linear feedback 0.5% It is recommendable to have the actuator to activate its limit switches on a regular basis, to ensure more precise positioning
Red	Not to be connected	

Actuator with potential free endstop signals and absolute positioning - Analogue feedback

Connection diagram:

Fig. 6 : 35xxxxx1xxxxxxx



Actuator with potential free endstop signals and absolute positioning - Analogue feedback

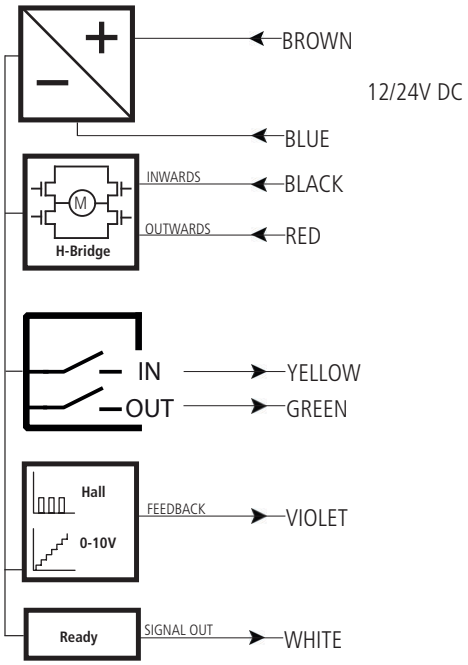
I/O specifications:

Input/Output	Specification	Comments
Description	The actuator is equipped with potential free endstop signals and an electronic circuit that gives an analogue feedback signal when the actuator moves. See connection diagram, fig. 6, page 21	
Brown	12-24VDC (+/-) 12V ± 20% 24V ± 10%	To extend actuator: Connect Brown to positive To retract actuator: Connect Brown to negative
Blue	Under normal conditions: 12V, max. 10A depending on load 24V, max. 5A depending on load	To extend actuator: Connect Blue to negative To retract actuator: Connect Blue to positive
White	Signal power supply (+) 10-28VDC	Current consumption: Max. 40mA, also when the actuator is not running
Black	Signal power supply GND (-)	
Green	Endstop signal out	Output voltage is the same as the input voltage
Yellow	Endstop signal in	
Violet	Analogue feedback 0-10V (Option A) 0.5-4.5V (Option B)	Tolerances +/- 0.5V Max. current output: 1mA Ripple max. 200mV Transaction delay 100ms Linear feedback 0.5% It is recommendable to have the actuator to activate its limit switches on a regular basis, to ensure more precise positioning
Red	Potential free signal power supply (+) 10-28VDC	Switching capacity: Minimum 10mA Maximum 1A

Actuator with IC

Connection diagram:

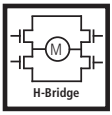
Fig. 7 : 35xxxxx2xxxxxxx



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

Actuator with IC

I/O specifications:

Input/Output	Specification	Comments
Description	Easy to use interface with integrated power electronics (H-bridge). The actuator can also be equipped with electronic circuit that gives an absolute or relative feedback signal. The version with "IC option" cannot be operated with PWM (power supply). See connection diagram, fig. 7, page 23	
Brown	12-24VDC + (VCC) Connect Brown to positive 12V ± 20% 24V ± 10% 12V, current limit 18A 24V, current limit 9A	Note: Do not change the power supply polarity on the brown and blue wires! Power supply GND (-) is electrically connected to the housing If the temperature drops below 0°C, all current limits will automatically increase to maximum (no limits)
Blue	12-24VD - (GND) Connect Blue to negative 12V ± 20% 24V ± 10% 12V, current limit 18A 24V, current limit 9A	
Red	Extends the actuator	On/off voltages: $> 67\%$ of V_{IN} = ON $< 33\%$ of V_{IN} = OFF Input current: 10mA
Black	Retracts the actuator	
Green	Endstop signal out	Output voltage min. V_{IN} - 2V Source current max. 100mA Endstop signals are NOT potential free.
Yellow	Endstop signal in	

Actuator with IC

I/O specifications:

Input/Output	Specification	Comments
Violet	Analogue feedback: Configure any high/low combination between 0-10V or 0.5-4.5V 0-10V (Option A) 0.5-4.5V (Option B)	Tolerances +/- 0.5V Max. current output: 1mA Ripple max. 200mV Transaction delay 100ms Linear feedback 0.5% It is recommendable to have the actuator to activate its limit switches on a regular basis, to ensure more precise positioning
	Single Hall output (PNP) Movement per Single Hall pulse: 3mm pitch = 0.38mm per pulse 5mm pitch = 0.63mm per pulse 9mm pitch = 1.13mm per pulse 12mm pitch = 1.5mm per pulse Frequency: Frequency is 30-125 Hz on Single Hall output depending on load and spindle. Overvoltage on the motor can result in shorter pulses.	Output voltage min. V_{IN} - 2V Max. current output: 12mA Max. 680nF N.B. For more precise measurements, please contact LINAK A/S. Low frequency with a high load. Higher frequency with no load.
White	Ready	The signal is constantly high when the actuator is in ready mode. Failure modes: The signal goes low when: - The current cuts off - The temperature is out of range (high duty cycle protection)

The high duty cycle protection is NOT to be used as a stop function, since this might damage the actuator!

Chapter 3

Troubleshooting

Symptom	Possible cause	Action
Motor runs but spindle does not move	Gearing system or spindle damaged	Please contact LINAK
No motor sound or movement of piston rod	The actuator is not properly connected to the power supply	Check the connection to the power supply or the external control unit (if any)
	Customer fuse burned	Check the fuse
	Cable damaged	Change the cable
	For IC only: Wrongly connected	For IC only: **Please make sure that the power supply polarity is properly connected, otherwise you might damage the actuator** Check the wire connection on the internal control unit
Excessive power consumption	Misalignment or overload in the application	Align or reduce the load
		Try to run the actuator without load
Actuator cannot lift full load or motor runs too slowly	Misalignment or overload in the application	Align or reduce the load
		Try to run the actuator without load
	Insufficient power supply	Check the power supply

Troubleshooting

Symptom	Possible cause	Action
No signal or incorrect feedback output	Cable damaged	Change the cable
	Wrongly connected	Check the wiring
	Signal is constantly high/low	Run the actuator to fully extended and retracted positions
	Feedback output overloaded	Reduce the load according to your chosen feedback type
Actuator runs in smaller steps	Insufficient power supply	Check the power supply
	Load is higher than specified	Reduce the load
Actuator cannot hold the chosen load	Load is higher than specified	Reduce the load

For further assistance, please contact your local LINAK supplier.

Chapter 4

Specifications

Motor:	Permanent magnet motor 12 or 24V *
Cable:	Motor: 2 x 14 AWG PVC cable Control: 6 x 20 AWG PVC cable **
Housing:	The housing is made of casted aluminium, coated for outdoor use and in harsh conditions
Spindle part:	Outer tube: Powder coated steel Inner tube: Stainless steel AISI304/SS2333 Acme spindle: Trapezoidal spindle with high efficiency
Temperature range:	-25° C to +60° C -13° F to +140° F Full performance +5° C to +40° C
End play:	2 mm maximum
Weather protection:	Rated IP66 for outdoor use. Furthermore, the actuator can be washed down with a high-pressure cleaner (IP69K)
Compatibility:	The LA35 IC is compatible with SMPS-T160 (For combination possibilities, please see the User Manual for SMPS-T160)

Usage:

- Duty cycle at 6000N and 3mm pitch is max. 10%
- Noise level: 48 dB (A) measuring method DS/EN ISO 3743-1 actuator not loaded

- **Safety device regarding functional failure:**

  Safety nut

  The LA35 has a built-in safety nut in push as an option. Actuators with safety nut in push can only function when used in push applications. The safety nut comes into operation should the main nut fail. Afterwards it is only possible to drive the actuator into the innermost position. Thereafter, the actuator will not function any more and must be sent for service

  Mechanical endstop

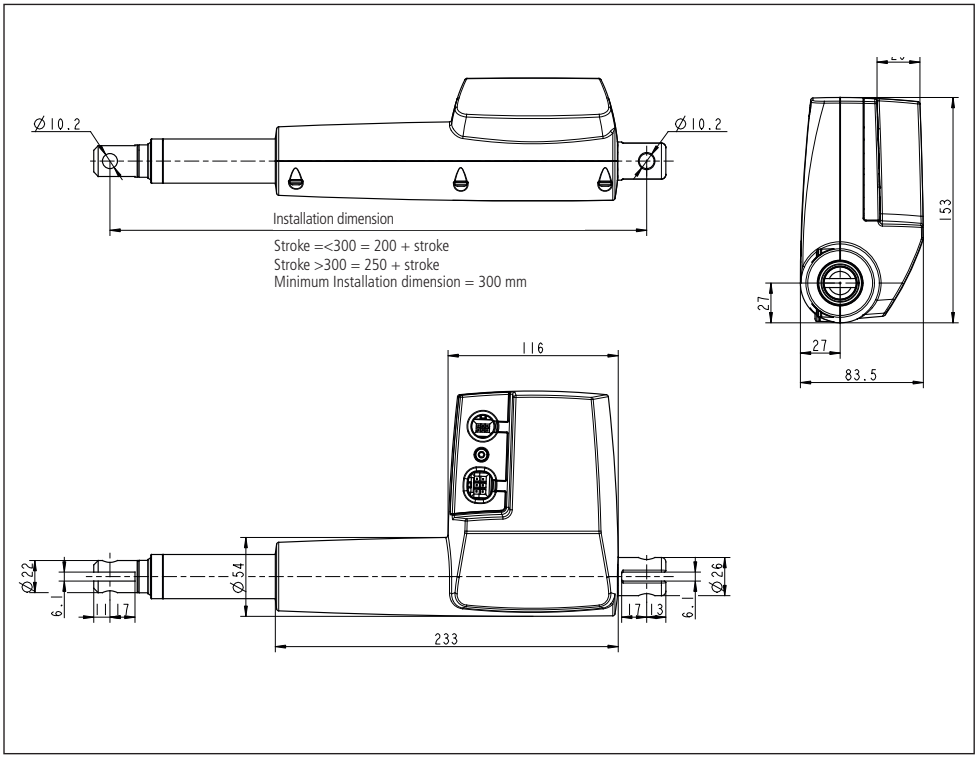
  LA35 is equipped with mechanical endstop

* Modbus actuators only 24V - please see the Modbus installation guide: **https://cdn.linak.com/-/media/files/ic-and-bus-actuators/techline-modbus-installation-guide-eng.ashx?la=en**

** Special control cabels for the Modbus actuator - please see the Modbus installation guide: **https://cdn.linak.com/-/media/files/ic-and-bus-actuators/techline-modbus-installation-guide-eng.ashx?la=en**

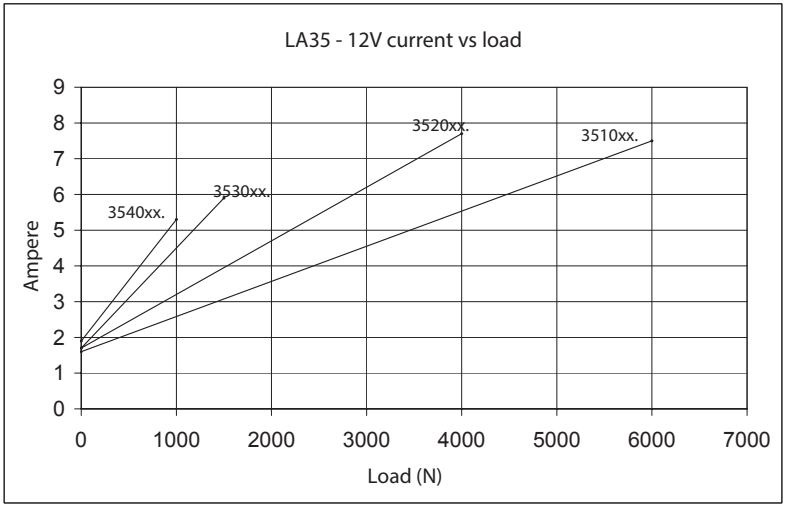
Actuator dimensions

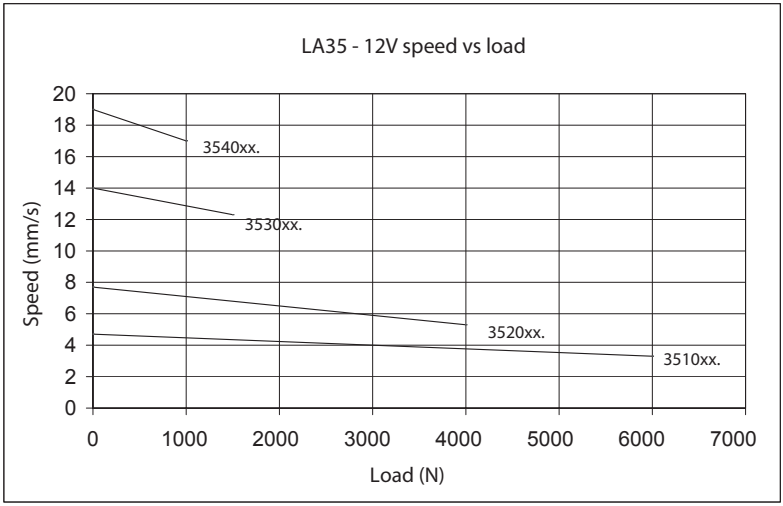
TECHLINE® LA35:



Speed and current curves - 12V motor

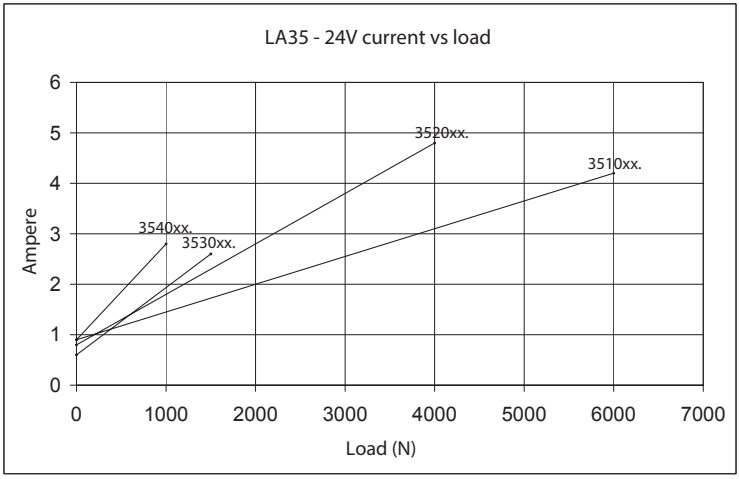
The values below are typical values and made with a stable power supply and an ambient temperature of 20°C.

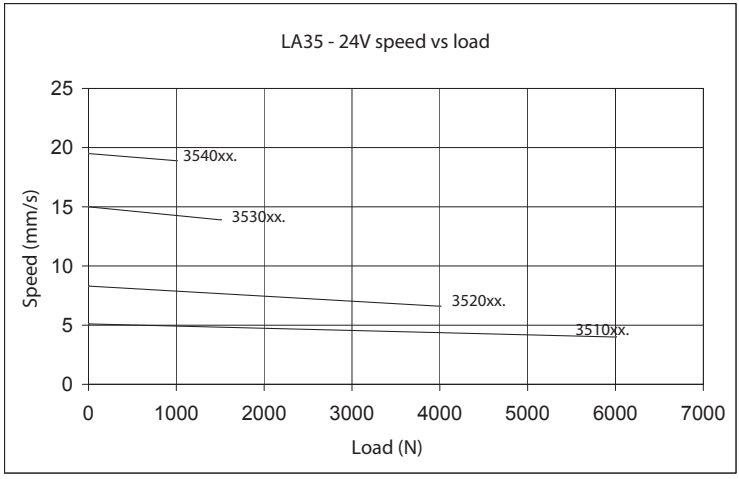




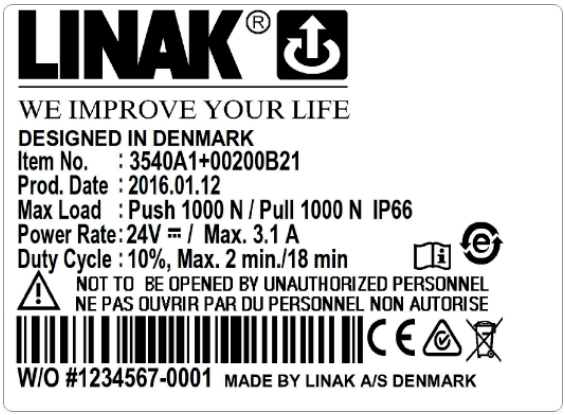
Speed and current curves - 24V motor

The values below are typical values and made with a stable power supply and an ambient temperature of 20°C.





Label for LA35



1. **Type: 3540A1+00200B21**
   Describes the basic functionality of the product
2. **Prod. Date: YYYY.MM.DD**
   Production date describes when the product has been produced. This date is the reference for warranty claims
3. **Max Load: Push 1000N / Pull 1000N IP66**
   Describes the maximum load that the product can be exposed to in compression and tension.
   This line also contains a reference to the product's IP protection degree
4. **Power Rate: 24VDC / Max. 3.1 Amp**
   Input voltage for the product and maximum current consumption
5. **Duty Cycle: 10%, Max. 2 min. / 18 min.**
   The duty cycle defines the maximum period during operation without interruption. After operation, a pause must be observed. It is important that the operator follows the instructions of the duty cycle; otherwise, a possible overload may result in reduced product life/errors
6. **W/O #1234567-0001**
   The LINAK work order followed by a unique sequential identification number

Key to symbols

The following symbols are used on the LA35 label:

Symbol	Norms	Approvals
	WEEE Directive 2002/96/EC	Wheelie bin
	Compliance to all relevant EC directives	CE
	Regulatory Compliance Mark: The Australian safety/EMC regulations	RCM
	China Pollution control mark (also indicates recyclability)	China RoHS legislation
	ISO 7000- 0434A: Caution	
	Operating instructions	

LA35 ordering example

35 1 0 A 0 + 0 0 2 0 0 0 2 1

CABLE:
0 = No cable
1 = 1.5 m power cable (0367046-1500)
2 = 5 m power cable (0367046-5000)
3 = 0.2 m power cable with AMP connector (0367006)
4 = 1.5 m power and 1.5 signal (0367046-1500/0367049-1500)
5 = 5 m power and 5 m signal (0367046-5000+0367049-5000)
6 = 1.5 m Y-cable power and signal in one (0367020)
7 = 5 m powercable & datacable M 12x1 (Bus) **
S = SMPS Cable

IP-DEGREE:
2 = IP66 Dynamic / IP69K Static
9 = Harsh environment housing + IP66/IP69K
(Special article number only)

MOTOR TYPE:
A = 12VDC
B = 24VDC

STROKE LENGTH: XXX = mm Acme spindle: 50, 150....600 mm

FEEDBACK:
0 = Standard (No feedback)
H = Hall signal (Magnet)
A = Analog feedback 0-10V (Magnet)
B = Analog feedback 0,5-4,5\ (Magnet)
D = Bus **

PCB OPTIONS:
0 = None
1 = Potential free endstop signals

***IC options for LA35:**
2 = IC option
A = Modbus ** (Special article number only)

SAFETY OPTIONS: '+ = None
1 = Safety Nut
2 = Splines
3 = Splines with safety nut

PISTON ROD EYE: X = Special
0 = Ø10,2 hole (for 10mm pin) with slot
1 = Ø10,2 hole with slot (for 10mm pin) - AISI 303
2 = Ø12,9 hole with slot (for 1/2" pin)
3 = Ball eye Ø10H7
4 = Ball eye Ø12H7

BACK FIXTURE X = Special
A = Stainless steel Ø10.2 (AISI 304)
B = Stainless steel Ø10.2 (AISI 304) turned 90 degrees
C = Stainless steel Ø12.9 (AISI 304)
D = Stainless steel Ø12.9 (AISI 304) turned 90 degrees
E = Ball eye Ø10H7
F = Ball eye Ø10H7 turned 90 degrees
G = Ball eye Ø12H7
H = Ball eye Ø12H7 turned 90 degrees

BRAKE:
0 = None
1 = Brake Push
2 = Brake pull

SPINDLE TYPE:
1 = 3 mm
2 = 5 mm
3 = 9 mm
4 = 12 mm
7 = 6 mm

ACTUATOR TYPE: 35 = LA35

*

IC INTEGRATED CONTROLLER

IC options:	Basic IC	Modbus
LA35 actuator:	□	□

** Cables option 7, Feedback option D and PCB option A are connected and can only be configured with Motor Type B

Chapter 5

Maintenance

- The actuator must be cleaned at regular intervals to remove dust and dirt and inspected for mechanical damages or wear.
- Inspect attachment points, wires, piston rod, cabinet, and plug, as well as check that the actuator functions correctly.
- To ensure that the pregreased inner tube remains lubricated, the actuator must only be washed down when the piston rod is fully retracted.
- The actuator is a closed unit and therefore requires no internal maintenance.
- In order to maintain a proper performance of the spherical eyes and to increase the resistance against environmental wear, we strongly recommend that the spherical eyes (ball bearings) mounted on actuators from LINAK are greased with anticorrosive grease or similar.

Repair

Only an authorised LINAK® service centre should repair LINAK actuator systems. Systems to be repaired under warranty must be sent to an authorised LINAK service centre.
In order to avoid the risk of malfunction, all actuator repairs must only be carried out by an authorised LINAK Service shop or repairer, as special tools and parts must be used.
If a system is opened by unauthorised personel there is a risk that it may malfunction at a later date.

Main groups of disposal

LINAK's products may be disposed of, possibly by dividing them into different waste groups for recycling or combustion.

Product	Metal scrap	Cable scrap	Electronic scrap	Plastic recycling or combustion
LA35	X	X	X	X

We recommend that our product is disassembled as much as possible at the disposal and that you try to recycle it.

Warranty

There is an 18 months' warranty on TECHLINE products against manufacturing faults calculated from the production date of the individual products (see label). LINAK's warranty is only valid in so far as the equipment has been used and maintained correctly and has not been tampered with. Furthermore, the actuator must not be exposed to violent treatment. In the event of this, the warranty will be ineffective/invalid. For further details, please see standard terms of sale and delivery for LINAK A/S.

Note:
Only an authorised LINAK® service centre should repair LINAK actuator systems. Systems to be repaired under warranty must be sent to an authorised LINAK service centre.
In order to avoid the risk of malfunction, all actuator repairs must only be carried out by an authorised LINAK Service shop or repairer, as special tools and parts must be used.
If a system is opened by unauthorised personel there is a risk that it may malfunction at a later date.

The actuator is not to be opened by unauthorised personnel. In case the actuator is opened, the warranty will be invalid.

DECLARATION OF CONFORMITY

LINAK A/S
Smedevænget 8
DK - 6430 Nordborg

Hereby declares that LINAK Actuator 35xxxxxxxxxx2x

complies with the EMC Directive 2014/30/EU according to following harmonized standards:

EN 61000-4-2:2009, EN 61000-4-3:2006+A1+A2, EN 61000-4-4:2012, EN 61000-4-5:2014, EN 61000-4-6:2014, EN 50121-3-2: 2015, EN 60204-31: 2013

complies with RoHS2 Directive 2011/65/EU according to the standard:
EN 50581:2012

Additional information:
The actuator does also comply with EMC requirements of:
The Machinery Directive 2006/42/EC
The Recreational Craft Directive 94/25/EC
The Vehicle EMC Directive 2004/104/EC
and the following standards:
DS/EN 13309:2001 (Construction machinery - Electromagnetic compatibility of machines with internal electrical power supply),
DS/EN ISO 14982:1998 (Agricultural and forestry machines - Electromagnetic compatibility - Test methods and acceptance criteria),
EN/ISO 13766:2006 (Earth-moving machinery - Electromagnetic compatibility)

Nordborg, 2015-11-04

LINAK A/S
John Kling, B.Sc.E.E.
Certification and Regulatory Affairs
Authorized to compile the relevant technical documentation

Original declaration

DECLARATION OF INCORPORATION OF PARTLY COMPLETED MACHINERY

LINAK A/S
Smedevænget 8
DK - 6430 Nordborg

Herewith declares that LINAK TECHLINE ® products
as characterized by the following models and types:

Linear Actuators LA12, LA14, LA22, LA23, LA25, LA30, LA35, LA36, LA37

comply with the following parts of the Machinery Directive 2006/42/EC, ANNEX I, *Essential health and safety requirements relating to the design and construction of machinery*:

1.5.1 Electricity supply

The relevant technical documentation is compiled in accordance with part B of Annex VII and that this documentation or part hereof will be transmitted by post or electronically to a reasoned request by the national authorities.

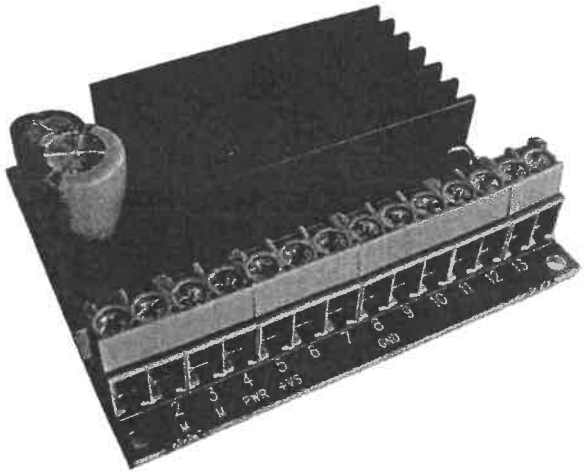
This partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of the Machinery Directive 2006/42/EC where appropriate.

Nordborg, 2014-10-20

LINAK A/S
John Kling, B.Sc.E.E.
Certification and Regulatory Affairs
Authorized to compile the relevant technical documentation

Original Declaration

TR- EM-288 DC-MOTOR CONTROLLER 12-24V 15A



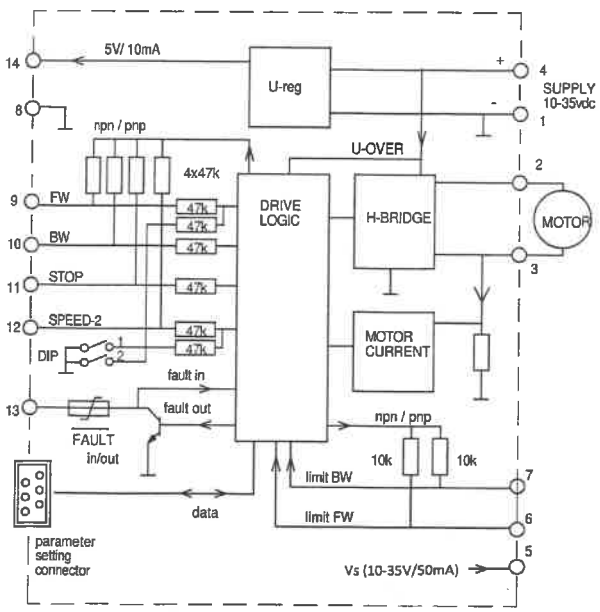
- small size
- high current output
- current limit
- zero current limit
- speed setting
- flexible control inputs
- impulse / continuous mode
- rail base mountable
- digital parameter setting

TR-EM-288 is a full bridge DC-motor starter. It is designed to work with DC-motor in applications where some special functions are needed. Starter has adjustable acceleration and deceleration ramps, which make possible the smooth starts and stops. Adjustable current limit protects motor against overcurrent and it can also be used as an end-stop. This device has also two settable speeds, which are usefull in positioning applications. Control inputs FW and BW start the forward and backward run. STOP is for the motor shut-down but there are also available individual limit inputs for FW and BW directions. SPEED-2 input activates preset speed-2, but it can also be used as input for analog speed control signal 0-5V. FAULT terminal has at the same time input and output function, the pin is normally high, but is pulled down in overheat and conditionally also in current trip situation. If FAULT-line is pulled down externally it will cause a stop and prevent the new start. For example, it is possible to link fault pins of several units together and achieve a syncronous stop.
There are 2 selectable control modes, contionuous and impulse. In continuous mode the motor runs as long as the control is active. In impulse mode a short comand starts the motor, and only a new impulse will change the status. The card has selectable input logics. Inputs are divided in two groups, control and limit -inputs. Groups can be individually set for NPN or PNP logic. The parameters are set with EM-236 interface unit. Operation of the controller and some of its functional values can also be monitored with EM-236 interface unit.

TECHNICAL DATA

Supply voltage 10-35V
Start up voltage 9V, shutdown voltage 8V
Motor current cont. max. 15A, peak max. 30A (Ta<50°C)
Current limit adjustable 0.1-20A (at start max 30A)
Overheat limit 100°C
Start and stop ramp adjustable 0-5s
PWM frequency 2kHz
Speed input scale (speed-2) 0-5V = 0-100% pwm
Input control logic: high =4-30V, low=0-1V
Control input impedances typ. 47kohm
Limit FW / BW input imped. typ 10kohm
Control input response time typ 5ms.
Fault out. NPN open coll. max 30V / 1A
Fault in actives Uin < 1V (NPN)
Motor and supply connectors 2.5mm
Control connectors 1mm
Dimensions 72x59x25mm
Dimensions in DIN-rail base 90x62x50mm
CE-tested for industrial environment (emc)
Operating temp (Ta) -40...60°C
Weight 80g

TR-EM-288 BLOCK DIAGRAM



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288A3RDE 6.5.10

CONNECTIONS TR-EM-288

Supply voltage must be filtered DC of 10-35V, and ripple should be less than 30% at full load.
CAUTION ! Wrong polarity can damage the unit.
CAUTION ! Unit doesn't have an internal fuse, so an external fuse should be added if fuse required.

ADJUSTMENT AND SETTINGS

Adjusting and parameter setting of eg. current limit value, ramp times and speed-2 value is done with the EM-236 interface unit. With EM-236 the parameters and adjusted values can also be copied to multible devices accurately and reliably.

17 SETTABLE PARAMETERS defaults in brackets

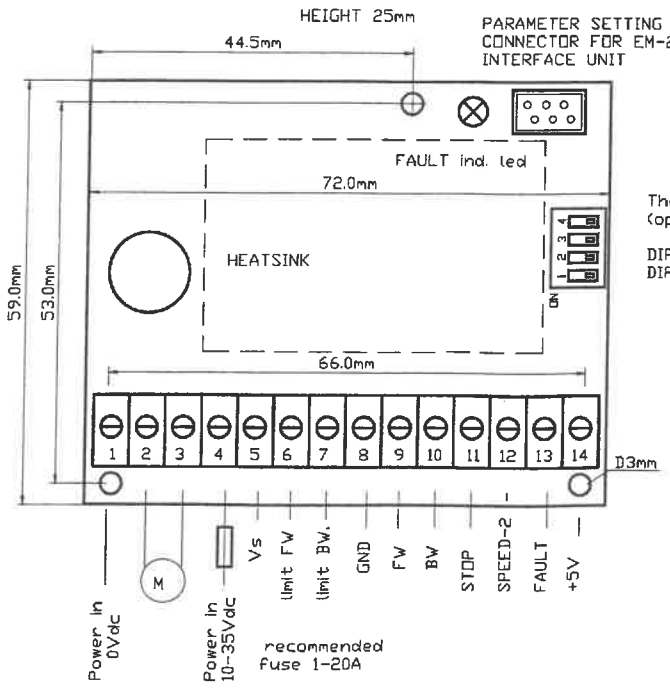
1 command mode: continuous = 0, impulse= 1 (0)
2 start condition combinations: 0-3 (1)
  0= start both direction after I-trip and Stop
  1= start only opposite direction after I-trip
  2= start only opposite direction after Stop
  3= start only opposite direction after I- and Stop
3 input logic combinations 0-3 PNP/NPN (0)
  0= command and limit inputs as PNP (positive)
  1= command inputs NPN, and limit inputs PNP
  2= command inputs PNP. and limit input NPN
  3= command and limit inputs NPN (negative)
4 running speed-1: 0-100% / 0-100 (100)
5 running speed-2: 0-100% / 0-100 (50)
  Note: if selected to 0 "speed2-input" is used as analog 0-5V speed control input.
6 current limit FW: 0.1-20A / 1-200 (30)
7 current limit REV: 0.1-20A / 1-200 (30)
8 Trip combinations: 0-3 (1)
  0= no I-trip, no zero-current-trip
  1= only I-trip
  2= only zero-current-trip
  3= both I-trip and zero-current-trip
9 I-trip delay: 0-255ms / 0-255 (20)
10 Fault output combinations: 0-3 (1)
  0= I-trip and zero current won't cause fault output signal
  1= only I-trip causes fault output signal
  2= only zero current causes fault output signal
  3= both I-trip and zero current causes fault output signal.
11 overvoltage limit: 15-40V / 15-40 (35)
  Overvoltage can be caused by load driving the motor or when braking the speed down but supply can not accept the current back from driver. Exceeding the limit will cause the power stage set to free-wheel state.
  With a direct battery supply the brake current is charging the battery and the voltage will not normally rice.
12 load compensation: 0-255 / 0-255 (0)
  Load compensation (Rxl) improves low speed and start torgue, but too high compensation causes unstable running. Run motor at low speed (30%) Increace compensation with small steps until motor start behaviour unstable, then decrease value about 10%
13 timeout: 0-255s. / 0-255 (0=not in use) (0)
14 Reset for start and hour-counter 0/1 (0)
  selecting 1 and push save = reset counters
15 start ramp: 0-5s / 0-500 (100)
16 stop ramp: 0-5s / 0-500 (100)
17 kick start 0-200ms / 0-200 (0)

MONITORABLE VALUES

1/5 Motor current 0-20A (0-200)
2/5 PWM-level-% 0-100% (0-100)
3/5 hour counter (max.65535h)
4/5 start counter (max.65535)
5/5 carry counter for start counter

FAULT-LED signal codes

1. power on	one blink
2. current on limit	led is lit
3. current trip	fast blinking...
4. zero-cur trip	long blink- short pause...
5. overvoltage	4 x blink -pause...
6. overheat	short blink- long pause...
7. timeout	3 x blink + long blink...
8. fault input	2 x short + 1x long blink...



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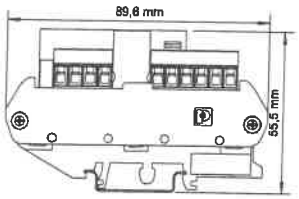
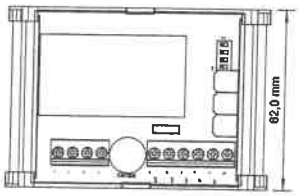
TR-EM-288 Housing options

TR-EM-288-R

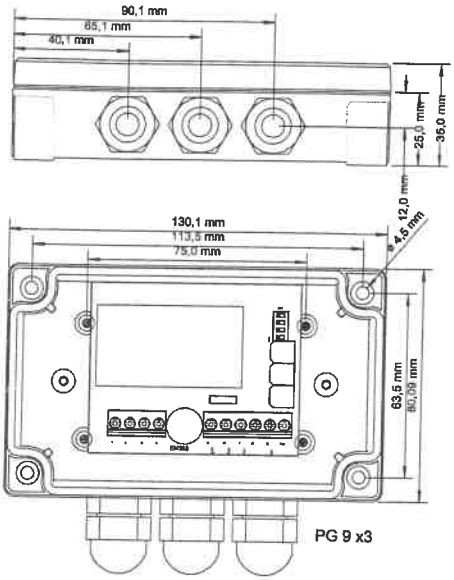


Fits to 35 mm DIN-rail or C-rail.



Phoenix Contact UM 72 profile rail base

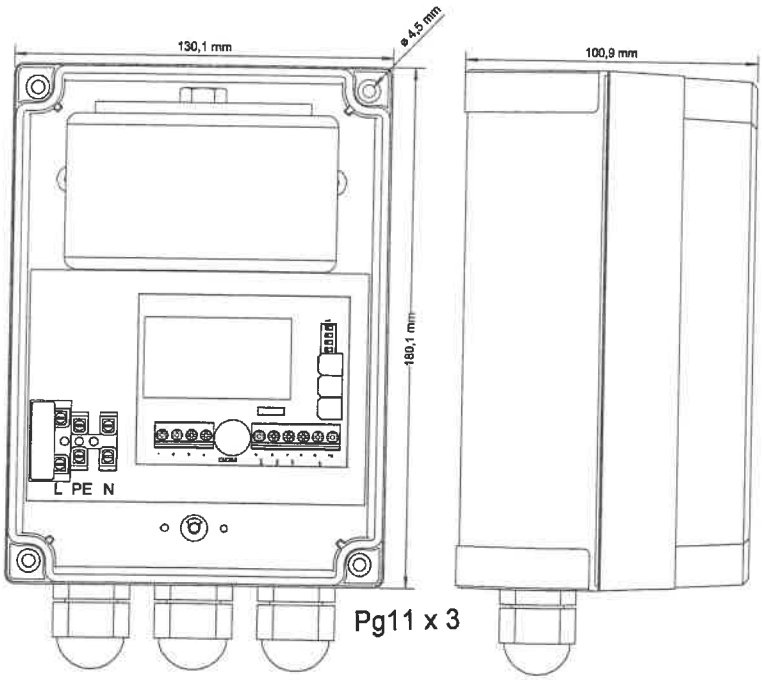
TR-EM-288-H



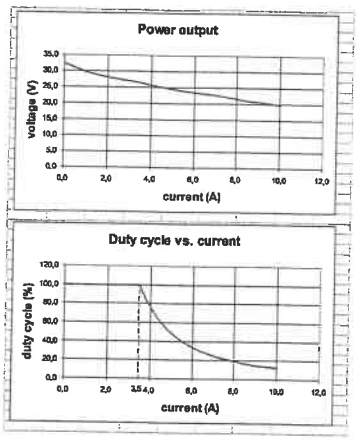
Fibox PC100/35LG IP66 housing

TR-EM-288-T-230

(TR-EM-000-T-230)



Fibox PC150/100HG IP66 housing



Technical data

Supply voltage	230 Vac
Fuse	T1.6A / 20.0 x 5.0 mm
Transformer	230 / 22 Vac / 150 VA Max output 10 A (12% duty cycle), continuous 3.5 A
Filtering	8800 uF
Weight	2.4 kg

Product is EMC-tested and CE-marked.

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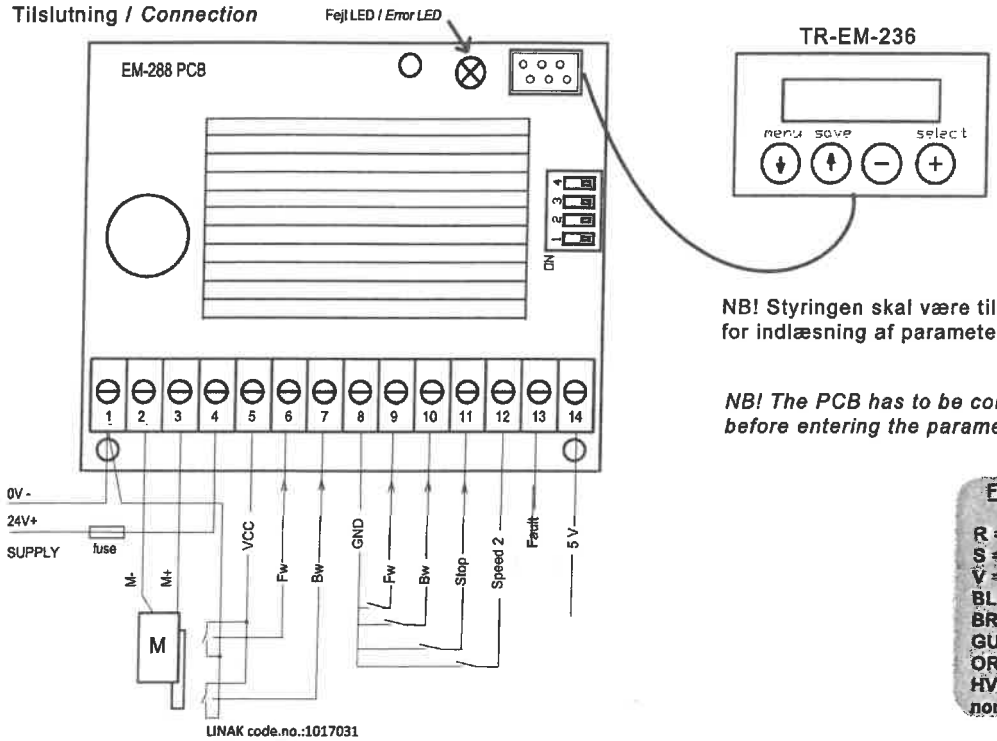
QUICK GUIDE

Motorstyring / *Motor Controller*
Type TR-EM-288

Tilslutning / *Connection*



NB! Styringen skal være tilsluttet forsyningsspænding for indlæsning af parameter.

NB! The PCB has to be connected to power supply before entering the parameters is possible.

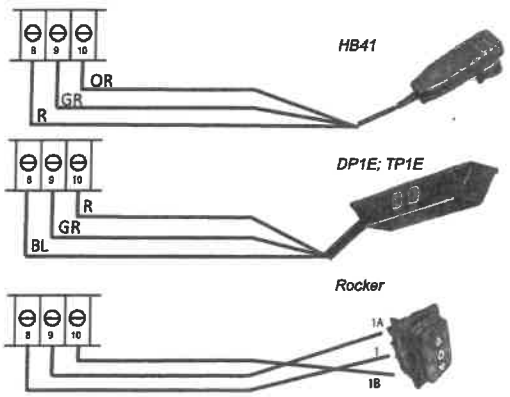
Farvekoder / *Color codes*

R = Rød / *Red*
S = Sort / *Black*
V = Violet
BL = Blå / *Blue*
BR = Brun / *Brown*
GU = Gul / *Yellow*
OR = *Orange*
HV = Hvid / *White*
none = Ingen ledning / *No wire*

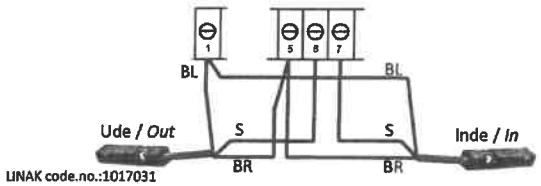
Tilslutning af aktuatorer ved hjælp af ledningsfarver / *Connection of Actuators by the help of wire colors*

	Terminal	LA12	LA23	LA28	LA30	LA31	LA32	LA34	LA35	LA36
0V -	1									
Actuator -	2	BL	BL	BL	BL	BL	BL	BL	BL	BL
Actuator +	3	BR	BR	BR	BR	BR	BR	BR	BR	BR
24V +	4									

Tilslutning af håndbetjening ved hjælp af ledningsfarver / *Connection of a handset by the help of wire colors*



Tilslutning af eksterne aftastere ved hjælp af ledningsfarver / *Connection of magnetic field switches by the help of wire colors*



Fejludlæsning / *Error read out*

1. strøm tilsluttet / *power on:*	*1x blink*
2. strømgrænse nået / *current on limit:*	LED lyser / *LED is lit*
3. afbrydelse af overstrøm / *current trip:*	Hurtig blinken / *fast blinking*
4. afbrydelse af nulstrøm / *zero-cur trip:*	Lang blink-kort pause/ *long blink short pause*
5. overspænding / *overvoltage:*	*4x blink-pause*
6. overophedet / *overheat:*	Kort blink-lang pause / *short blink-long pause*
7. timeout:	3x blink + lang blink / *3x blink + long pause*
8. fejlindgang / *fault input:*	2x kort + 1x lang blink / *2x short + 1x long blink*

Produceret af / Produced by Electromen OY ELECTROMEN Oy

Forhandler / Distributor:

LINAK Danmark A/S
Mønstedsvej 9
DK-8600 Silkeborg
Tlf. +45 86803611 - www.linak.dk

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05 -07- 2019

QUICK GUIDE

Motorstyring / *Motor Controller*
Type TR-EM-288

Parameterindstillinger / *Parameter settings*

Tilslut programmeringsenheden TR-EM-236 og indlæs nedenstående værdierne for det pågældende aktuatorsæt

Connect the programming unit TR-EM-236 to the PCB and enter the values from the list below for the resp. Actuators

Parameter	LA12	LA23	LA28	LA30	LA31	LA32	LA34	LA35	LA36
1	0	0	0	0	0	0	0	0	0
2	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1
4	100	100	100	100	100	100	100	100	100
5	50	50	50	50	50	50	50	50	50
6	20	20	50	70	50	50	70	50	100
7	20	20	50	70	50	50	70	50	100
8	1	1	1	1	1	1	1	1	1
9	20	20	20	20	20	20	20	20	20
10	1	1	1	1	1	1	1	1	1
11	35	35	35	35	35	35	35	35	35
12	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0
15	10	10	10	10	10	10	10	10	10
16	10	10	10	10	10	10	10	10	10
17	0	0	0	0	0	0	0	0	0

Parameterbeskrivelse / *Parameter description*

1. Betjeningstilstand / *command mode*
2. Startbetingelse / *start condition combination*
3. Indgangstype / *input logic combination*
4. Hastighed 1 / *running speed 1*
5. Hastighed 2 / *running speed 2*
6. Strømgrænse - FREM / *current limit FW*
7. Strømgrænse - TILBAGE / *current limit BW*
8. Afbryderkombination / *trip combination*
9. Forsinkelse inden afbrydelse / *I-trip delay*
10. Kombination af fejludgange / *fault output combination*
11. Overspændingsgrænse / *over voltage limit*
12. Belastningsudligning / *load compensation*
13. Time-out
14. Nulstilling / *reset for start and hour counter*
15. Startrampe / *start ramp*
16. Stoprampe / *stop ramp*
17. Kickstart

For yderligere vejledning, henvises til brugsanvisningen.

For detailed instructions please refer to the Instruction Manual

Produceret af / Produced by Electromen OY ELECTROMEN Oy

Forhandler / Distributor:

LINAK Danmark A/S
Mønstedsvej 9
DK-8600 Silkeborg
Tlf. +45 86803611 - www.linak.dk

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05 -07- 2019

LINAK DANMARK
Third Party Product

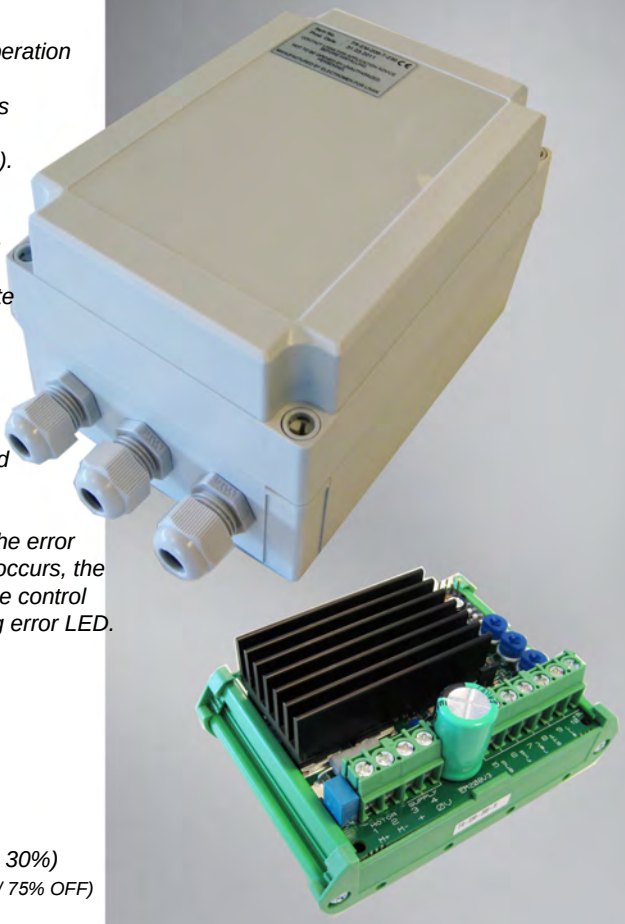
MOTOR CONTROLLER
Type TR-EM-208

The TR-EM-208 motor control unit is designed for operation with 1 single actuator.
The control's main function is to turn off the actuator's motor when the current limit is reached (protecting actuator and application against overload).
It is also possible to adjust soft start and soft stop.

The FORWARD and BACK commands can be received in continuous or impulse signal mode.
In continuous mode, the actuator continues to operate for as long as the command signal is activated.
In impulse mode, only a single impulse is required to start and stop the actuator's movement.

The stop command has the highest priority and will be executed even if the command for running forward or backward has been activated.

When the current limit is reached this is stated with the error output and the error LED. If overheating of the PCB occurs, the thermal protection will be activated and shut down the control unit. This is indicated by the error output and flashing error LED.



TECHNICAL DATA

Power supply	*12-35 V DC (ripple max. 30%)*
Max. power limit	*12 A cont. 25 A (25% ON / 75% OFF)*
Stand-by power	*typically 10 mA*
Power limit	*range 1; 1-5 A (start 1.5x)* *range 2; 5-10 A (start 1.5x)* *range 3; 10-25 A (start 1.5x)*
Thermal protection	*120°C*
Start ramp	*adjustable 0-3 sec.*
Free deceleration	*adjustable 0-3 sec.*
Operating frequency	*2 kHz*
Voltage loss	*0.6 V (Im 12A)*
Control inputs	*"1" = 4-30 V DC, "0" = 0-1 V NPN*
Error output	*open-coll. 30 V 50 mA*
Operating temperature	*-10...60°C*
Weight:	*app.105 g*

DECLARATION

TR-EM-208 is declared to be in compliance under the designation TECH system 208 in combination with LINAK-compatible actuators and controls in accordance with the machinery directive 2006/42/EC Annex I as a partly completed machinery with focus on the following: 1.2.1;1.2.2;1.2.3;1.2.4.1;1.2.6;1.3.2;1.3.7;1.3.8.

TR-EM-208 is designet to run a single actuator and is compatibel with following LINAK actuators: LA12; LA14; LA23; LA25; LA28; LA30; LA31; LA32; LA34; LA35; LA36 and LA37

The specified product is produced by Electromen OY

ELECTROMEN Oy

Distributor:
LINAK Danmark A/S
Mønstedsvej 9
DK-8600 Silkeborg
Tel. +45 86 80 36 11 - www.linak.dk

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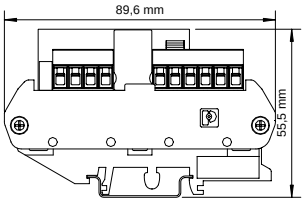
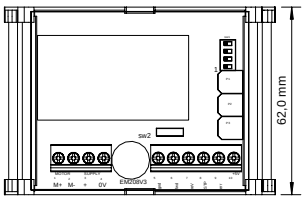
Product variants

TR-EM-208-R

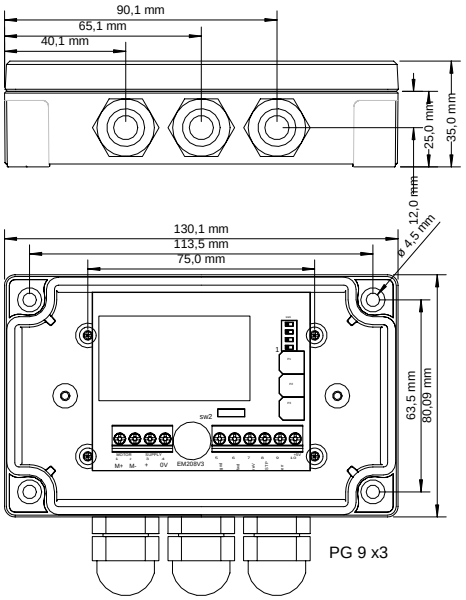


For mounting on a 35 mm DIN rail for building into a board



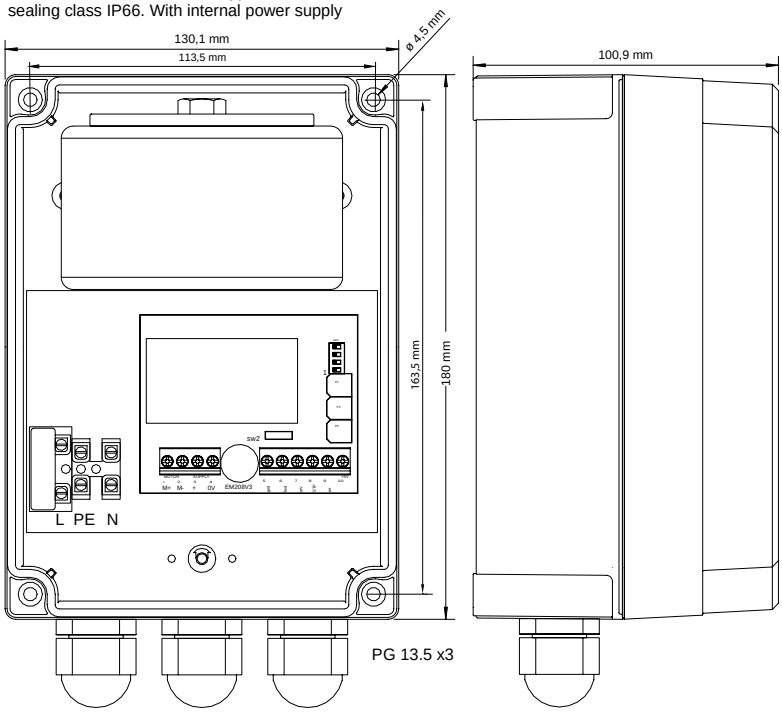
TR-EM-208-H

Motor control mounted in box type Fibox PC100/35LG sealing class IP66. For external power supply



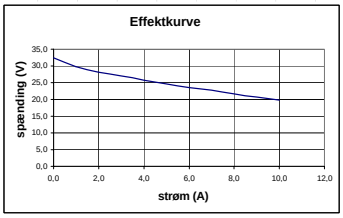
TR-EM-208-T-230

Motor control mounted in box type Fibox PC150/100HG sealing class IP66. With internal power supply



TECHNICAL DATA (power supply)

Connected voltage	230 Vac
Fuse	T1.6A / 20.0 x 5.0 mm
Transformer	230 / 22 Vac / 150 VA
Max. current	10 A
Intermittence max.	12%
Filtering	8800 uF
Weight:	app. 2.4 kg



Distributor:
LINAK Danmark A/S
Mønstedsvej 9
DK-8600 Silkeborg
Tel. +45 86 80 36 11 - www.linak.dk

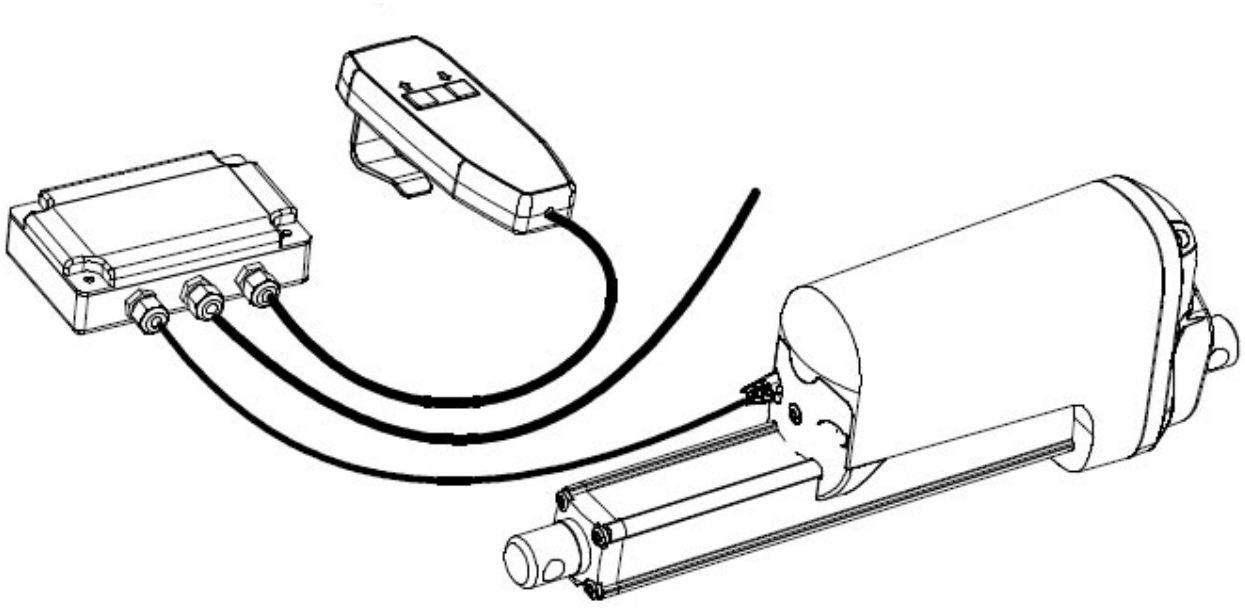
LINAK WE IMPROVE YOUR LIFE

TECH-system

Type 208

For single operation

Instructions for installation and use



Preface

Dear User,
Thank you for choosing an actuator system from LINAK®. LINAK systems consist of hi-tech products that are based on many years of experience with the production and development of actuators, electronic control boxes, control units and chargers.

TECH-systems is composed of LINAK actuators and a motor control unit developed and produced by third party manufacturers. The function and operational reliability of TECH-systems have been tried and tested in a wide range of different situations. In addition, we continuously improve our products and systems so as to accommodate customer requirements.

This instruction manual describes how to install and maintain your TECH-system. We are sure that your TECH-system will provide you with many years of problem-free operation.

Before our products leave our factory, they always undergo comprehensive quality and function tests. In the unlikely event that you should experience any problems with your systems, please contact LINAK Danmark A/S on +45 8680 3611.

LINAK provides a warranty on all its products and systems. However, this warranty is provided on condition that the product is used in accordance with the applicable specifications, that maintenance is performed correctly, and that any repairs are carried out at a workshop that is authorised to repair LINAK products.

Any changes to the installation and use of LINAK systems may affect their operation and durability. The products must never be opened by non-authorised persons.

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DK-8600 Silkeborg

Important information

Important information about LINAK products is presented under the following headers:

Warning! Failure to comply with these instructions may result in accidents leading to serious personal injury.

NB! Failure to comply with these instructions may result in damage to or destruction of the product.

Warranty

The LINAK warranty covers manufacturing faults and defects in the products as calculated from the date of manufacture. Please contact LINAK Danmark A/S for additional information about the warranty period. The warranty is limited to the value of
the LINAK product.
The LINAK warranty shall only apply if the system has been used correctly and has not been opened. The control box and control unit must not be exposed to violent use. Failure to comply with this requirement will void the warranty.

Safety instructions

Please read the following safety information carefully. It is essential that everyone who is to connect, install or use the system receive the necessary information and have access to this instruction manual.

LINAK recommends that the actuators be used for pressure push applications rather than pull applications.

It is essential that everyone who is to connect, assemble or operate the systems receive the necessary information and have access to this instruction manual.

Before installation, removal or troubleshooting:

- Stop the actuator.
- Disconnect the power supply and remove the mains plug from the socket.
- Free the actuator from any load that may be released during the work.

Before starting:

- Make sure that the system has been assembled as described in this instruction manual.
- Make sure that the current to the control box is correct before connecting the system to a power supply.
- System connection. The individual parts must be connected before the motor control unit is connected to mains power.

During operation:

- If the motor control unit emits unusual sounds or smells, disconnect the mains current and any external batteries.
- Make sure that the cables are not damaged.

- Disconnect the mains cable from mobile equipment before moving same.
- The products can be used both indoors and outdoors (see the encapsulation class of the individual actuator).

Classification:

The equipment is not suitable for use in the immediate vicinity of a flammable, anaesthetic mixture involving air, oxygen or laughing gas (nitrous oxide).

Environmental conditions:

Storage and transport	
Operating :	
Temperature Relative humidity Atmospheric pressure	5°C to 40°C 20% to 90% @ 30°C – not condensing 700 to 1060 hPa
Storage :	
Temperature Relative humidity Atmospheric pressure	-10°C to +50°C 20% to 90% @ 30°C – not condensing 700 to 1060 hPa
Transport :	
If the actuator is assembled in the application and is exposed to push or pull during transportation, the actuator can be damaged. Do not drop an actuator or otherwise damage the housing during disassembly or transportation. We do not recommend using an actuator which has been damaged.	

Warning!
The following applies if the actuator is used for traction in an application that involves a risk of personal injury:
It is the manufacturer of the application who is responsible for implementing appropriate safety measures designed to prevent personal injury in the event that the actuator fails.

Warning!
Please note that any application in which the actuator is involved must not feature any risk of personal injury, e.g. a risk of crushed fingers.

Warning!
The plastic components in the system cannot withstand cutting oil.

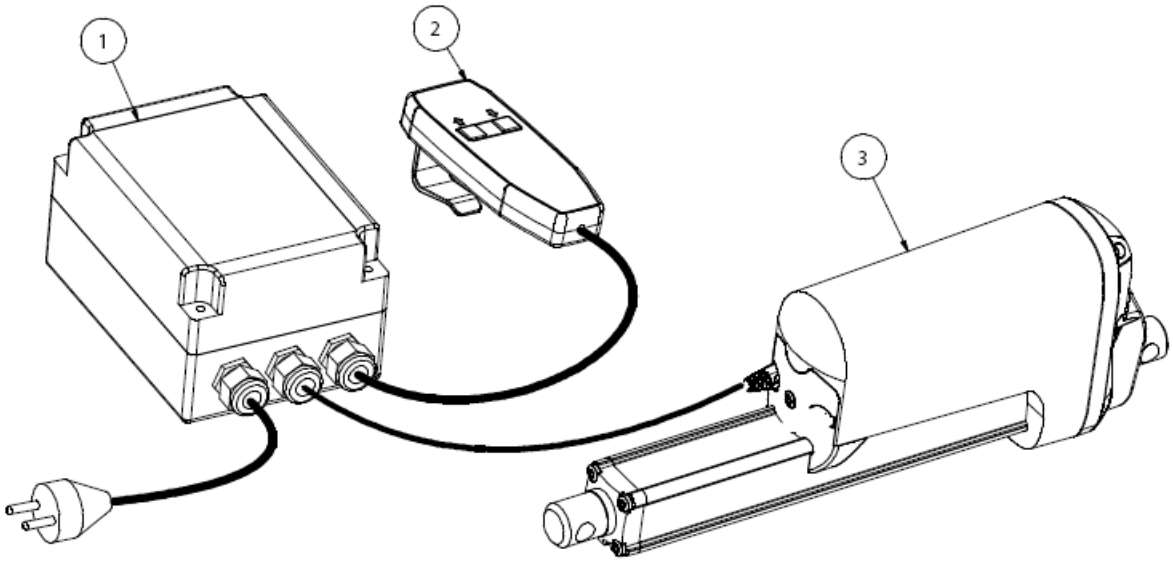
Table of contents.

Technical data

The TECH-system type 208 consists of a motor control unit, actuators and an operating unit. Several versions of the motor control unit are available, with and without power supply. Eleven different actuator types are available, as well as four different standard LINAK operating units.

Description of the system

The TECH-system type 208 is an actuator system is composed of one LINAK actuator, which uses a specially designed motor control unit to ensure an operationally reliable system. The TECH-system type 208 has been specially developed for industrial purposes. The motor control unit can be configured to provide a variety of functions. For example, it is possible to adjust the acceleration/deceleration time and the max. Power limit.
The TECH-System type 208 is compatible with a range of different LINK actuators.



Motor control unit: (pos.1)

Type designation:	TR-EM-208
Actuator connection:	1 actuator
Actuator power limit:	20 A at max. duty cycle 30%
Actuator voltage:	24 V DC
Supply voltage to PCB:	10–35 V DC smoothed voltage
Thermal protection:	120°C
Blind current:	< 10 mA
Power limit, setting:	1–25 A
Input control logic:	4-30V = High; 0-1V = low
Operating temperature (Ta):	+5 °C to +40 °C

Four versions of the motor control unit are available:

- Separate PCB: Order no. **TR-EM-208**
- PCB fitted in box: Order no. **TR-EM-208-H**
- PCB mounted on DIN rail for panel mounting Order no. **TR-EM-208-R**
- PCB fitted in box with power supply: Order no. **TR-EM-208-T-230**

Power supply: (applies to TR-EM-208-T230)

Supply voltage:	230 V AC
Fuse	T1.6A / 20.0 x 5.0 mm
Max. Current:	10A (duty cycle of 12%)
Continuous current:	3.5A
Transformer:	230/220 V – 150 Va

- Power supply in plastic box, excl. control unit Order no. **TR-EM-000-T-230**

Actuator (pos.3)

The system is compatible with the following LINAK actuators (all without feedback):

- Actuator LA12
- Actuator LA14
- Actuator LA23
- Actuator LA25
- Actuator LA28
- Actuator LA30
- Actuator LA31
- Actuator LA32
- Actuator LA34
- Actuator LA35
- Actuator LA36

(See the appropriate product data sheets for additional information)

Control device: (pos.2)

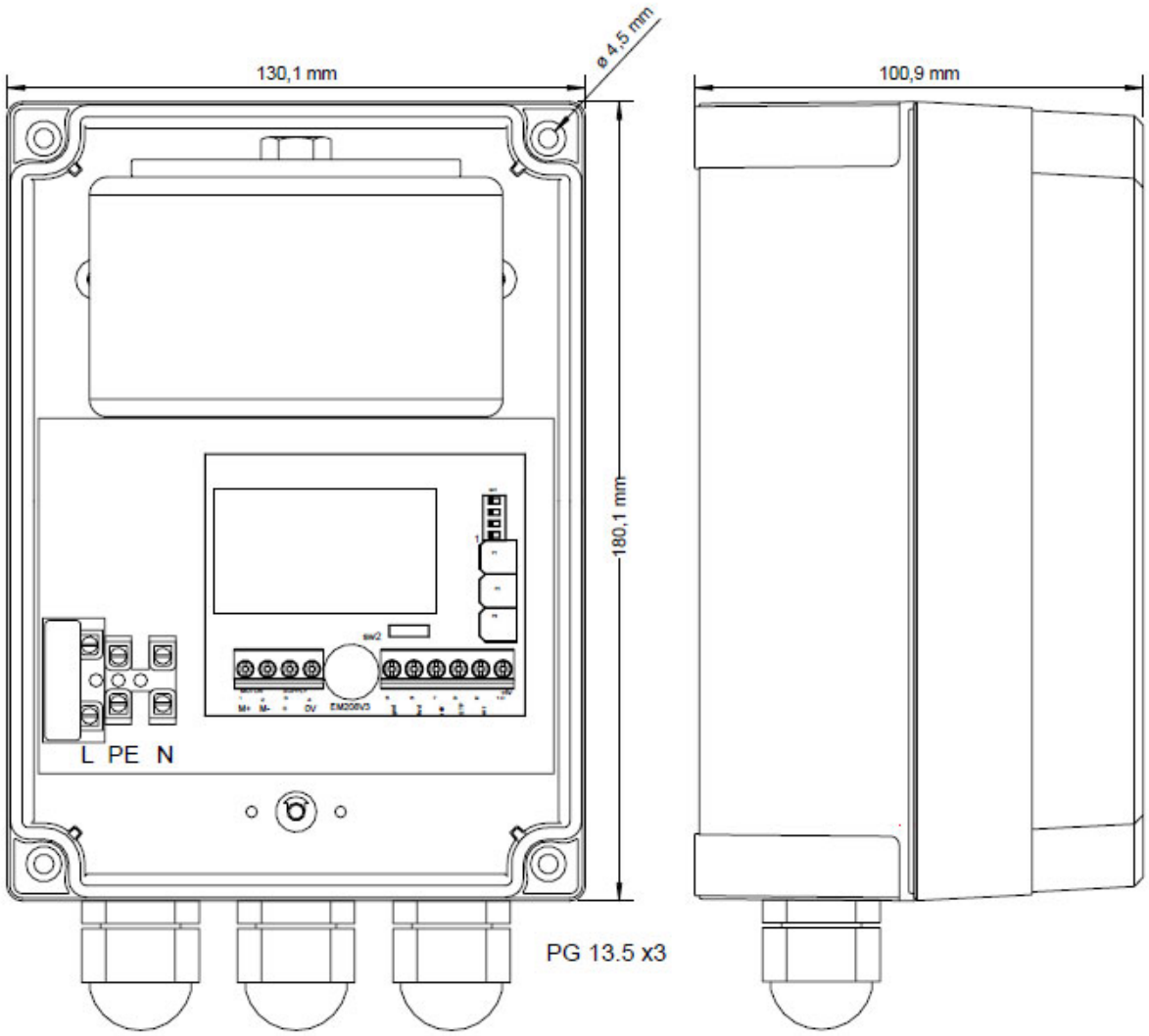
The system is compatible with the following LINAK control device

- Desk-mounted operation, type DP1T: Order no. **DP1T00-000006**
- Desk-mounted operation, type TP1: Order no. **TP1010+00**
- Hand-held operation, type HB41T: Order no. **HB41T00-000009**
- Hand-held operation, type HB61: Order no. **HB61T00-000009**
- Rocker switch for building in: Order no. **TR-1939.3314-00**

Other types of control devices can also be used.

Dimensions

The TR-EM-208 motor control unit fitted in a plastic box with built-in power supply
Weight 2.4 kg



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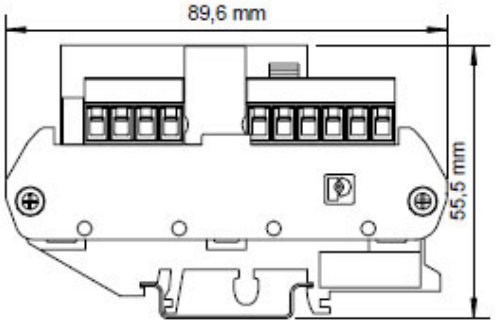
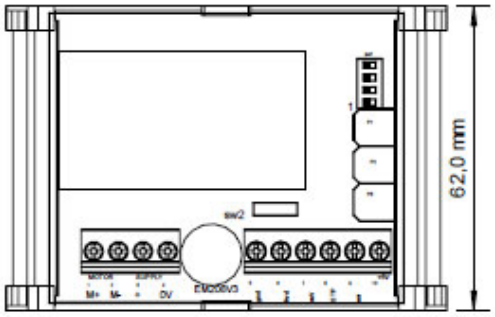
TR-EM-208 for mounting on DIN rail for incorporating into an electrical panel

Weight 200 gram

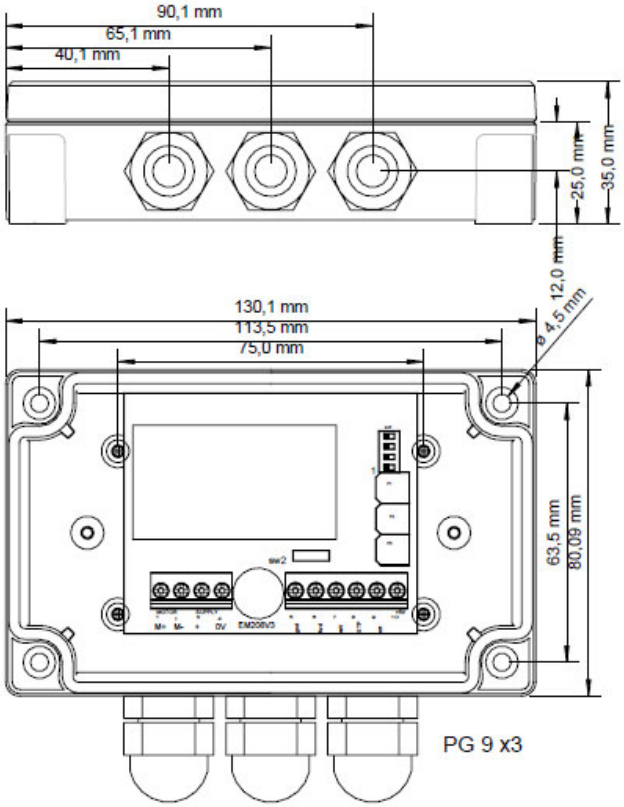


Fits to 35 mm DIN-rail or C-rail.



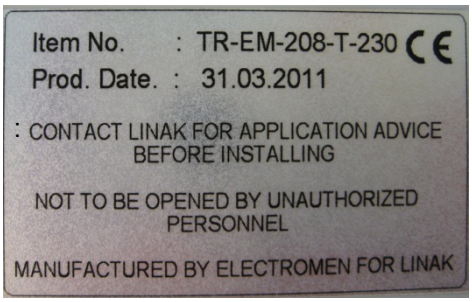
TR-EM-208 mounted in plastic housing without power supply

Weight: 300 gram

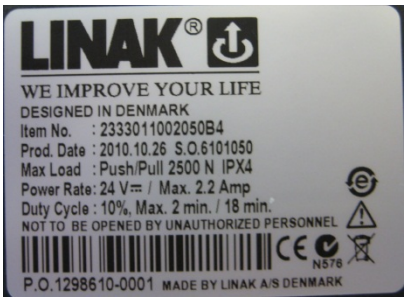


Rating plate and labelling

Rating plate on TR-EM-208 control unit:



Rating plate on actuator LA23



Declaration of Incorporation

Declaration of incorporation
of partly completed Machinery

Directive 2006/42/EC Annex II B

The signatory Manufacturer and authorised to compile the relevant technical documentation for partly completed Machinery and in response to a reasoned request by the national authorities transmit the relevant information:

LINAK Danmark A/S
Mønstedsvej 9
DK-8600 Silkeborg

Declares that the partly completed machinery:

Discription:	Linear Actuator system for single Actuator operating
Name:	TECH-system
Type:	208

Consisting of:

LINAK Actuator type:	**LA12** *or* **LA14** *or* **LA23 or LA25 or LA28 or LA30 or LA31** *or* **LA32** *or* **LA34 or LA35 or LA36 or LA37**
Motor controller unit:	**TR-EM-208-T-120** *or* **TR-EM-208-230**
Operating unit:	**HB40** *or* **HB50** *or* **TP01** *or* **DP1** *and/or* **SLS** *and/or* **SILS**

comply with the following parts of the essential health and safety requirements of the Directive 2006/42/EC Annex I:

1.2.1-safety and reliability of the control system; 1.2.2-control device; 1.2.3-starting; 1.2.4.1-stopping; 1.2.6-faliure of the power system; 1.3.2-risk of brake-up during operation; 1.3.7-risks related moving parts; 1.3.8-choice of protection against risks arising moving parts.

comply with the requirements of the following EU Directives:

- Electromagnetic compability 2014/30/EU

comply with the requirements of the following EN Standards:

- EN 13849-1:2008 SRP/CS Cat. B, PL = b og SRESW PL = b

The partly completed Machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of the Directive 2006/42/EC and other relevant Directives, where appropriate.

Date: Silkeborg

4/8 - 17

Name and signature

Technical chief
Thomas Skovbjerg Petersen

Thomas Skovbjerg

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Connection and installation

Screw terminals are used to connect the TR-EM-208 motor control unit. A general description of the individual terminals is presented below. See the diagrams later in this manual for information about the correct connection of the different actuators.

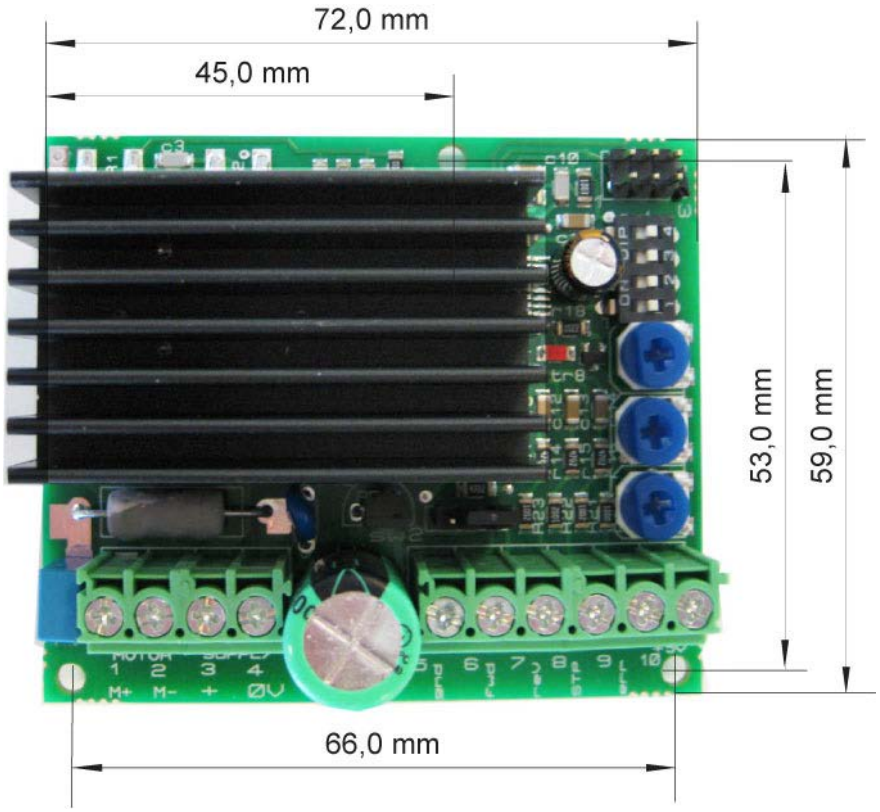
Fitting the motor control unit

Four versions of the TR-EM-208 motor control unit are available:

1.	Separate PCB:	Order no. **TR-EM-208**
2.	PCB fitted in box:	Order no. **TR-EM-208-H**
3.	PCB mounted on DIN rail for panel mounting	Order no. **TR-EM-208-R**
4.	PCB fitted in box with power supply:	Order no. **TR-EM-208-T-230**

Separate PCB – TR-EM-208

The PCB is fitted using three 3 mm diameter screws and connected to an external power supply. The height of the PCB is approx. 25 mm.



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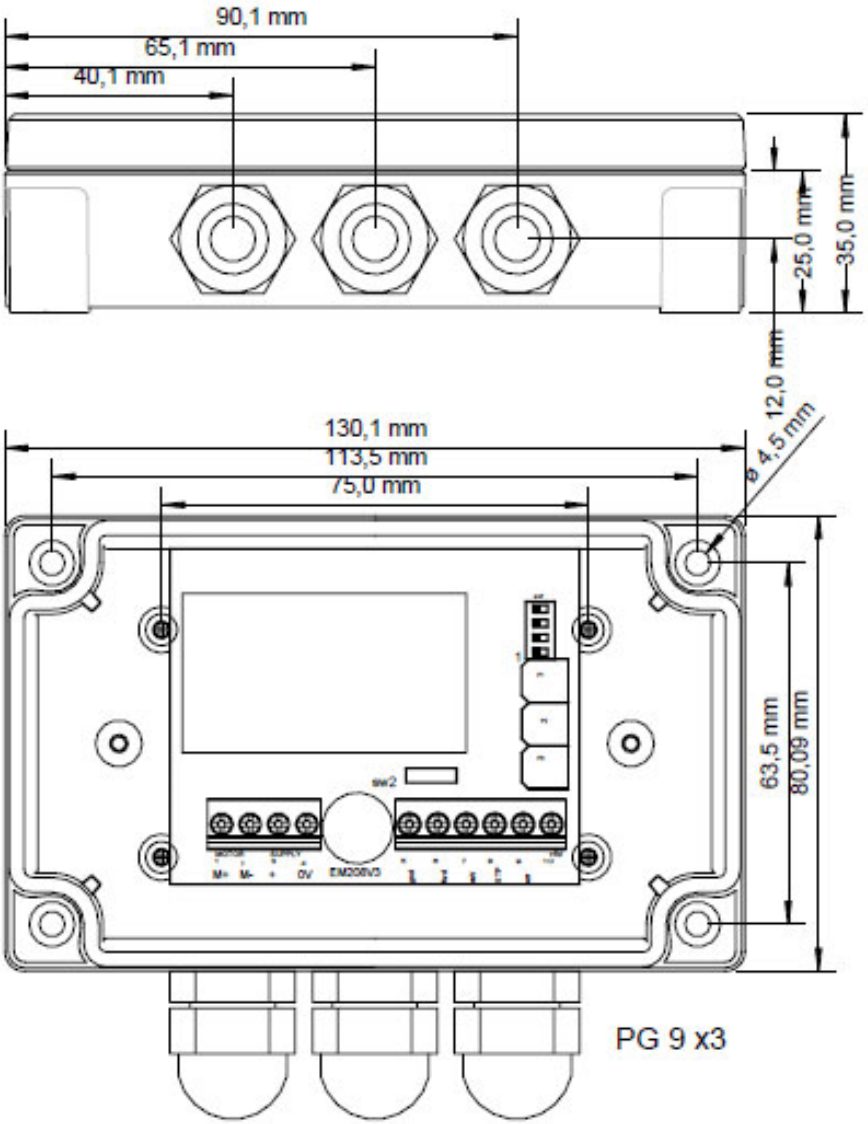
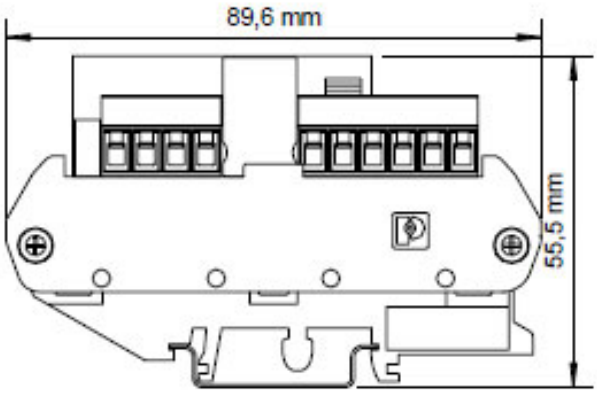
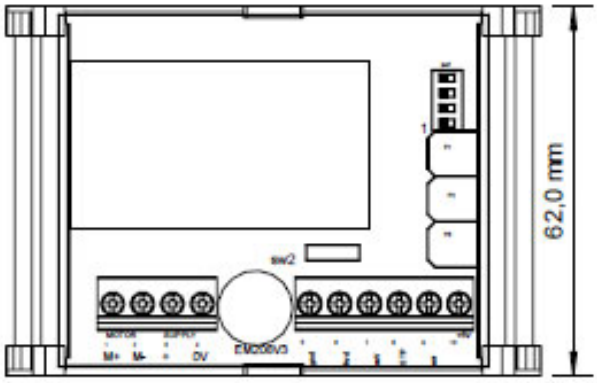
PCB fitted in box – **TR-EM-208-H**:
The box is fitted using three 3 mm diameter screws and connected to an external power supply. The box complies with encapsulation class IP66 and is thus well-suited to outdoor installation.



PCB fitted on DIN rail for panel installation – **TR-EM-208-R**
The PCB is mounted on a DIN rail and connected to an external power supply.



Fits to 35 mm DIN-rail or C-rail.



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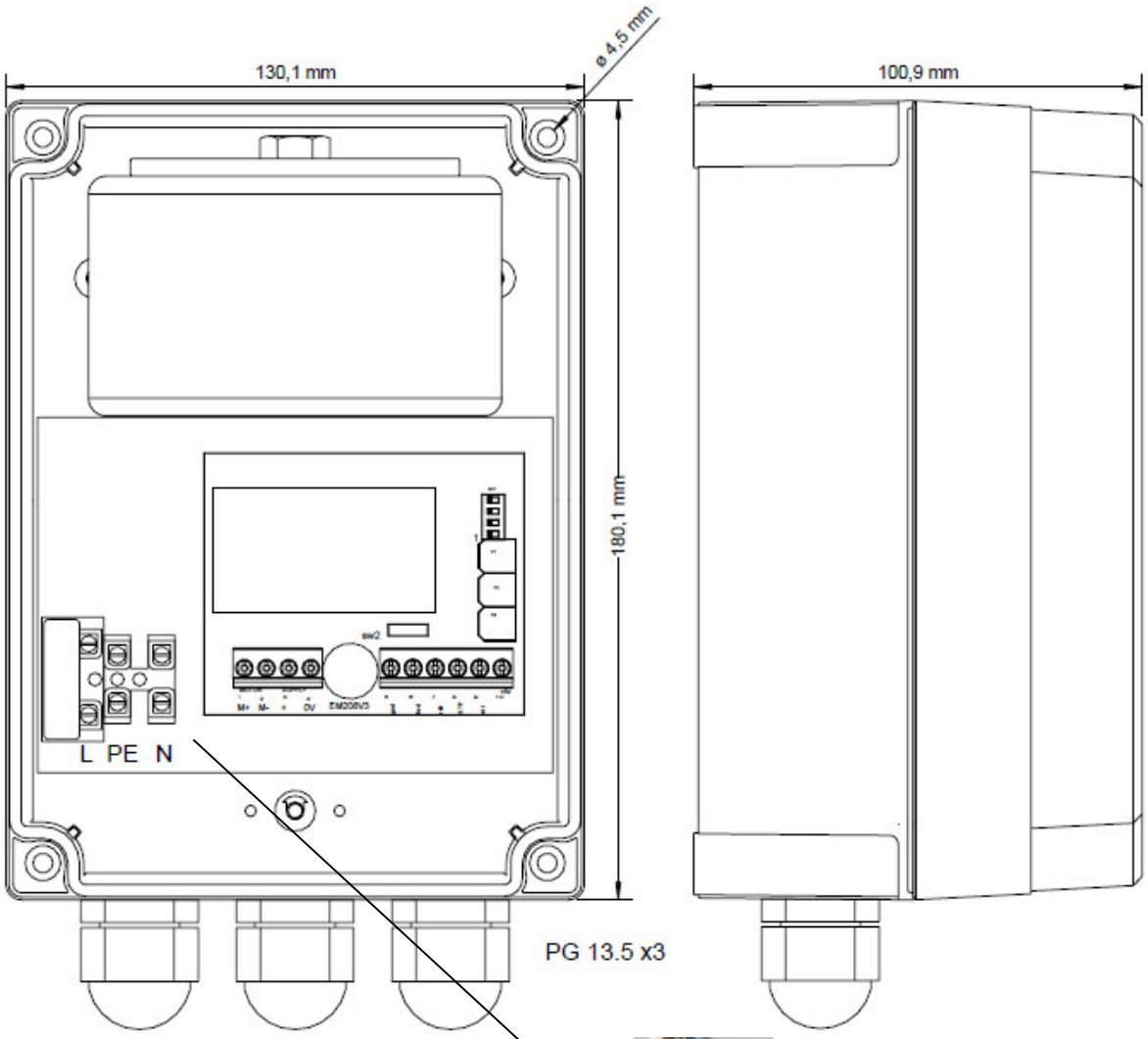
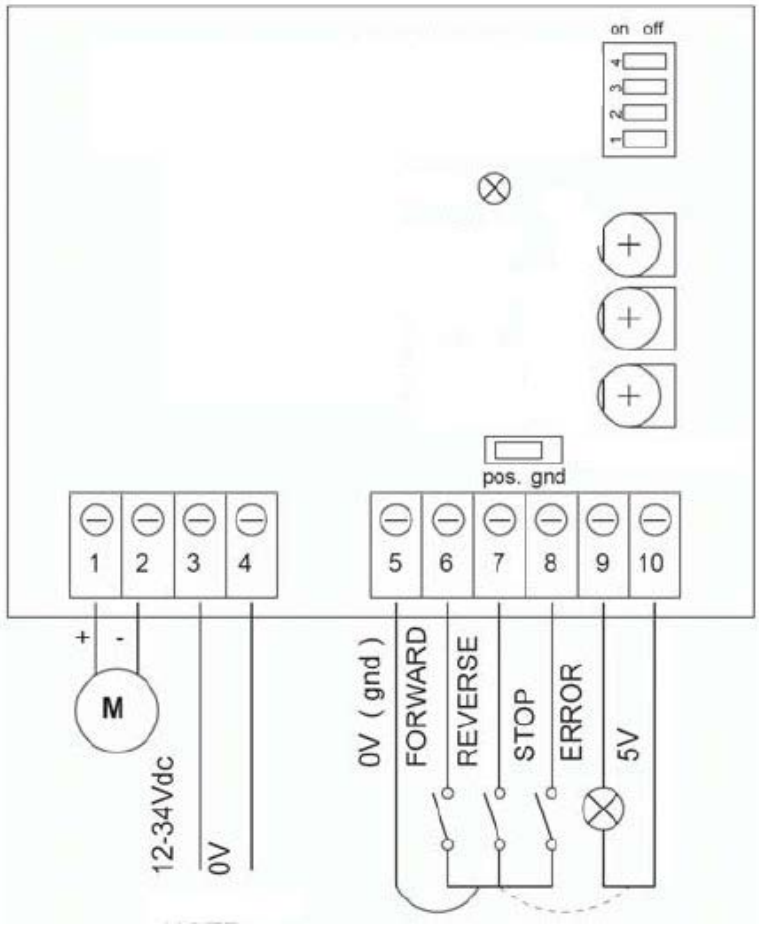
PCB fitted in box with internal power supply – TR-EM-208-T-230
The box is fitted using four screws and the power supply unit is connected to mains voltage as shown below.



Fuse

Connect mains voltage to the

Connection of the motor control unit



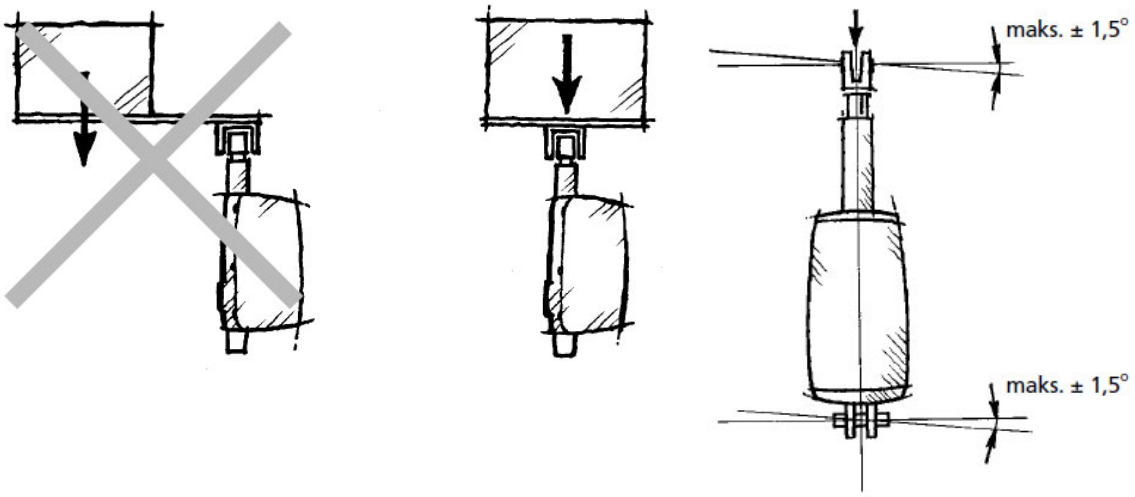
Terminal 1:	Voltage to motor on actuator (+24 V DC)
Terminal 2:	Voltage to motor on actuator (-24 V DC)
Terminal 3:	Supply voltage (+ 10–35 V DC)
Terminal 4:	Supply voltage (- gnd)
Terminal 5:	Shared 0 V (GND)
Terminal 6:	Actuator FORWARD (ARROW UP on LINAK operating unit)
Terminal 7:	Actuator BACK (ARROW DOWN on LINAK operating unit)
Terminal 8:	STOPS all operation. Can be used for electric end stop switches.
Terminals 9+10:	For external error indication, 5 V out.

Installing the actuators

When installing actuators, it is important to make sure that the actuators can move freely along their full stroke length, without being limited by the mechanical construction. It is also important to ensure that the application is not subjected to uneven twisting and traction, nor to unevenly distributed load.

NB! The actuator must only be secured using the piston end and rear fastening plate – never the outer tube of the spindle or the motor housing.

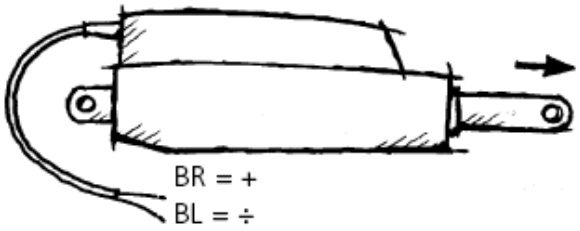
For additional information, please refer to the data sheet for the actuator in question.



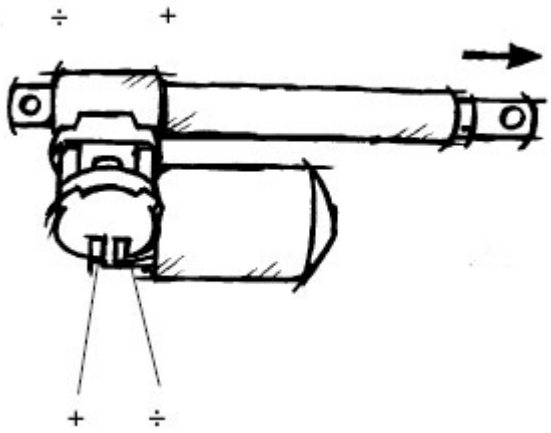
Connection of LINAK actuators

The majority of LINAK actuators are supplied as standard with a pre-fitted cable, and the actuators are also fitted with different types of plugs depending on which control box has been selected for the control operations. For operation with TR-EM-208, the actuators are typically supplied without plugs.

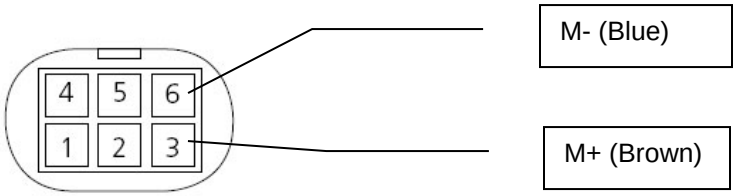
LA12 / LA14 / LA28 / LA31 / LA32 / LA34



LA30



LA23 / LA25 -minifit plug



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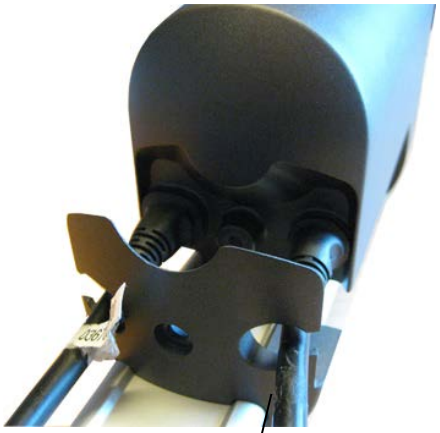
The new generation of actuators is fitted with minifit plugs in the motor housing, and are thus supplied without fitted cables. In contrast to the cable types mentioned above, the supply and signal conductors have now been separated and are thus in individual cables.

LA35

Motor cable
Order no. 0367002-1500

Signal cable not used

LA36



Signal cable not used

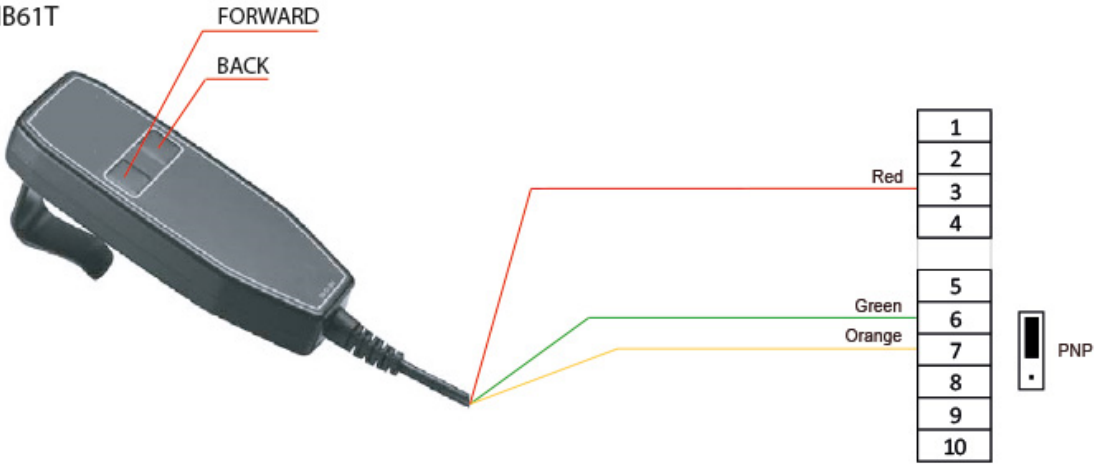
LA23

Motor cable
Order no. 0237008-0750-A

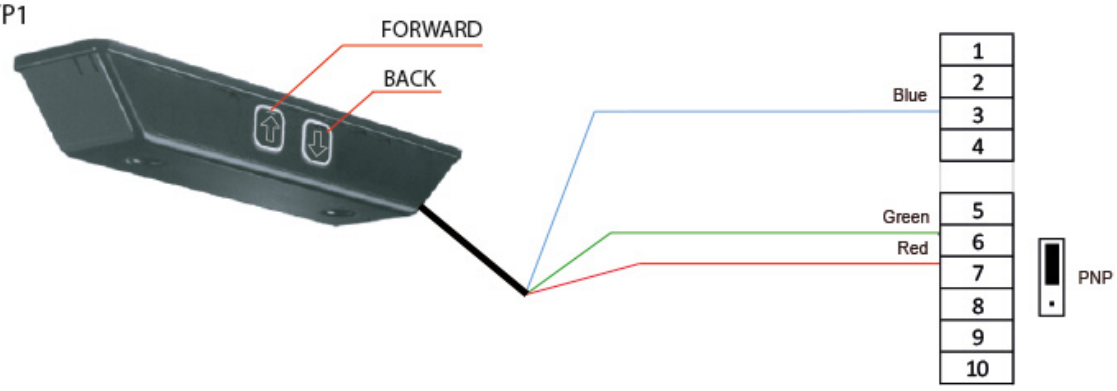
Connection diagram for LINAK control devices

(Cable length max. 5 m)

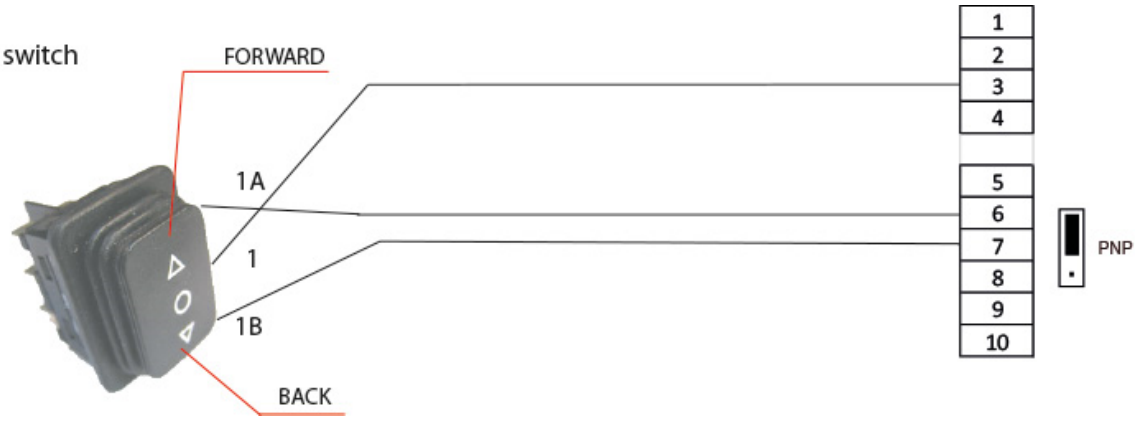
HB41T + HB61T



DP1T + TP1



Rocker switch



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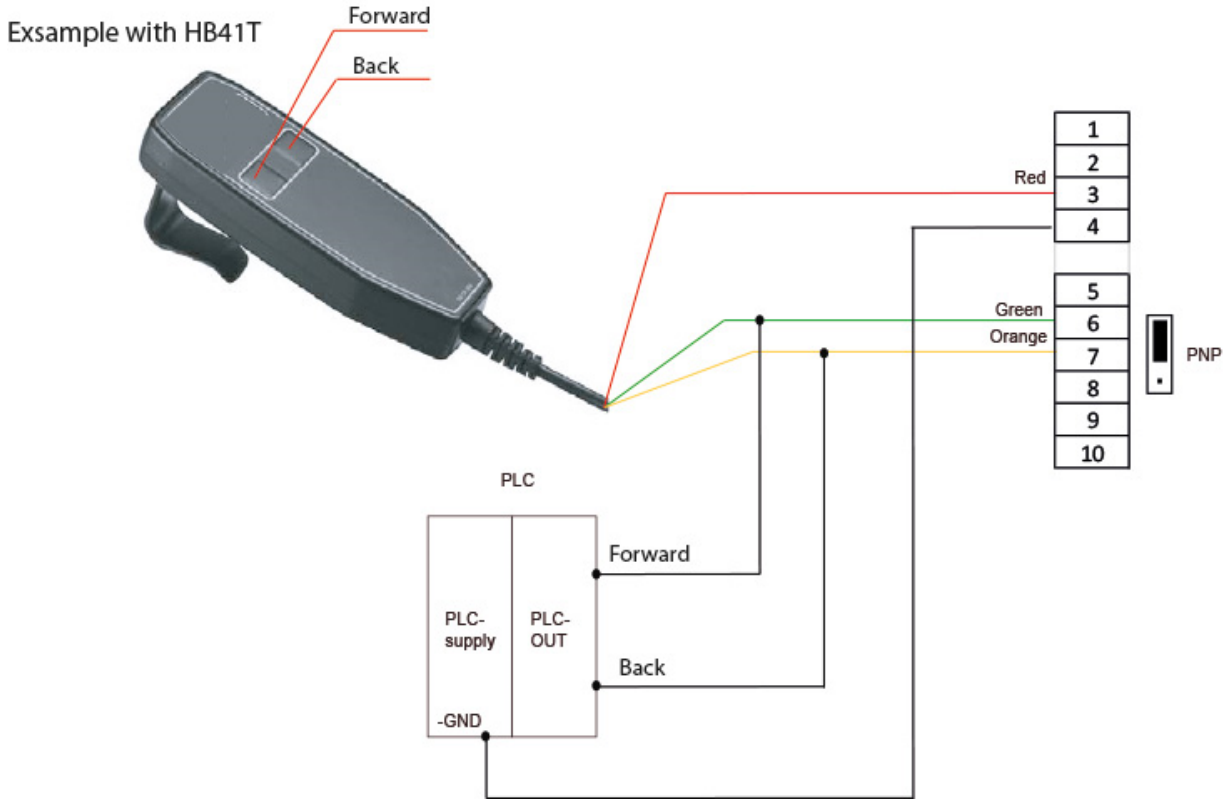
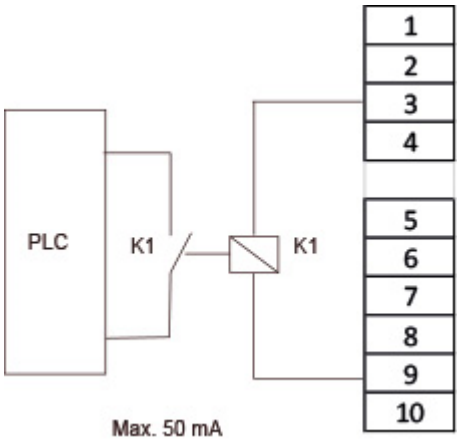
Connection diagram for PLC together with manual hand control

(Manual hand control with cable length above 5 m)

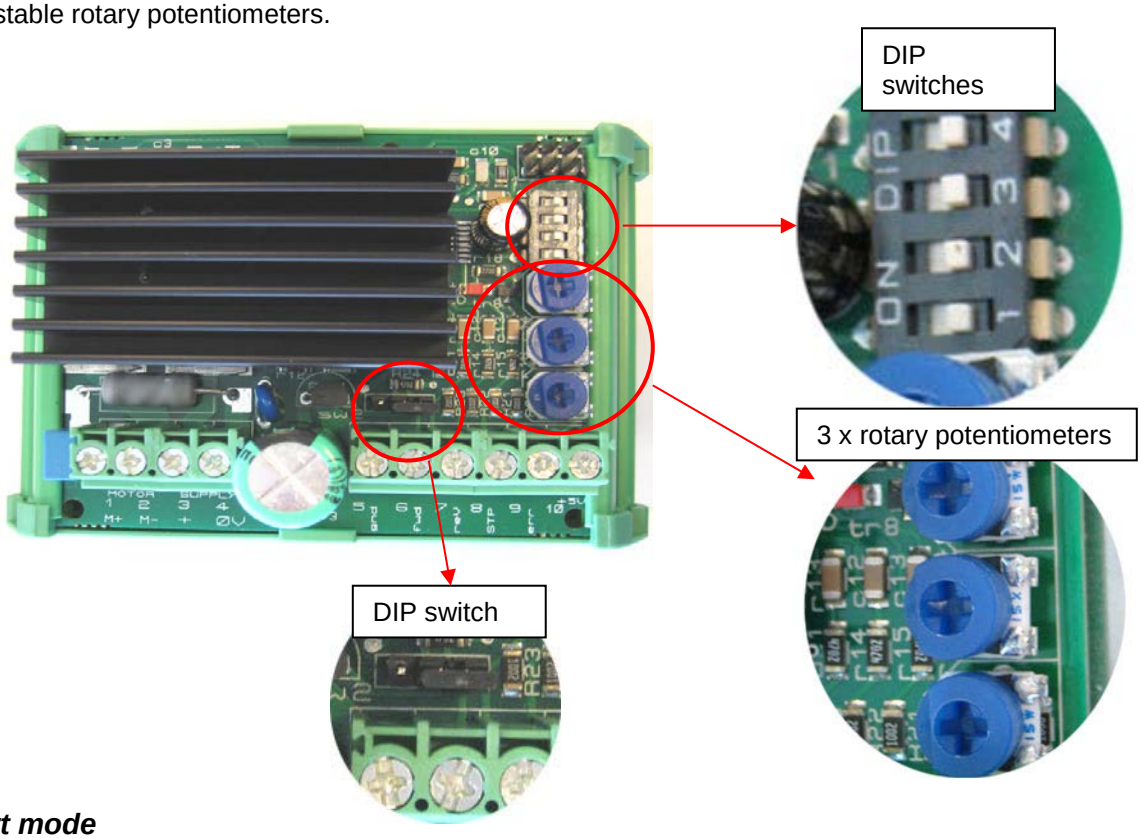


Connection diagram for fault out relais (PLC)



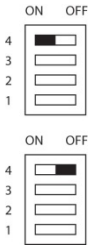
Function settings

The TR-EM-208 motor control unit features a range of parameters that can be set to match the individual application. The settings are entered directly on the PCB using DIP switches and steplessly adjustable rotary potentiometers.



Start mode

DIP switch no. 4 is used to define how the actuator is to be started again following a stop.

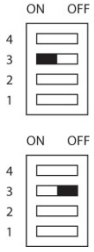


When DIP 4 is set to "ON" the control unit can only be started again after a STOP command or a shut-down due to the max. power limit being exceeded by pressing the ARROW DOWN button.

When DIP 4 is set to "OFF" the control unit can be started again after a STOP command or a shut-down due to the max. power limit being exceeded by pressing either the ARROW UP or the ARROW DOWN button.

Control mode

DIP switch 3 is used to choose between pulse activating and constant activating. In pulse activating mode, the control unit starts the actuator when a button on the control device is activated once, and continues operation until the end stop is reached or shut down is caused by the max. power limit being exceeded. In constant activating mode, the button on the control device must be kept activated constantly to operate the actuator. The actuator will stop when the button is released or in the event of shut down caused by the max. power limit being exceeded.

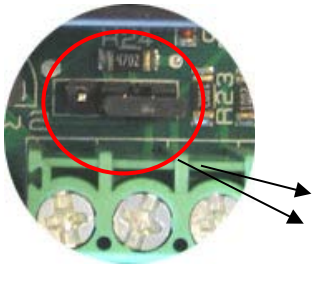


When DIP 3 is set to "ON", the unit is in pulse activating mode. The actuator is stated by pressing ARROW UP or ARROW DOWN once, and continues to operate until STOP, ARROW UP or ARROW DOWN is pressed or until the system shuts down on account of the max. power limit being exceeded.

When DIP 3 is set to "OFF", the unit is in constant activating mode.

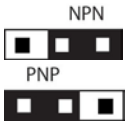
Selection of control logic

CONTROL LOGIC switch gnd/pos logic



Set the control to gnd (NPN) or positive (PNP) control.

If PNP control is selected, the 5 V reference output or external 4–30 V DC can be used.



NB! All LINAK operating units use NPN logic

Max. Power limit

DIP switches 1 and 2 are used to select the adjustment range for shut down due to max. Power limit.

1–5 A: Applies to LA12; LA14; LA23; LA31 and LA35

5–10 A: Applies to LA25; LA28; LA30; LA32; LA34

10–25 A: Applies to LA36 and LA37

The rotary potentiometer is used for fine adjustment of the max. Power limit.

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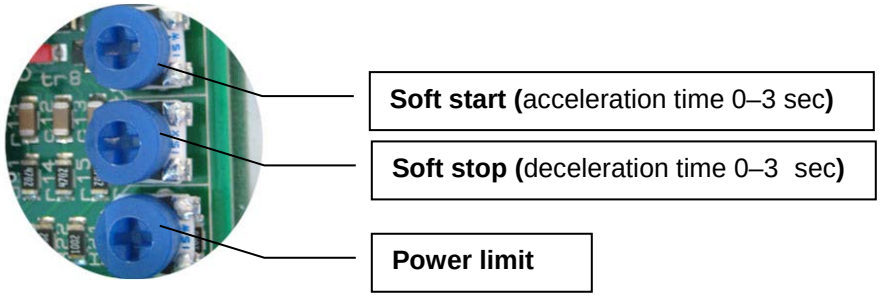
Rotary potentiometers

The rotary potentiometers are used for fine adjustment of the following functions: Soft start (Ramp UP), Soft stop (Ramp DOWN) and max. Power limit. The following observation applies to all three:

Turned counter-clockwise = minimum

Turned clockwise = maximum



NB: If soft start/stop is set to 0 sec, the control commands will be executed immediately, irrespective of the previous command or the command that is executed at the time in question.

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Operation

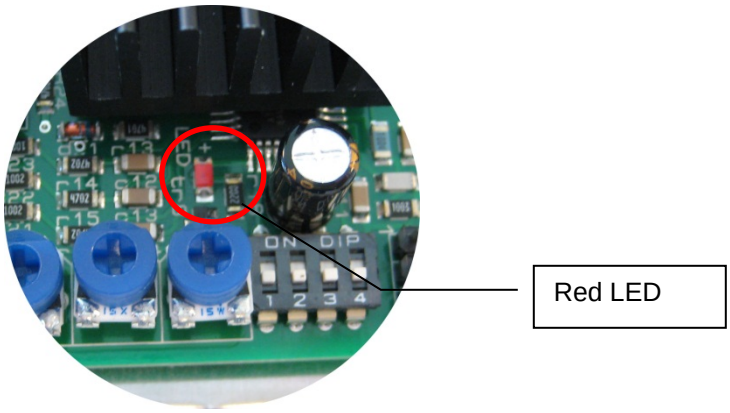
Before starting to use the system, it is important to ensure that the motor control unit has been set correctly according to the above.
If no adjustments are made, the system will use the factory settings.

Stop

The STOP command has highest priority and will be executed even though the command for forward or backward operation has been initiated. After a STOP, it is possible to restart the system in both directions or only in backward direction according to the setting selected.

Troubleshooting

If an error occurs or if the control unit has shut down on account of the max. power limit being exceeded, the actuator will stop operating and the error condition will be indicated by a red LED on the PCB. The LED is visible when the cover of the control unit is removed.



If overheating occurs, the thermal protection will be activated and shut down the control unit. This is indicated by an error message and the error LED flashing.

Disposal of LINAK products

To dispose of LINAK products, start by sorting them into different categories for recycling or incineration. We recommend that you dismantle your product as fully as possible for disposal, and that you reuse the parts. Sorting categories may include:

- metal
- plastic
- cables
- flammable material
- reuse

It is possible to subdivide within some of these categories. For example, “metal” can be subdivided into steel and aluminium, while “plastic” can be divided into ABS and PP. As an example of sorting, the table below illustrates the various categories under which the LINAK components are to be sorted.

Product	Component	Recycling group
Actuator:	Spindle and motor Plastic housing Cable	Metal scrap Plastic recycling or combustion Cable scrap or combustion
Control box:	PC-board Plastic housing Cable Transformer Batteries	Electronics scrap Plastic recycling or combustion Cable scrap or combustion Metal scrap Recoverable resources
Control:	Plastic housing Cable PC-board	Plastic recycling or combustion Cable scrap or combustion Electronics scrap

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