

FERROVAC

ULTRA HIGH VACUUM TECHNOLOGY

DRVRMOTL

Motorized Linear Drive

DRVRMOTL(LV)

Motorized Linear Drive, Light Version

DRVRMOTLR

Motorized Linear and Rotary Drive

DRVRMOTLRR

Motorized Linear and Double Rotary Drive



Manual

Version: 25138_Rev_D [December, 2023]

Ferrovac AG
Thurgauerstrasse 72
CH-8050 Zürich

www.ferrovac.com



Important!

It is the sole responsibility of all users, service engineers and technicians to read the user manual carefully and keep it in a safe place, accessible by all users. Read and strictly follow all safety instructions before using the product described in this document. Ferrovac declines all responsibility and liability for any damage or injuries resulting from incorrect use, non-designated use, adjusting, controlling, altering, or re-programming of the product.

Warranty

Ferrovac warrants this product to be free from defects in material and workmanship for a period of 24 months from the date of shipment. In the event of any such defects, Ferrovac will, at its discretion, either repair or replace the product.

Warranty limitations

This warranty does not apply to defects resulting from the following:

- Failure to observe operational and safety instructions
- Natural wear of components
- Consumables
- Modifications to our products without our written consent
- Misuse of any product or part of the product

This warranty replaces all other warranties, whether implied or expressed, including any implied warranty of merchantability or fitness for a particular use. The remedies provided herein are the buyer's sole and exclusive remedies.

Ferrovac AG and its employees shall not be liable for any direct, indirect, incidental, consequential, or special damages arising from the use of its products, even if Ferrovac AG has been advised of the possibility of such damages. Excluded damages may include, but are not limited to, costs of removal and installation, losses due to injury, or property damage.

Copyright

Copyright © 2023, Ferrovac AG. All rights reserved. The information within this document is the exclusive property of Ferrovac AG, protected by Swiss copyright laws and international conventions. Ferrovac AG allows reproduction solely for the purchaser's personal use. No part of this manual may be reproduced or transmitted in any form or by any means, for any purpose, without the prior written consent of Ferrovac AG.

Content

1. General Information.....	4
1.1. Designated Use.....	4
1.2. Non-Designated Use.....	4
2. Terms and Symbols.....	5
3. General Safety Information.....	6
3.1. Specific Safety Precautions for DRVRMOTL(LV)(R)(R).....	7
3.1.1. Residual risks.....	7
4. About.....	8
4.1. DRVRMOTL.....	8
4.2. DRVRMOTL(LV).....	8
4.3. DRVRMOTLR.....	8
4.4. DRVRMOTLRR.....	8
5. Specifications.....	9
5.1. Naming Conventions and List of Elements.....	9
5.2. Dimensions.....	11
5.3. Facility requirements.....	13
5.4. Configuration.....	14
5.5. Specifications Stepper Motor, Type: ST5918L2008-B.....	15
5.6. Specifications BLDC Motor, Type: DB59S024035-B3.....	15
5.7. Specifications Stepper Motor, Type: ST2818L1404-B.....	15
5.9. Specifications Rotary Actuator / Worm Gear Unit.....	16
6. Unpacking.....	17
7. Installation.....	17
7.1. Pinout.....	18
7.2. Main Interface, D-Sub HD26.....	18
7.3. Handling & Adjusting Of the Limit Switches.....	20
7.3.1. Front Limit Switch.....	20
7.3.2. Back/Rear Limit Switch.....	20
7.3.3. Rotation Limit Switches.....	21
7.3.4. Attachment to Sample Transporter.....	21
8. Operation.....	21
8.1. Bakeout Procedure.....	22
9. Additional Information.....	23
9.1. Return of defective items.....	23
9.2. Options and accessories.....	23
9.2.1. Tube support.....	23
10. Appendix I.....	24

1. General Information

This manual covers crucial details regarding the installation, commissioning, and operation of your DRVRMOTL(LV)(R)(R). It also includes essential safety instructions, maintenance procedures, guidelines for identifying faults, and methods for correcting identified issues.

The described product adheres to relevant national standards and guidelines during its manufacturing. The information provided in this document reflects the product's state at the time of printing and is subject to technical modifications without prior notice. Ferrovac does not guarantee the absolute accuracy or completeness of the contents of this publication. Figures and images included are for reference purposes and may not be binding. Product names used are for identification and might be trademarks of their respective companies.



Important: Read Manuals First!



Before using the product or any related equipment, please thoroughly read all safety instructions and pertinent manuals.

1.1. Designated Use

This document specifies the intended application of the product, defined by the following criteria:

The product must be:

- Used with original cable sets supplied by Ferrovac explicitly specified for this product.
- Operated indoors, within a research laboratory, or an industrial facility.
- Handled by personnel qualified for operating delicate scientific equipment.
- Used in strict accordance with all related manuals.











1.2. Non-Designated Use

Non-designated use is defined if any of the following conditions are met:

- Using the product with equipment not explicitly acknowledged by Ferrovac in writing.
- Operating the product outdoors or in conditions beyond specified ambient values.
- Employing the product with unqualified personnel.
- Ignoring the safety instructions during operation.

Operating the product with disabled, modified, removed, or damaged safety equipment and -devices.

2. Terms and Symbols

Symbol	Term	Meaning
	Danger!	Risk of mortal danger or severe injury when not observed
	Warning!	Risk of severe injury, danger to life and risk of damage when not observed
	Caution!	Risk of injury or damage to equipment when not observed
	High Voltage!	Presence of potentially lethal voltages
	Warning: Hand Injury!	Potential risk of hand injuries and crush injuries to extremities if not careful.
	Cryogenic Substance!	Potential risk of cold burn hazard and danger to life when not observed
	Hot Surface!!	Potential risk of fire hazard and injury when not observed
	Important!	Important information for safe operation of the equipment
	Information!	Useful information, hints, and clues
	First Read Manual!	Mandatory study of all relevant manuals

3. General Safety Information

Carefully review the safety instructions before using the product detailed in this manual and any associated instrumentation. Adhere strictly to all safety precautions.

Familiarize yourself with this manual to operate the product correctly. Store this manual near the product and inform all users of its location. Ensure this manual is passed on when transferring the product to third parties.

The responsible body refers to individuals or a group accountable for the proper use and maintenance of the product within its specifications. This entity must ensure adequate training for users.

Operators must use the product for its intended purpose and receive training in electrical safety, handling cryogenic liquids (if applicable), and using scientific instruments safely. They must be protected from electric shock and other hazardous situations.

Maintenance Personnel perform routine tasks to maintain the product's operating condition, such as adjusting line voltage or replacing consumables, following procedures outlined in this manual.

Service Personnel are qualified to work on live circuits, handle cryogenic liquids (if applicable), conduct fault finding, and perform repairs. Only fully trained service personnel qualified to manage potentially lethal voltages should perform servicing and repairs.

Shock hazard: Hazardous voltages are considered present when voltage levels exceed 30 V RMS, 42.2 V peak, or 60 VDC, according to the American National Standards Institute. Assume the presence of hazardous voltages in any unknown circuitry as a safety precaution.

Hand Injury Warning: Hand Injury Warning: Exercise caution to prevent hand injuries and crush injuries while handling the product. Due to the presence of moving components, ensure that no objects or body parts come into contact with the moving and/or fixed components.



Important: Ambient conditions and environment!

This product is only to be used indoors, in locations meeting the following requirements:

- Room temperature should range between 15°C and 35°C.
- Humidity should range between 30% and 75%.
- Altitudes up to 2000m are acceptable.
- Pollution Degree 2 environments are suitable.

3.1. Specific Safety Precautions for DRVRMOTL(LV)(R)(R)

The products detailed in this manual should only be operated by qualified personnel who are aware of potential shock hazards and well-versed in the necessary precautions to prevent injury.



Warning: Electrical Safety!

- Always adhere to and strictly follow the safety guidelines provided in this document.
- Check for correct mains voltage before connecting any equipment!
- Mains supply voltage fluctuation must not exceed $\pm 10\%$ of the nominal voltage.
- Use the originally provided cables for all electrical connections.
- Turn off the device before disconnecting any cables.
- Avoid operating the device outside its designated environment.
- DO NOT ATTEMPT TO OPEN the device unless you are a fully trained service personnel familiar with live circuits and potentially lethal voltages.



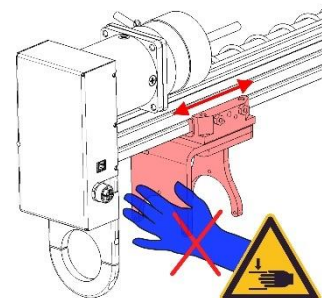
Warning: Hand Injury!

- Always adhere to and strictly follow the safety guidelines provided in this document.
- Avoid placing your hands and objects in hazardous areas, especially during machine operation or near moving parts.
- Use protective gear such as gloves or safety gloves when working with potentially sharp or hazardous objects.
- Ensure that machines or equipment are powered off and disconnected from the mains before performing maintenance.
- Avoid wearing loose clothing, jewelry, or long hair near rotating/moving machine parts to prevent entanglement.
- Exercise caution when handling sharp objects or tools and avoid placing your hands near them.
- Observe all warning signs and safety instructions posted on machines or in hazardous work areas.

3.1.1. Residual risks

Despite careful engineering and implementation of safety measures, residual risks may still exist, potentially leading to injuries. Be aware of the risk of hand or extremity injuries, especially near moving parts.

Take appropriate precautions to mitigate these risks and prevent injuries. Even with these precautions, accidents can occur if safety instructions are not followed. Ensure they use the product properly and adhere to all necessary safety measures to minimize the risk of injuries. Inform all persons about this residual risk who will work with this product!



4. About

This manual pertains to a motorization kit developed for Ferrovac sample transporters. The motorization kit enhances the functionality of Ferrovac sample transporters by enabling motorized movement. Depending on specific requirements and application scenarios, the motorization kit is available in several versions:

4.1. DRVRMOTL

The DRVRMOTL is a stepper motor-driven linear and manual rotary drive designed to operate sample transporters and optionally attached sample locking mechanisms such as a pincer grip. Compatible with RM40, RMHS40, RMJ40, RMD40, RMJG40 and RMDG40 sample transporters, it allows for manual rotation of the shaft for sensitive sample handling or when opening/closing the pincer. Rotation can be locked using a thumbscrew.



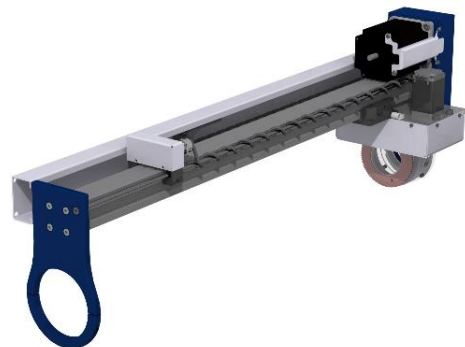
4.2. DRVRMOTL(LV)

The DRVRMOTL(LV) is a light version of the DRVRMOTL motorization, optimized for simple linear motion applications in vacuum environments. This version employs a BLDC motor, prioritizing speed over precision, making it suitable for basic linear movement tasks. The mounting of the magnetic coupling is less precise, aimed at reducing weight and costs without compromising essential functionality. Designed for straightforward usage scenarios, the DRVRMOTL(LV) facilitates simple linear motion in vacuum environments where precise positioning is not critical.



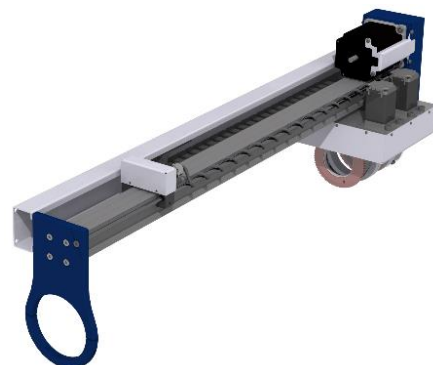
4.3. DRVRMOTLR

The DRVRMOTLR is a stepper motor-driven linear and rotary drive designed to operate sample transporters and optionally attached sample locking mechanisms. Compatible with RM40, RMHS40, RMJ40, RMD40, RMJG40 and RMDG40 sample transporters, it enables fully motorized single rotation and linear movement, facilitating easy opening/closing of pincers or rotation of the sample carrier from a workstation.



4.4. DRVRMOTLRR

The DRVRMOTLRR is a stepper motor-driven linear and double rotary drive designed for RMJG40 and RMDG40 sample transporters, featuring two rotatable axes. Offering fully motorized double rotational axis and linear movement, it allows effortless opening/closing and rotation of pincers or the sample carrier from a workstation.



5. Specifications



Important: Subject to Variation in Specifications!

The specifications provided in this manual are accurate at the time of printing. Installation of options or accessories may alter these specifications.

5.1. Naming Conventions and List of Elements

DRVRMOTL

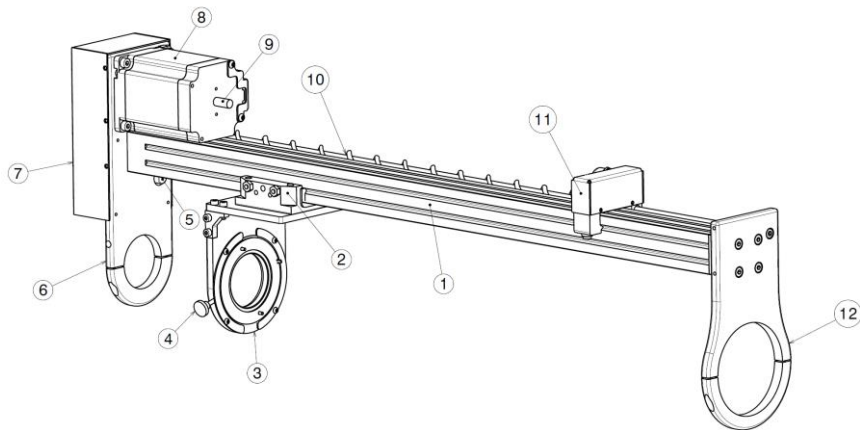


Figure 1: Naming Conventions DRVRMOTL

List of Elements:

- | | |
|------------------------------------|--------------------------------------|
| 1. Linear Drive Spindle Unit | 7. Cable / Gearbox Housing |
| 2. Linear Carrier | 8. Linear Actuator Stepper Motor |
| 3. Magnet Pickup Adapter | 9. Motor Shaft Extension |
| 4. Knurled Rotational Lock Screw | 10. Cable Guide |
| 5. Limit Switch (Back) | 11. Limit Switch (Front) |
| 6. Sample Transporter Clamp (Back) | 12. Sample Transporter Clamp (Front) |

DRVRMOTL(LV)

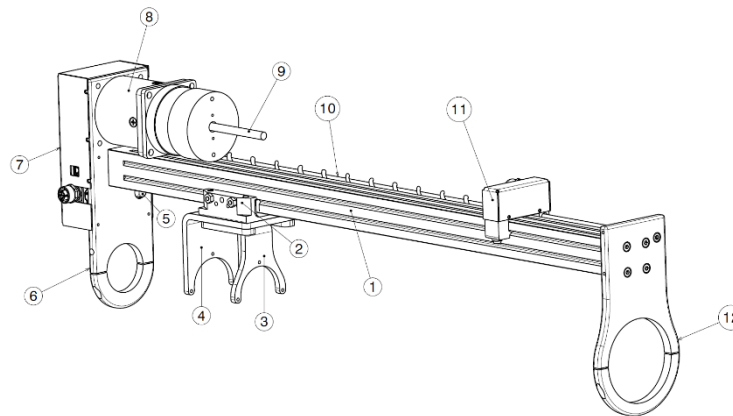


Figure 2: Naming Conventions DRVRMOTL(LV)

List of Elements:

- | | |
|------------------------------------|--------------------------------------|
| 1. Linear Drive Spindle Unit | 7. Cable / Gearbox Housing |
| 2. Linear Carrier | 8. Linear Actuator BLDC Motor |
| 3. Magnet Pickup Bracket 1 | 9. Motor Shaft Extension |
| 4. Magnet Pickup Bracket 2 | 10. Cable Guide |
| 5. Limit Switch (Back) | 11. Limit Switch (Front) |
| 6. Sample Transporter Clamp (Back) | 12. Sample Transporter Clamp (Front) |

DRVRMOTLR

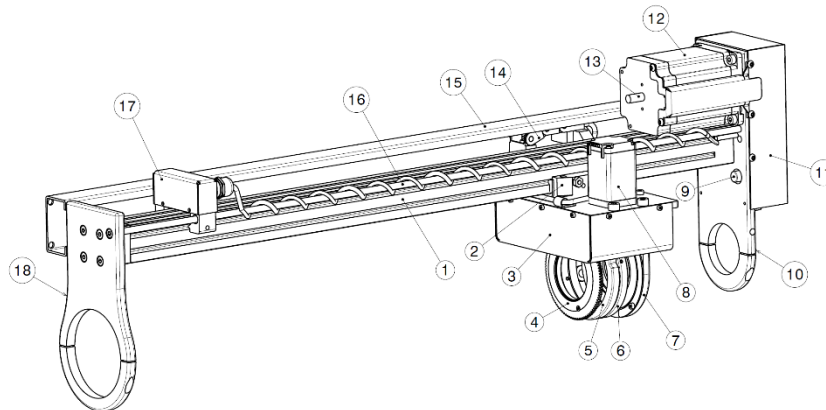


Figure 3: Naming Conventions DRVRMOTLR

List of Elements:

- | | |
|--|--------------------------------------|
| 1. Linear Drive Spindle Unit | 10. Sample Transporter Clamp (Back) |
| 2. Linear Carrier | 11. Cable / Gearbox Housing |
| 3. Worm-Gearbox Housing | 12. Linear Actuator Stepper Motor |
| 4. Worm wheel | 13. Motor Shaft Extension |
| 5. Rotation Limit Switch Actuator 2 | 14. Cable Carrier/Chain |
| 6. Rotation Limit Switch Actuator 1 | 15. Cable Carrier/Chain Guide Rail |
| 7. Magnet Pickup Adapter
(w. Knurled Rotational Lock Screw) | 16. Cable Guide |
| 8. Rotary Actuator Stepper Motor | 17. Limit Switch (Front) |
| 9. Limit Switch (Back) | 18. Sample Transporter Clamp (Front) |

DRVRMOTLRR

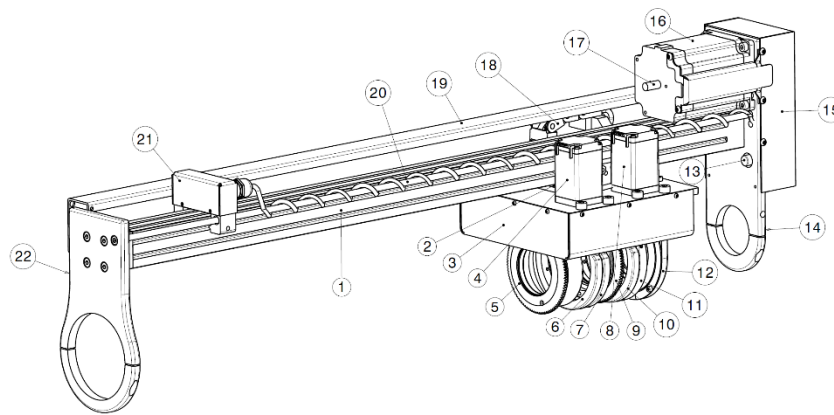


Figure 4: Naming Conventions DRVRMOTLR

List of Elements:

- | | |
|--|--|
| 1. Linear Drive Spindle Unit | 12. Magnet Pickup Adapter (w. Knurled Rotational Lock Screw) |
| 2. Linear Carrier | 13. Limit Switch (Back) |
| 3. Worm-Gearbox Housing | 14. Sample Transporter Clamp (Back) |
| 4. Rotary Actuator Stepper Motor 2 | 15. Cable / Gearbox Housing |
| 5. Worm Wheel 2 | 16. Linear Actuator Stepper Motor |
| 6. Rotation Limit Switch Actuator 2.2 | 17. Motor Shaft Extension |
| 7. Rotation Limit Switch Actuator 2.1 | 18. Cable Carrier/Chain |
| 8. Rotary Actuator Stepper Motor 1 | 19. Cable Carrier/Chain Guide Rail |
| 9. Worm Wheel 1 | 20. Cable Guide |
| 10. Rotation Limit Switch Actuator 1.2 | 21. Limit Switch (Front) |
| 11. Rotation Limit Switch Actuator 1.1 | 22. Sample Transporter Clamp (Front) |

5.2. Dimensions

DRVRMOTL

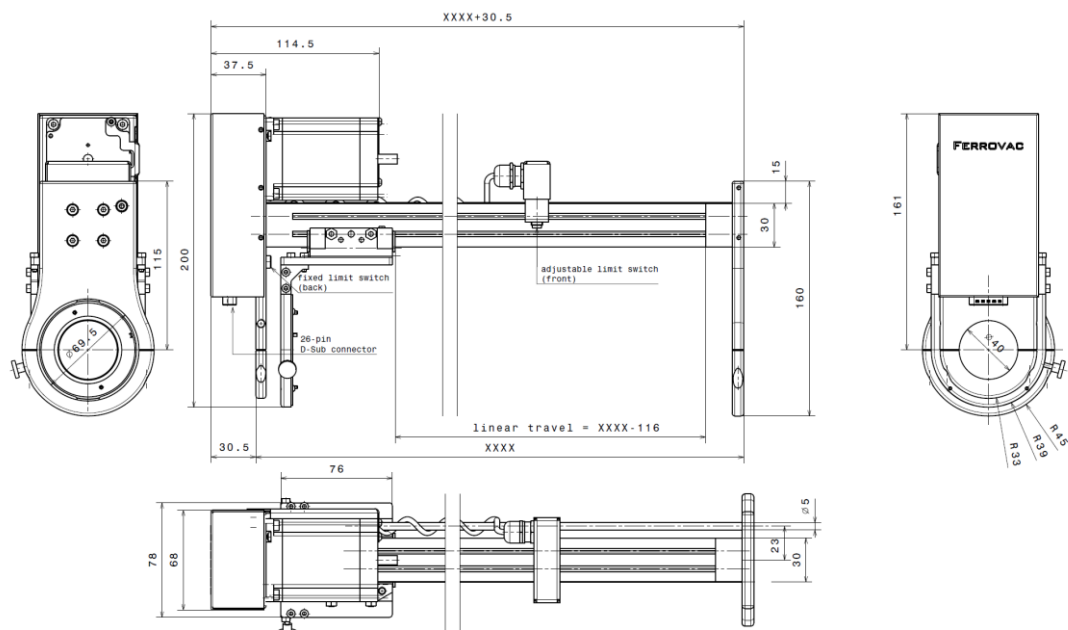


Figure 5: Dimensions DRVRMOTL

DRVRMOTL(LV)

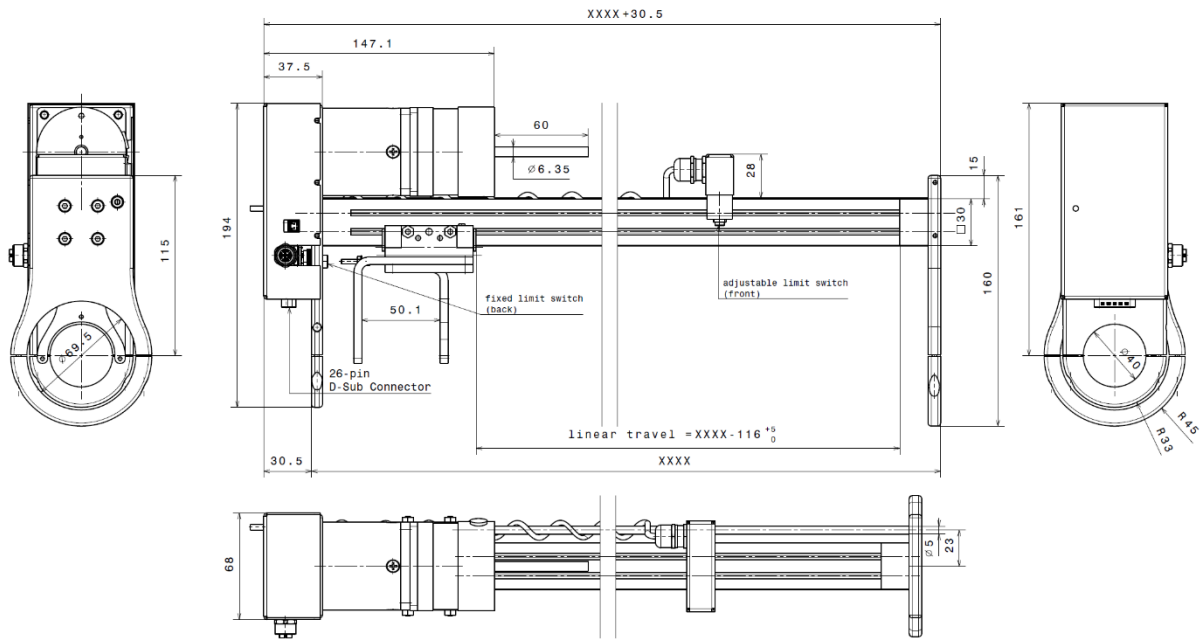


Figure 6: Dimensions DRVRMOTL(LV)

DRVRMOTLR

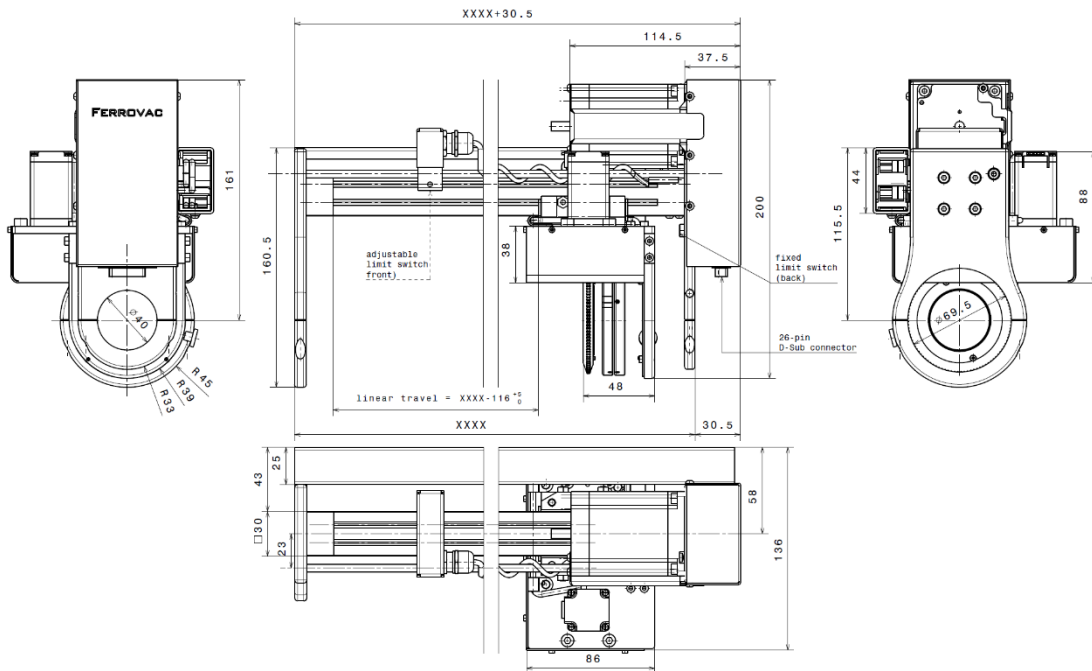


Figure 7: Dimensions DRVRMOTLR

DRVRMOTLRR

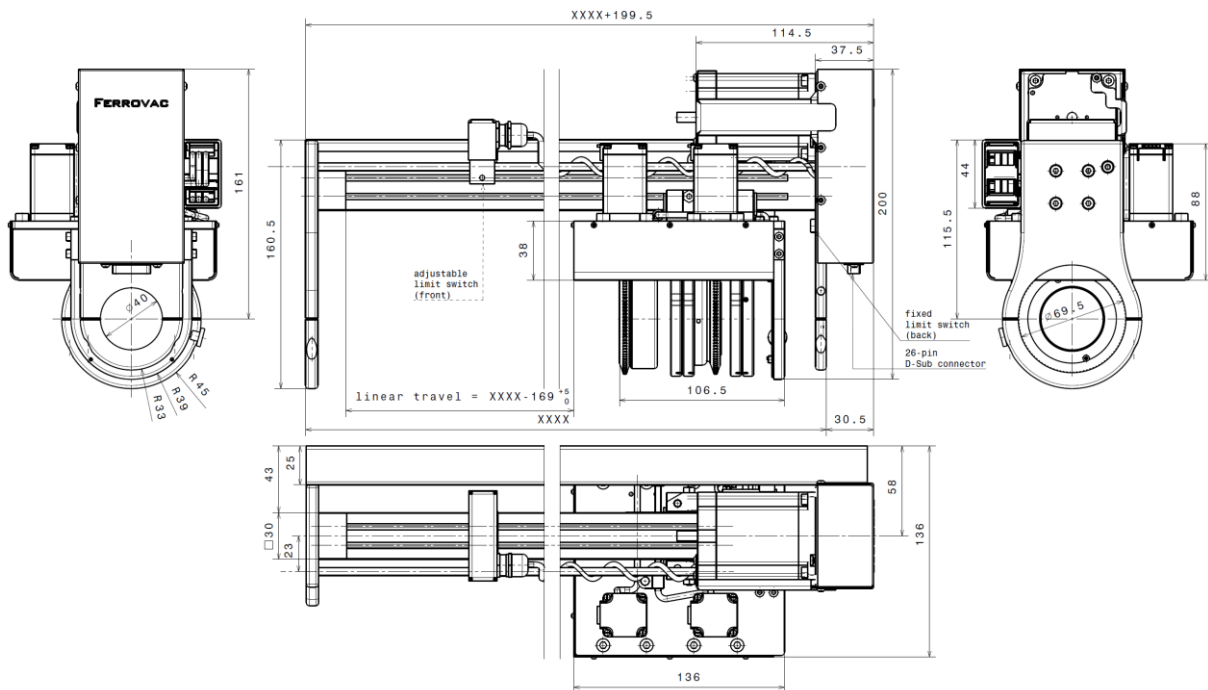


Figure 8: Dimensions DRVRMOTLRR

5.3. Facility requirements

Before installing and operating the equipment, it is crucial to ensure that the facility meets certain mandatory requirements. This section outlines the necessary environmental conditions and infrastructure needed for the safe and efficient operation of the product.

Environmental Conditions:

Please refer to Section 3. General Safety Information, for the accurate environmental conditions.

Mandatory Infrastructure:

Ferrovac Sample transporter: This product is an option/accessory designed for use with Ferrovac Sample Transporters. Each motorized equipment mentioned in this manual needs to be ordered together with a sample transporter. Ferrovac does not recommend self-retrofitting motorization of a sample transporter. If retrofitting is required, please contact Ferrovac to ascertain feasibility for returning and retrofitting and/or ensure the necessary technical skills are available on-site.

Controllers, Programming, and System Integration: Due to the varying requirements of interfaces and internal regulations at our customers' universities, institutes, and companies, Ferrovac does not offer controllers, programming, or any kind of system integration. The resources required for accommodating all these diverse requirements would be too extensive.

Stepper Motor Controller: A suitable commercial stepper motor controller is necessary for the operation of the equipment. It must meet the specifications of the product. One recommended manufacturer for such controllers is "GALIL Motion Control."

Wiring/Cables: Please contact your internal technical department and specialists responsible for electronics and control to integrate the device into your system. Technical information can be found in the relevant chapters of this manual.

5.4. Configuration

Each motorized drive follows a similar setup with built-in elements and types specific to the respective models:

DRVRMOTL

- Interfaces:
 - 1x Main Interface: D-Sub HD26
- 1x Linear Actuator
 - 1x Spindle Drive unit
 - 1x Stepper Motor, Type: ST5918L2008-B
 - 1x Limit Switch (Back)
 - 1x Limit Switch (Front)
- rotation effected manually (by hand) or blocked

DRVRMOTL(LV)

- Interfaces:
 - 1x Main Interface: D-Sub HD26
 - 1x Enable Switch Interface
 - 1x Key-Panel Interface
- 1x Linear Actuator
 - 1x Spindle Drive unit
 - 1x BLDC Motor, Type: DB59S024035-B3 with Gear GP56-N1-4-SR
 - 1x Limit Switch (Back)
 - 1x Limit Switch (Front)
- rotation blocked (adjustment possible manually)

DRVRMOTLR

- Interfaces:
 - 1x Main Interface: D-Sub HD26
- 1x Linear Actuator
 - 1x Spindle Drive unit
 - 1x Stepper Motor, Type: ST5918L2008-B
 - 1x Limit Switch (Back)
 - 1x Limit Switch (Front)
- 1x Rotary Actuator
 - 1x Spur Gear & Worm gear Unit
 - 1x Stepper Motor, Type: ST2818L1404-B
 - 1x Rotation Limit Switches

DRVRMOTLRR

- Interfaces:
 - 1x Main Interface: D-Sub HD26
- 1x Linear Actuator
 - 1x Spindle Drive unit
 - 1x Stepper Motor, Type: ST5918L2008-B
 - 1x Limit Switch (Back)
 - 1x Limit Switch (Front)
- 2x Rotary Actuator
 - 2x Spur Gear & Worm gear Unit
 - 2x Stepper Motor, Type: ST2818L1404-B
 - 4x Rotation Limit Switches

5.5. Specifications Stepper Motor, Type: ST5918L2008-B

The models which are equipped with a linear actuator driven by stepper motors, Type: ST5918L2008, manufactured by Nanotec, feature the following specifications:

- Model: ST5918L2008
- Motor Type: Stepper Motor
- Rated Voltage: 24 - 48 V
- Rated Current: 2 A (Bipolar: Series = 1.41 | Parallel = 2.82 A)
- Rated Power: Not specified in provided datasheet
- Rated Torque (Bipolar): 1.87 Nm
- Rated Speed: Approximately...
 - 225 RPM / 1.83Nm (@2.8A 48V parallel)
 - 937.5 RPM / 0.694 Nm (@2.8A 48V parallel)

For more detailed specifications refer to appendix 1, ST5918L2008-B.pdf, original Datasheet from Nanotec, of this Manual.

5.6. Specifications BLDC Motor, Type: DB59S024035-B3

The models which are equipped with a linear actuator driven by BLDC motors, Type: DB59S024035-B3, manufactured by Nanotec, feature the following specifications:

- Model: DB59S024035-B3
- Motor Type: BLDC Motor
- Pre-assembled Gear Type: GP56-N1-4-SR with integrated 5V Hall Sensor
- Rated Voltage: 24 V
- Rated Current: 5 A
- Rated Power: 84 W
- Rated Torque: Approximately 0.78 Nm (including gearbox)
- Rated Speed: Approximately 884 RPM (including gearbox)

For more detailed specifications, please refer to appendix 2, DB59S024035-B3.pdf, the original datasheet from Nanotec, included in this manual.

5.7. Specifications Stepper Motor, Type: ST2818L1404-B

The models which are equipped with a linear actuator driven by stepper motors, Type: ST2818L1404-B, manufactured by Nanotec, feature the following specifications:

- Model: ST2818L1404-B
- Motor Type: Stepper Motor
- Rated Voltage: 12 - 48 V
- Rated Current: 1.4 A
- Rated Power: Not specified in provided datasheet
- Rated Torque: 0.117 Nm
- Rated Speed: Approximately...
 - 200 RPM / 0.128 Nm (@1.4A 12V)
 - 1000 RPM / 0.056 Nm (@1.4A 12V)
 - 1000 RPM / 0.114 Nm (@1.4A 24V)
 - 1000 RPM / 0.110 Nm (@1.4A 48V)

For more detailed specifications refer to appendix 3, ST2818L1404-B.pdf ,original Datasheet from Nanotec, of this Manual.

5.8. Specifications Linear Actuator/Spindle Drive Unit

The spindle drive unit of the motorized drives facilitates linear motion. Below are the specifications for the spindle drive unit used in the motorized drives:

- Accuracy: ± 0.1 mm / 300 mm
- Toothed Belt Transmission Ratio: 1:1
- Pitch: 3 mm
- Max. speed: ¹
 - With stepper motor ST5918L2008-B: ~ 25 mm/s
 - With BLDC motor DB59S024035-B3: ~ 44 mm/s
- Spindle Type: Trapezoidal lead screw
- Self-locking: Yes
- Limit switches:
 - Front:
 - adjustable position
 - reed switch
 - Back:
 - fixed position (@0mm)
 - push button/switch

5.9. Specifications Rotary Actuator / Worm Gear Unit

The spindle drive unit of the motorized drives facilitates linear motion. Below are the specifications for the spindle drive unit used in the motorized drives:

- Accuracy: $\pm 36''$
- Max. speed: ¹
 - With stepper motor ST2818L1404-B: $\sim 60^\circ$ /s
- Worm Gear Transmission Ratio: 1:100
- Self-locking: Yes
- Spur Gear Transmission Ratio: 1:1
- Limit switches: per rotation axis two micro switches with adjustable actuator ring for individual detection position

¹ The provided information is without guarantee, as the actual speed depends on various factors such as system configuration and control type

6. Unpacking

Before unpacking, visually inspect the parcel. If any damage is detected, take photographs of the parcel, and immediately notify Ferrovac. Verify the package contents for completeness based on the delivery note or commercial invoice. Any damages or missing items must be reported to Ferrovac within one week of delivery.



Caution: Special Requirements for the Working Environment!

Provide a safe and clean workspace in a laboratory before unpacking, inspecting, and using any kind of equipment provided by Ferrovac:

- Ensure that the workspace is clear of obstructions and provides adequate space for safe handling of delicate scientific instrumentation.
- Provide a sufficiently large and clean table.
- Provide a clean set of tools free of any grease and dust.
- Wear surgical gloves while working.
- Provide lint free tissues and keep a small bottle of isopropanol or ethanol within reach.
- Do not use aggressive chemicals or strong solvents such as acetone.

7. Installation



Caution: Mandatory initialization and adjustment

Failure to perform the required initialization and adjustment procedures following a shutdown can result in equipment damage. Strict adherence to these steps is vital for safe and efficient system operation. Non-compliance with the recommended initialization and adjustment procedures relieves Ferrovac from liability for equipment damage or operational issues.

7.1. Pinout

7.2. Main Interface, D-Sub HD26

Each motorized drive for sample transporter has the same Main interface which is a high density 26-pin (HD26) D-Sub connector. The Pinout of each model is quite similar and is described according the following pinout tables.

D-Sub HD26 Pin #	Function		
	DRVRMOTL	DRVRMOTLR	DRVRMOTLRR
1	Linear Motor (A)	Linear Motor (A)	Linear Motor (A)
2	Linear Motor (A*)	Linear Motor (A*)	Linear Motor (A*)
3	Linear Motor (B*)	Linear Motor (B*)	Linear Motor (B*)
4		Rotary Motor (A)	Rotary Motor 1 (A)
5			Rotary Motor 2 (A)
6		Rotation Limit Switch 1	Rotation Limit Switch 1.2
7		Rotation Limit Switch 2	Rotation Limit Switch 1.1
8	Limit Switch (Back) 1	Limit Switch (Back) 1	Limit Switch (Back) 1
9	Limit Switch (Front)	Limit Switch (Front)	Limit Switch (Front)
10	Linear Motor (A)	Linear Motor (A)	Linear Motor (A)
11	Linear Motor (A*)	Linear Motor (A*)	Linear Motor (A*)
12	Linear Motor (B)	Linear Motor (B)	Linear Motor (B)
13		Rotary Motor (A)	Rotary Motor 1 (A)
14			Rotary Motor 2 (A)
15		Rotation Limit Switch 1	Rotary Motor 2 (B)
16		Rotation Limit Switch 2	Rotation Limit Switch 1.1 & 1.2
17	Endswitch (Back) 2	Endswitch (Back) 2	Endswitch (Back) 2
18	Limit Switch (Front)	Limit Switch (Front)	Limit Switch (Front)
19	Linear Motor (B)	Linear Motor (B)	Linear Motor (B)
20	Linear Motor (B*)	Linear Motor (B*)	Linear Motor (B*)
21		Rotary Motor (B)	Rotary Motor 1 (B)
22		Rotary Motor (B)	Rotary Motor 1 (B)
23			Rotary Motor 2 (B)
24		Rotation Limit Switch 1	Rotation Limit Switch 2.1
25		Rotation Limit Switch 2	Rotation Limit Switch 2.1 & 2.2
26	Limit Switch (Front)	Limit Switch (Front)	Rotation Limit Switch 2.2

Tabella 1: Pinout DRVRMOTL(R)(R)

The details provided in this table are also depicted in the drawings accompanying each model. Please refer to Appendix 4, 6 and 7 for additional information.

The light version of the DRVRMOTL, the DRVRMOTL(LV), with the BLDC Motor, has some notable differences, particularly in its pinout configuration, as outlined in the following table:

D-Sub HD26 Pin #	Function		
	DRVRMOT(LV)		
1	BLDC Motor (Phase 1)		
2	BLDC Motor (Phase 3)		
3			
4	HALL Sensor (HALL 1)		
5	HALL Sensor (GND)		
6	Key Panel (Up)		
7	Key Panel (Down)		
8	Back Limit SW (Normally Close)		
9	Front Limit SW (Normally Close)		
10	BLDC Motor (Phase 2)		
11			
12			
13	HALL Sensor (HALL 2)		
14	HALL Sensor (+5VDC)		
15	Key Panel LED (Up Button)		
16	Key Panel LED (Down Button)		
17	Back Limit SW (+5VDC)		
18	Enable SW (+5VDC)	Front Limit SW	Back Limit SW
19			
20			
21	HALL Sensor (HALL 3)		
22	Key Panel LED (P/V Button)		
23	Key Panel (Pump/Vent)		
24	Key Panel (GND)		
25	Enable SW (Normally Open)		
26	Front Limit SW (Normally Open)		

Tabella 2: Pinout DRVRMOTL(LV)

The details provided in this table are also depicted in the drawings accompanying for this model. Please refer to Appendix 5 for additional information.

7.3. Handling & Adjusting Of the Limit Switches



Warning: Hand Injury!

- Always adhere to and strictly follow the safety guidelines provided in this document.
- Avoid placing your hands and objects in hazardous areas, especially during machine operation or near moving parts.
- Use protective gear such as gloves or safety gloves when working with potentially sharp or hazardous objects.
- Ensure that machines or equipment are powered off and disconnected from the mains before performing maintenance.
- Avoid wearing loose clothing, jewelry, or long hair near rotating/moving machine parts to prevent entanglement.
- Exercise caution when handling sharp objects or tools and avoid placing your hands near them.
- Observe all warning signs and safety instructions posted on machines or in hazardous work areas.

7.3.1. Front Limit Switch

All Ferrovac sample transporter motorizations are equipped with an adjustable front limit switch, enabling users to customize the maximum extended length of the transporter to their preference. To make adjustments, simply loosen the small M4 grub screw located on the side of the limit switch housing.

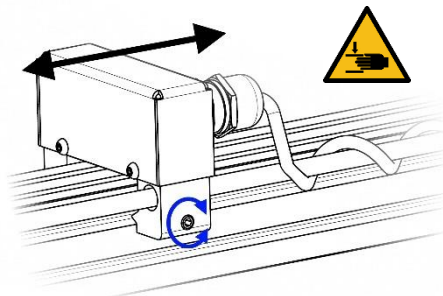


Figure 9: Front Limit Switch Adjustment

This switch is a reed switch, activated by a magnetic field. It will typically be wired as normally closed and open when activated (when the desired position is reached).

7.3.2. Back/Rear Limit Switch

The rear limit switch is located at the rear end of the motorization, directly under the Linear Drive Spindle Unit. Please note that its position is not adjustable.

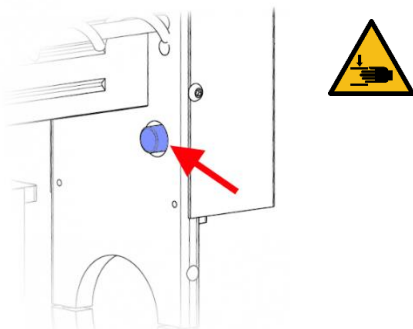


Figure 10: Back Limit Switch

7.3.3. Rotation Limit Switches

Each rotational axis/unit is equipped with two limit switches, indicating the starting and ending positions. The starting and ending angles can be easily adjusted to specific requirements using three grub screws per position.

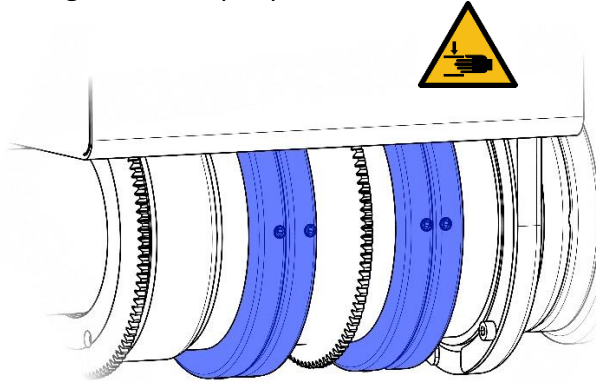


Figure 11: Limit Switch Rotation

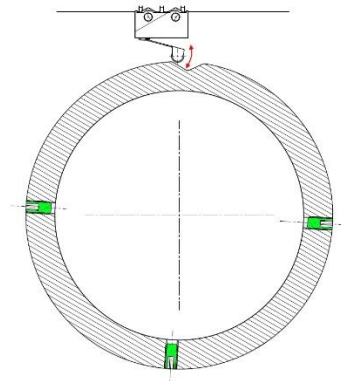


Figure 12: Limit Switch Rotation Function

7.3.4. Attachment to Sample Transporter

The products outlined in this manual, along with their assorted variations, are typically supplied with a sample transporter or are available only in conjunction with one. Attachment to a sample transporter is thus generally not feasible on-site, or if so, only exceptionally and after consulting with Ferrovac. However, the DRVRMOTL(LV) product is straightforward enough to be offered as a retrofit option, allowing for independent installation. The steps outlined in Chapter XXX can be followed for this purpose.

8. Operation

Given that the product, along with its scope of delivery, does not encompass any control mechanisms or power supply, it remains incomplete until integrated into a larger system. Consequently, specific operational instructions for this product are not provided, as it necessitates external components to be fully functional.

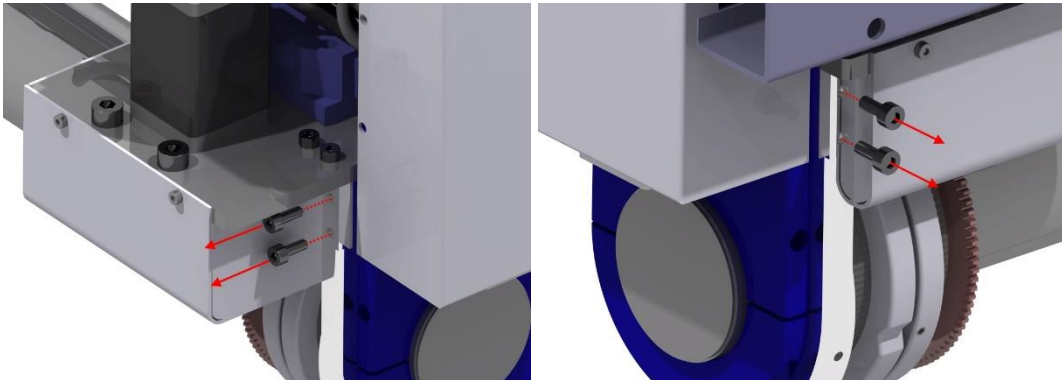
For guidance on the integration and control aspects of your setup, please consult with the individual responsible for system integration and control within your team or organization. They will provide the necessary instructions tailored to your specific setup requirements.

8.1. Bakeout Procedure

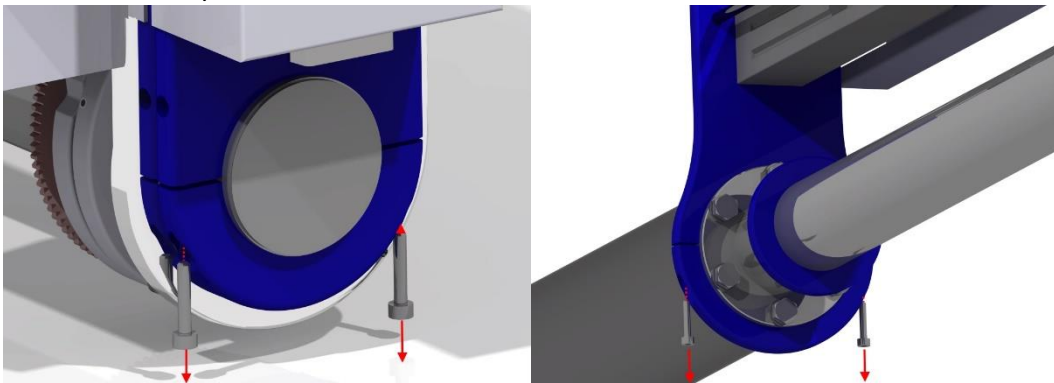
In ultra-high vacuum (UHV) technology, a heating process known as "bakeout" is occasionally employed to enhance vacuum quality by subjecting chamber and components interfacing with the vacuum environment to temperatures exceeding 100°C. However, components within the product described in this manual are not designed to withstand such high temperatures and may incur damage.

Therefore, it is imperative to disassemble the motorization unit of the sample transporter before initiating the heating process. This can be achieved by following these steps:

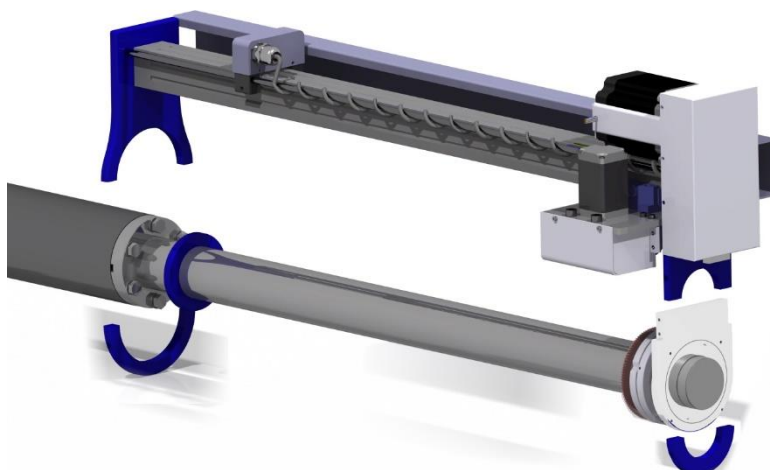
1. Unscrew the two screws located on the left and right sides of the guide carriage.
(**Note:** The DRVRMOTL(LV) model does not have these screws. Here, you can simply loosen the fixing screws at the front metal sheet bracket that holds the magnet in position.)



2. Remove the two screws located at the front and back of the motorization. It's crucial not to perform this step alone. Work as a pair: one person holds the motorization steady while the other person unscrews the screws.



3. Carefully lift the entire motorization unit.



9. Additional Information

9.1. Return of defective items



Important: No unauthorized return of material!

- Do not return any equipment to our factory without a return of materials authorization (RMA)!
- You are obliged to provide a completed Declaration of Contamination form.
- Note: Parcels will not be opened if the Declaration of Contamination is missing

9.2. Options and accessories

9.2.1. Tube support

Please take care when dealing with long configurations (>450mm). The sample transporter and its motorization face a risk due to their own weight and the long overhang. The leverage generated by heavy loads can result in shaft bending or flange breakage. Ferrovac offers various support solutions that can be effortlessly affixed to the blue plate at the motorization's end using two screws (e.g., Order Code TSRMB)

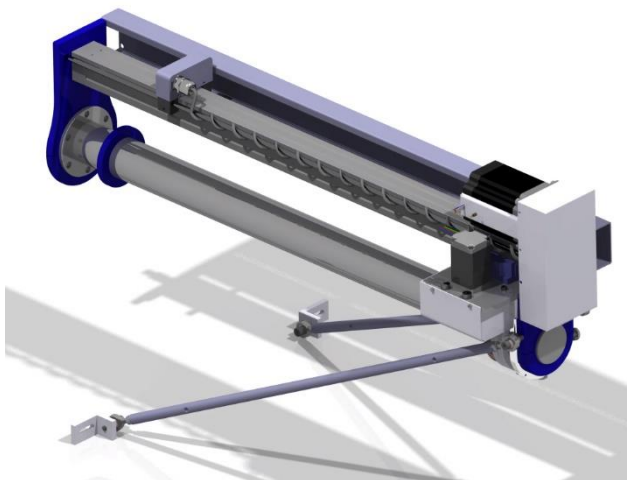
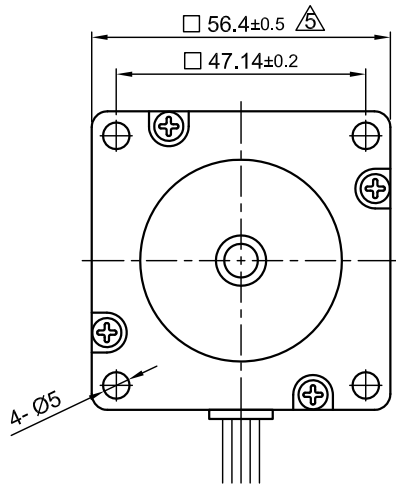


Figure 13: RM40 with DRVRMOTLR and Tube Support TSRMB

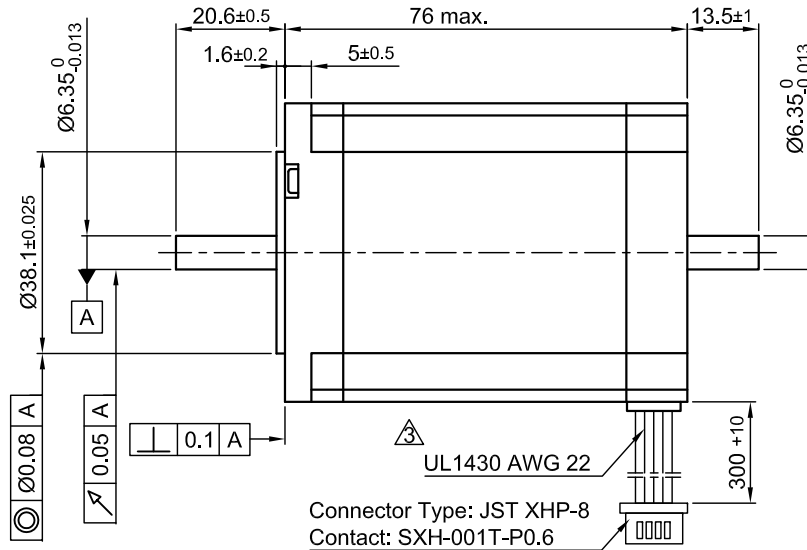
10. Appendix I

1. ST5918L2008-B.pdf
 - a. Datasheet Nanotec Stepper Motor, Type: ST5918L2008-B
2. DB59S024035-B3.pdf
 - a. Datasheet Nanotec BLDC Motor, Type: DB59S024035-B3
3. ST2818L1404-B.pdf
 - a. Datasheet Nanotec Stepper Motor, Type: ST2818L1404-B
4. DRVRMOTL_Rev_D.pdf
 - a. Drawing of DRVRMOTL, Revision D
5. DRVRMOTL(LV)_Rev_A.pdf
 - a. Drawing of DRVRMOTL(LV), Revision A
6. DRVRMOTLR_Rev_D.pdf
 - a. Drawing of DRVRMOTLR, Revision D
7. DRVRMOTLRR_Rev_C.pdf
 - a. Drawing of DRVRMOTLRR, Revision C

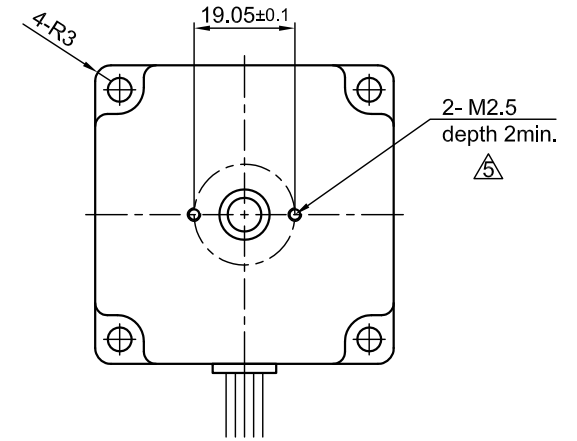
Front view and mounting



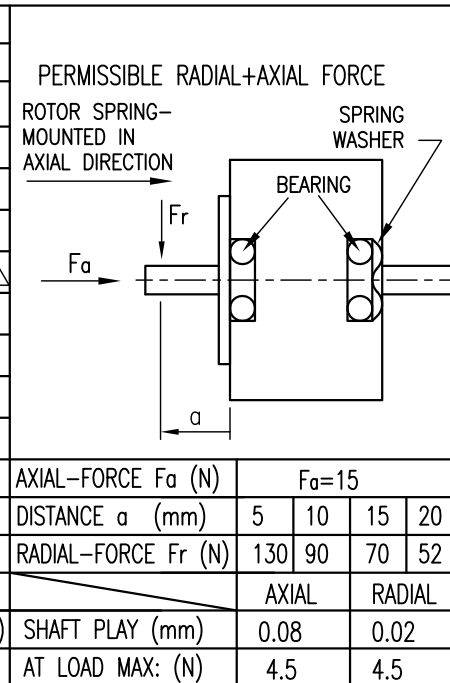
Side view



Rear view



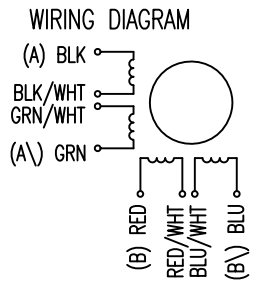
SPECIFICATION	CONNECTION	UNIPOLAR OR BIPOLAR-1 WINDING	BIPOLAR	
			SERIAL	PARALLEL
VOLTAGE (VDC)		4.8		
AMPS/PHASE		2.0	1.41	2.82
RESISTANCE/PHASE (Ohms)@25°C		2.4±10%	4.8±10%	1.2±10%
INDUCTANCE/PHASE (mH) @1KHz		5.1±20%	20.4±20%	5.1±20%
HOLDING TORQUE (Nm) [lb-in]		1.32 [11.71]	1.87 [16.52]	1.87 [16.52]
DETENT TORQUE (Nm) [lb-in]		0.068 [0.602]		
STEP ANGLE (°) ± ACCURACY		1.8±5% (NON-ACCUM)		
ROTOR INERTIA (Kg-m²) [lb-in²]		4.8x10 ⁻⁵ [0.164]		
WEIGHT (Kg) [lb]		1.0 [2.2]		
TEMPERATURE RISE: MAX.80°C (MOTOR STANDSTILL; FOR 2 PHASE ENERGIZED)				
AMBIENT TEMPERATURE -10~ 50°C [14°F ~ 122°F]				
INSULATION RESISTANCE 100 MOhm (UNDER NORMAL TEMPERATURE AND HUMIDITY)				
INSULATION CLASS B 130° [266°F]				
DIELECTRIC STRENGTH 500VAC FOR 1 MIN. (BETWEEN THE MOTOR COILS AND THE MOTOR CASE)				
AMBIENT HUMIDITY MAX. 85% (NO CONDENSATION)				



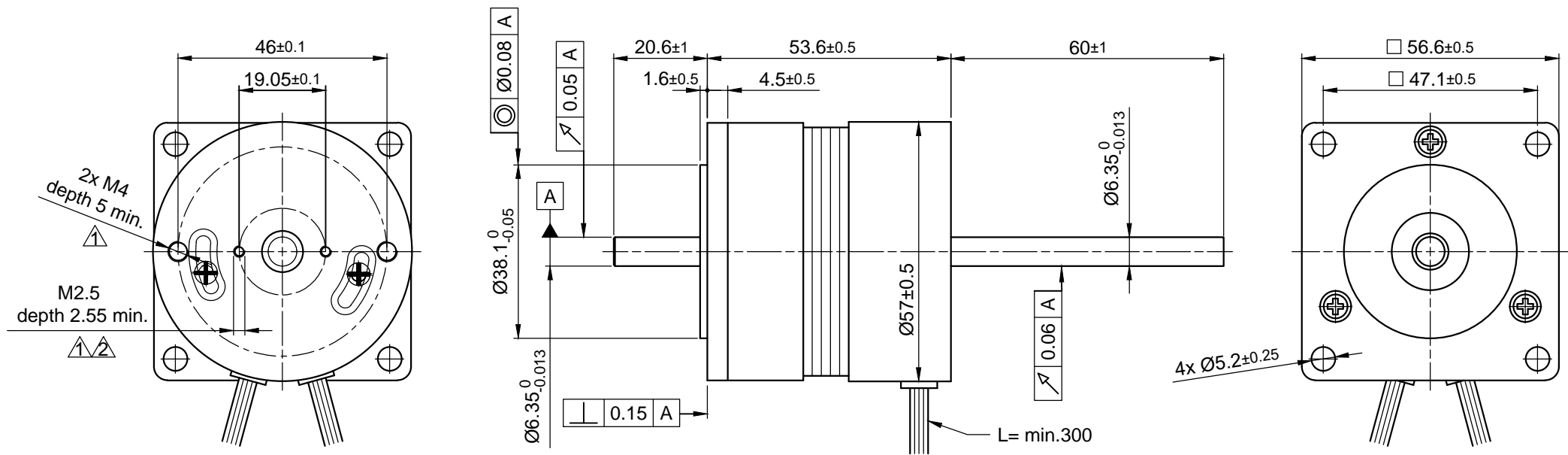
UNIPOLAR	TYPE OF CONNECTION (EXTERN)			MOTOR		
	1WINDING	BIPOLAR SERIAL	BIPOLAR PARALLEL	CONNECTOR PIN NO.	LEADS	WINDING
A	A	A	A	1	BLK	A
COM	A			3	BLK/WHT	
A\		A\	A\	2	GRN/WHT	A\
B	B	B	B	4	GRN	B
COM	B			5	RED	
B\		B\	B\	7	RED/WHT	B\
				6	BLU/WHT	
				8	BLU	

FULL STEP 2 PHASE-Ex.,
WHEN FACING MOUNTING END (X)

STEP	A	B	A\	B\	CCW	CW
1	+	+	-	-	↓	↑
2	-	+	+	-	↓	↑
3	-	-	+	+	↓	↑
4	+	-	-	+	↓	↑

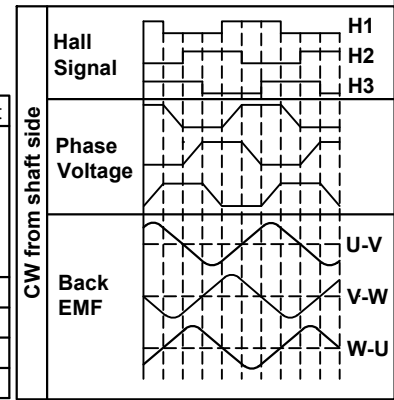
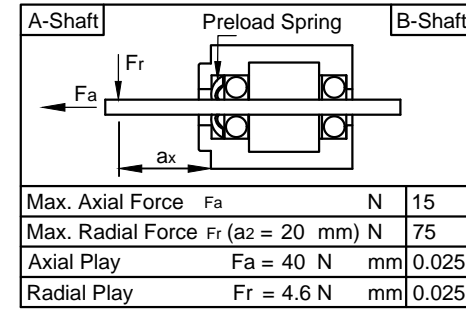


5	revise draw./change tol.	02.11.16	A.S.		APVD	S.Ha.	19.03.07	STEPPING MOTOR		
4	NEW VALUE OF HOLD. TOR.	04.11.13.	J.D.		CHKD					
3	NEW UL NO.+VALUE OF BACK-EMF	20.07.09	J.W.	Surface specification DIN ISO 1302	General tolerances DIN ISO 2768- cH	Work piece edge DIN ISO 13715	DRN	J.W.	21.11.06	DWG.NO
REV	DESCRIPTION	DATE	DRN				SIGNATURE	DATE		ST5918L2008-B



MOTOR SPECIFICATION		
No. of Poles		6
Rated Voltage	V DC	24
Current - Rated / Peak	A	5 /15
Resistance Line to Line	$\pm 10\%$ Ω	0.57
Inductance Line to Line (1kHz)	$\pm 20\%$ mH	0.63
Torque - Rated / Peak	Nm	0.23 /0.69
Torque Constant	Nm/A	0.045
Back-EMF Constant	$V_{rms}/krpm$	3.84
Rated Power	W	84
Speed - No Load / Rated	$\pm 10\%$ rpm	4800 /3500
Rotor Inertia	$kg\ m^2$	7.5×10^{-6}

WIRING DIAGRAM				
	Colour	Function	Lead Gauge	
Motor	Ye	U	UL1332	
	Rd	V	AWG18	
	Bk	W		
Hall 18 Impl. per Rev.	Rd	+5V	UL1430 AWG26	
	Bu	H1		
	Gn	H2		
	Wh	H3		
	Bk	GND		

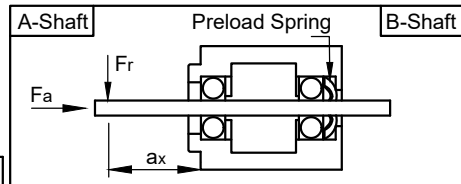
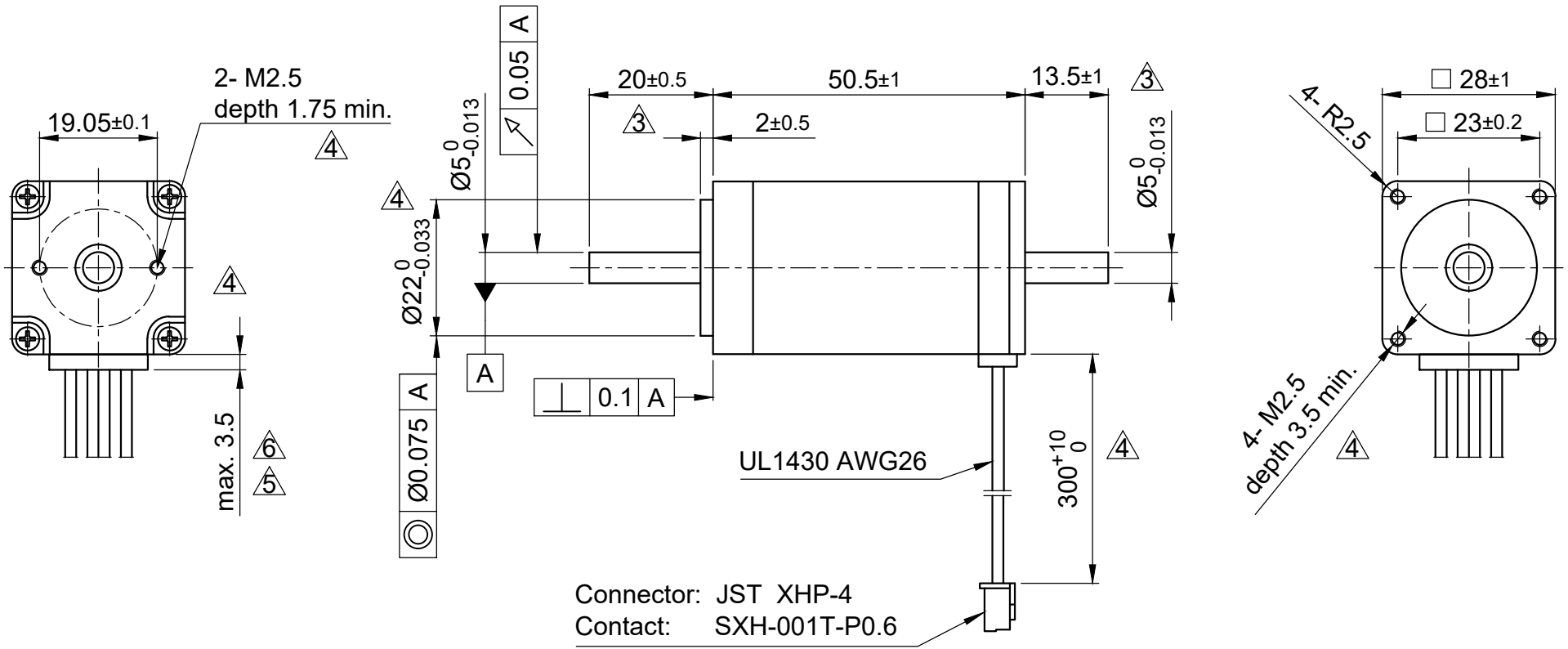


GENERAL MOTOR SPECIFICATION		
Ambient Temperature	$^{\circ}C$	-10 ... 50
Max. Temperature Rise (at standstill)	$^{\circ}C$	80
Max. Ambient Humidity (non condensing)	%	85
Insulation Class		B
Insulation Resistance	M Ω	100
Dielectric Strength (for 1 min - coil to case)	V AC	500

ISO 8015	ISO 1302	ISO 2768 cK	ISO 13715
		Date	Name
		Drawn	04.12.2017
		Checked	06.12.2018
		Approved	06.12.2018
02	change depth screw M2.5	Schneid_A	06.12.2018
REV	Rev. Text	Name	Rel. Date

Weight: 0.52 kg	
DB59S024035-B3	
03000121	
State: Released	
Rev: 02	
P	



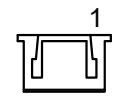


MOTOR SPECIFICATION		
Voltage	V DC	3.22
Current per Winding	A	1.4
Resistance per Phase (25°C)	±15% Ω	2.3
Inductance per Phase (1 kHz)	±20% mH	1.8
Holding Torque	Nm	0.117
Step Angle	±5% °	1.8
Rotor Inertia	kg m ²	1.8 × 10 ⁻⁶

TYPE OF CONNECTION			
Bipolar	Pin No.	Wire Col.	Winding
A	1	BK	[Symbol]
A\	2	GN	
B	3	RD	[Symbol]
B\	4	BU	

Max. Axial Force	Fa	N	7
Max. Radial Force	Fr (a1 = 5 mm)	N	58
Max. Radial Force	Fr (a2 = 20 mm)	N	20
Axial Play	Fa = 10 N	mm	0.075
Radial Play	Fr = 5.0 N	mm	0.025

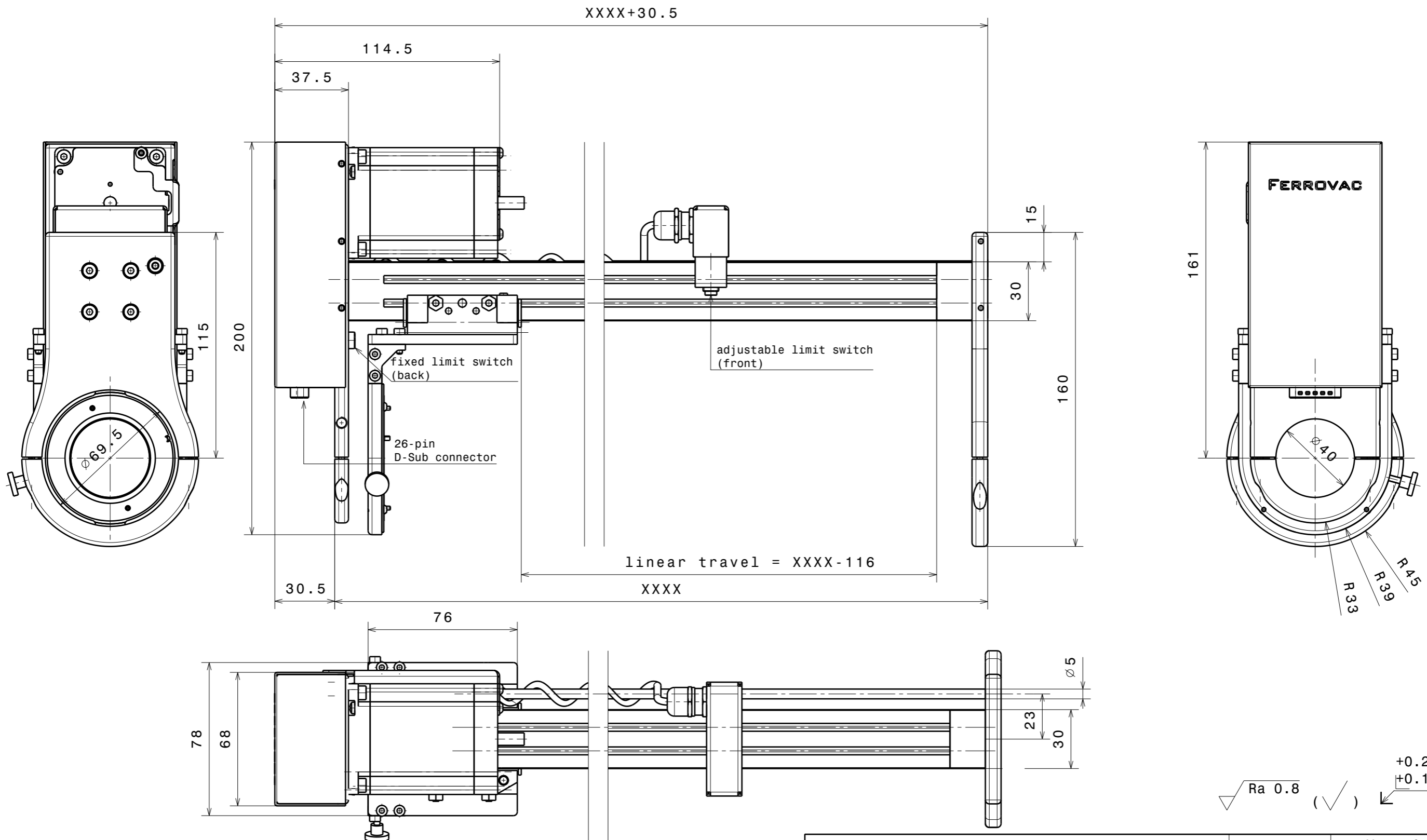
JST XHP-4



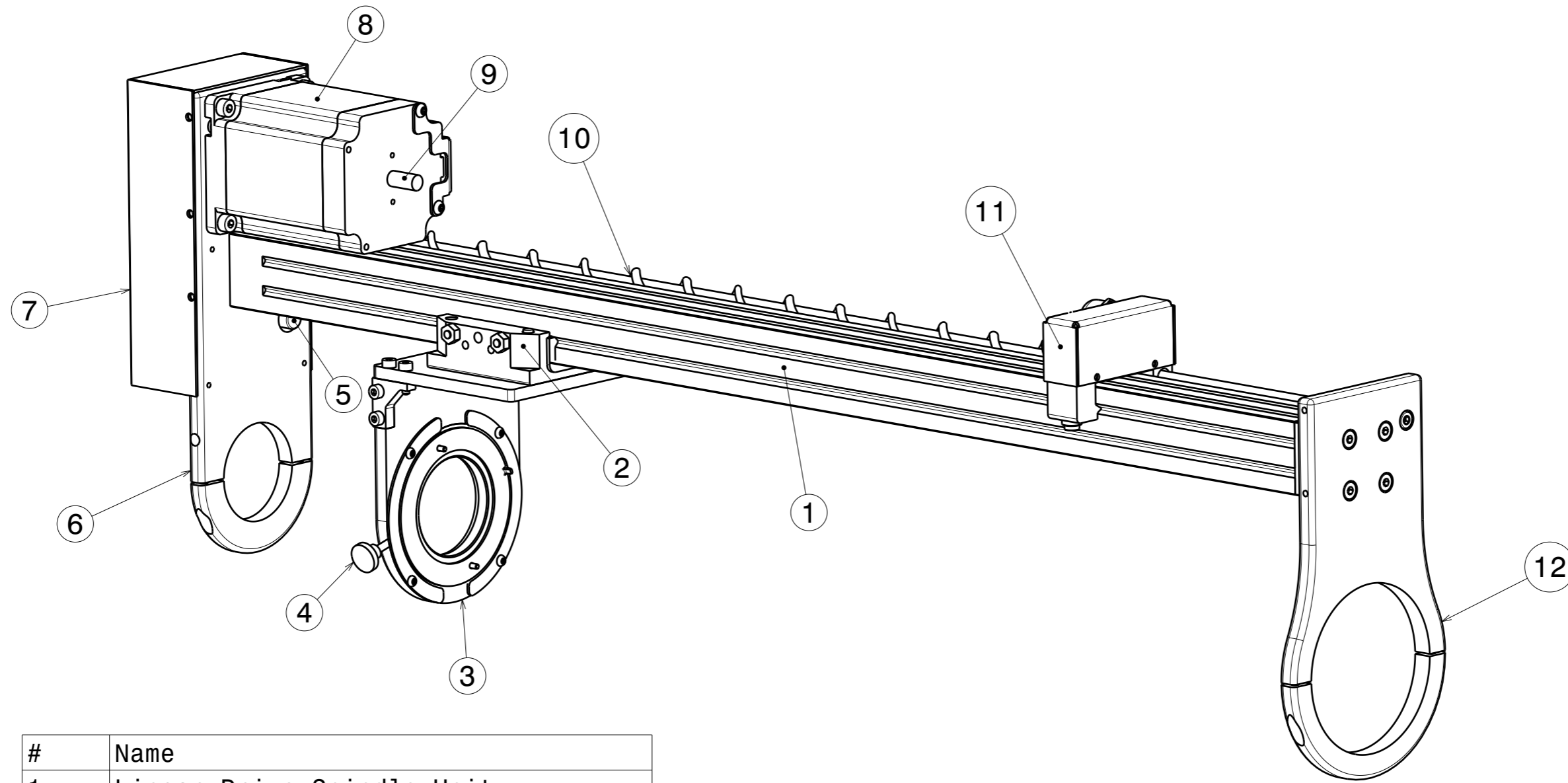
GENERAL MOTOR SPECIFICATION		
Ambient Temperature	°C	-10 ... 50
Max. Temperature Rise (at standstill - 2 phases energized)	°C	80
Max. Ambient Humidity (non condensing)	%	85
Insulation Class		B
Insulation Resistance	MΩ	100
Dielectric Strength (for 1 min - coil to case)	V AC	500

ISO 8015	ISO 1302	ISO 2768 cK	ISO 13715	Replacement for drawing from 02.08.11		Weight: ±10% 0.25 kg
			Date	Name	ST2818L1404-B	
			Drawn	Schneid_A		
			Reviewed	Reith_S		
			Released	Reith_S		
06	modified prod. process	Schneid_A	06.12.2023	20002184		A4 Page 1
REV	Rev. Text	Name	Date	State: Released		Rev: 06 CONFIDENTIAL





Material: various		nominal $\leq 30\text{mm}$	DIN ISO 2768-f-H
		dimensions $> 30\text{mm}$	DIN ISO 2768-m-K excluding Sym./Runout
		Sym./Runout $> 30\text{mm}$	DIN ISO 2768-H
Motorized linear drive for sample transporter		formed part dimensions	DIN ISO 2768-f-H
DRVRMOTL		Scale	Drawn C. Weiss
		Date	13.01.2015
		Changed	12.02.2024 CW
Ferrovac CH-8050 Zurich		1:2	DRVRMOTL - XXXX
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF FERROVAC. ANY REPRODUCTION IN PART OR AS WHOLE WITHOUT OUR PERMISSION IS PROHIBITED.			A3 sheet 1/3
Rev.	D		

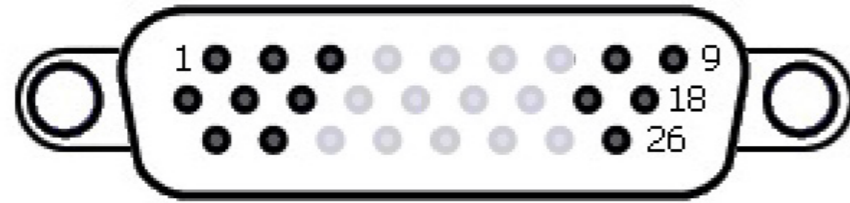


#	Name
1	Linear Drive Spindle Unit
2	Linear Carrier
3	Magnet Pickup Adapter
4	Knurled Rotational Lock Screw
5	Limit Switch (Back)
6	Sample Transporter Clamp (Back)
7	Cable / Gearbox Housing
8	Linear Actuator Stepper Motor
9	Motor Shaft Extension
10	Cable Guide
11	Limit Switch (Front)
12	Sample Transporter Clamp (Front)

$\sqrt{\text{Ra } 0.8}$ (✓)
 $\swarrow \begin{matrix} +0.2 \\ +0.1 \end{matrix}$
 $\searrow \begin{matrix} -0.1 \\ -0.2 \end{matrix}$

Material: various		nominal $\leq 30\text{mm}$	DIN ISO 2768-f-H
		dimensions $> 30\text{mm}$	DIN ISO 2768-m-K excluding Sym./Runout
Motorized linear drive for sample transporter		Sym./Runout $> 30\text{mm}$	DIN ISO 2768-H
DRVRMOTL		formed part dimensions	DIN ISO 2768-f-H
		Scale	Drawn C. Weiss
		1:2	Date 13.01.2015
			Changed 12.02.2024 CW
Ferrovac CH-8050 Zurich		THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF FERROVAC. ANY REPRODUCTION IN PART OR AS WHOLE WITHOUT OUR PERMISSION IS PROHIBITED.	
Rev.	D	DRVRMOTL - XXXX A3 sheet 2/3	

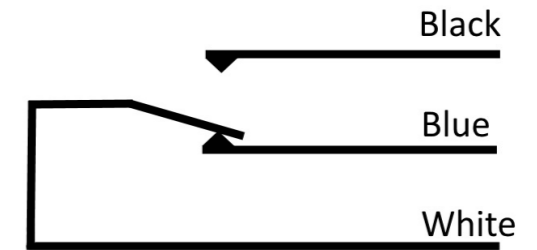
D-Sub Connector, HD-26



D-Sub Pin	Function	#
1	Linear Motor	(A) BLK
2	Linear Motor	(A*) BLK/WHT
3	Linear Motor	(B*) BLU/WHT
4		
5		
6		
7		
8	Limit Switch (Back)	1
9	Limit Switch (Front)	blue
10	Linear Motor	(A\) GRN
11	Linear Motor	(A*) GRN/WHT
12	Linear Motor	(B\) BLU
13		
14		
15		
16		
17	Endswitch (Back)	2
18	Limit Switch (Front)	white
19	Linear Motor	(B) RED
20	Linear Motor	(B*) RED/WHT
21		
22		
23		
24		
25		
26	Limit Switch (Front)	black

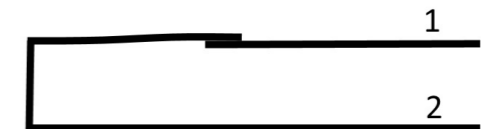
Limit Switch (Front)

Type: reed switch



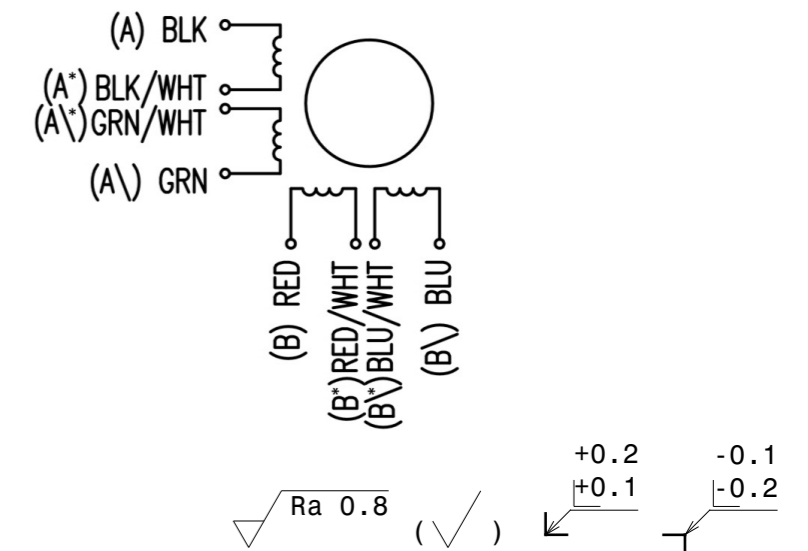
Limit Switch (Back)

Type: push switch

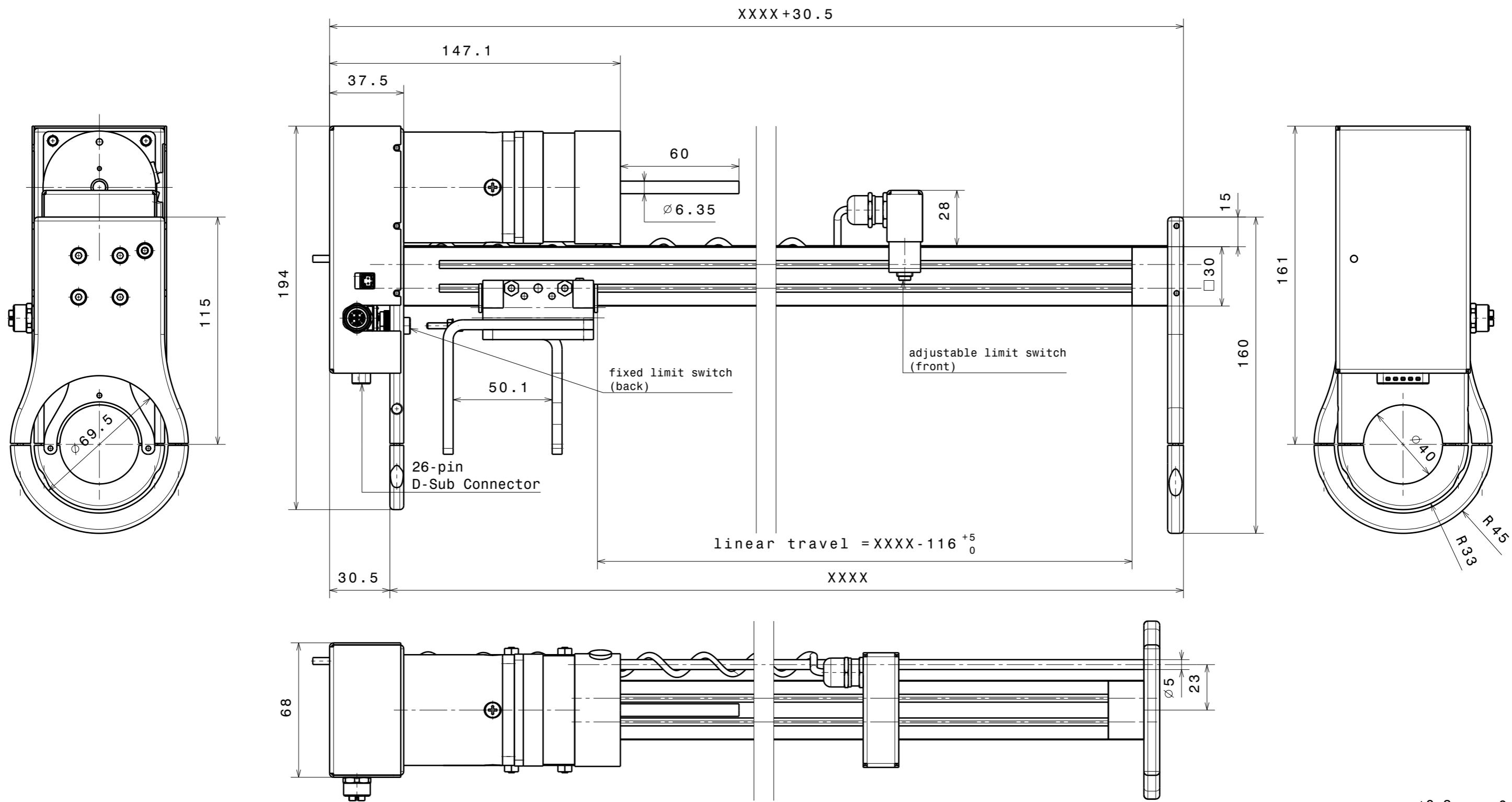


Motor Schematic

Type: Nanotec ST5918L2008-B



Material: various	nominal ≤30mm dimensions >30mm	DIN ISO 2768-f-H DIN ISO 2768-m-K excluding Sym./Runout
Motorized linear drive for sample transporter DRVRMOTL	Sym./Runout >30mm	DIN ISO 2768-H
	formed part dimensions	DIN ISO 2768-f-H
Scale	Drawn	C. Weiss
	Date	13.01.2015
1:2	Changed	12.02.2024 CW
	DRVRMOTL - XXXX	
Ferrovac CH-8050 Zurich	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF FERROVAC. ANY REPRODUCTION IN PART OR AS WHOLE WITHOUT OUR PERMISSION IS PROHIBITED.	Rev. D A3 sheet 3/3



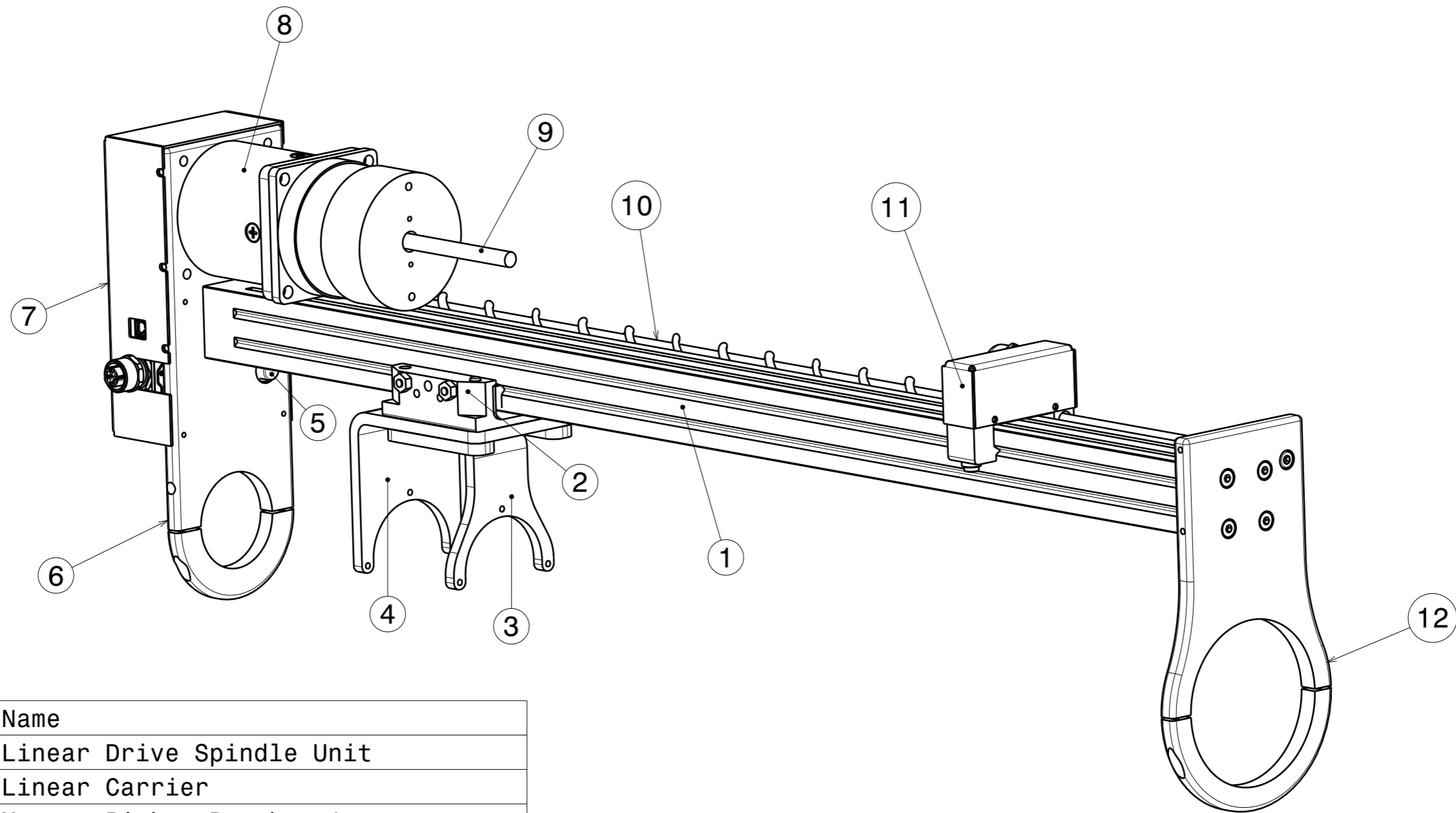
∇ Ra 0.8 (✓) \swarrow $\begin{matrix} +0.2 \\ +0.1 \end{matrix}$ \searrow $\begin{matrix} -0.1 \\ -0.2 \end{matrix}$

Material: various		nominal $\leq 30\text{mm}$	DIN ISO 2768-f-H
		dimensions $> 30\text{mm}$	DIN ISO 2768-m-K excluding Sym./Runout
Motorized Linear Drive for Sample Transporter - Light Version		Sym./Runout $> 30\text{mm}$	DIN ISO 2768-H
		formed part dimensions	DIN ISO 2768-f-H
Scale	Drawn	C.Weiss	
	Date	12.01.2024	
	Changed	
		DRVRMOTL (LV)	
		A3 sheet 1/3	
Rev.	A		

DRVRMOTL (LV)
Ferrovac
 CH-8050 Zurich

THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF FERROVAC. ANY REPRODUCTION IN PART OR AS WHOLE WITHOUT OUR PERMISSION IS PROHIBITED.

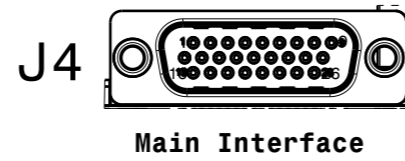
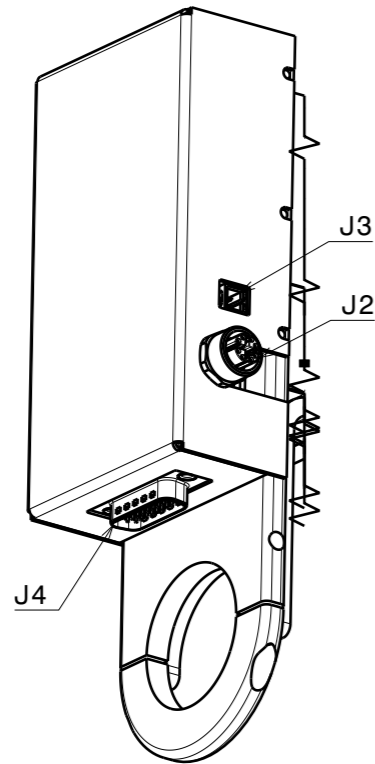
1:2



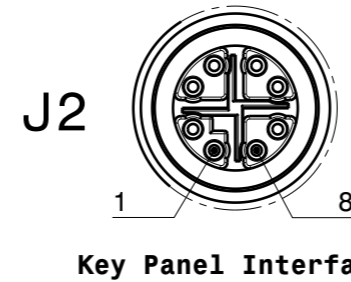
#	Name
1	Linear Drive Spindle Unit
2	Linear Carrier
3	Magnet Pickup Bracket 1
4	Magnet Pickup Bracket 2
5	Limit Switch (Back)
6	Sample Transporter Clamp (Back)
7	Cable / Gearbox Housing
8	Linear Actuator BLDC Motor
9	Motor Shaft Extension
10	Cable Guide
11	Limit Switch (Front)
12	Sample Transporter Clamp (Front)

$\sqrt{\text{Ra } 0.8}$ (✓) $\begin{matrix} +0.2 \\ +0.1 \end{matrix}$ $\begin{matrix} -0.1 \\ -0.2 \end{matrix}$

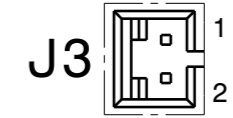
Material: various	nominal $\leq 30\text{mm}$ dimensions $> 30\text{mm}$	DIN ISO 2768-f-H DIN ISO 2768-m-K excluding Sym./Runout
Motorized Linear Drive for Sample Transporter - Light Version	Sym./Runout $> 30\text{mm}$	DIN ISO 2768-H
	formed part dimensions	DIN ISO 2768-f-H
DRVRMOTL (LV)	Scale	Drawn C.Weiss
	1:2	Date
Ferrovac CH-8050 Zurich		Changed
	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF FERROVAC. ANY REPRODUCTION IN PART OR AS WHOLE WITHOUT OUR PERMISSION IS PROHIBITED.	Rev.
		DRVRMOTL (LV)
		A3 sheet 2/3



High Density D-Sub, 26P		
Pin #	Device Type	Signal/Function
1	BLDC Motor	Phase 1
2	BLDC Motor	Phase 3
3		-
4	HALL Sensor	HALL 1
5	HALL Sensor	GND
6	Key Panel	Up
7	Key Panel	Down
8	Back Limit SW	Normally Close
9	Fron Limit SW	Normally Close
10	BLDC Motor	Phase 2
11		-
12		-
13	HALL Sensor	HALL 2
14	HALL Sensor	+5VDC
15	Key Panel	LED Up Button
16	Key Panel	LED Down Button
17	Back Limit SW	+5VDC
18	Enable SW & Front Limit SW	+5VDC
19		-
20		-
21	HALL Sensor	HALL 3
22	Key Panel	LED P/V Button
23	Key Panel	Pump/Vent
24	Key Panel	GND
25	Enable SW	Normally Open
26	Front Limit SW	Normally Open

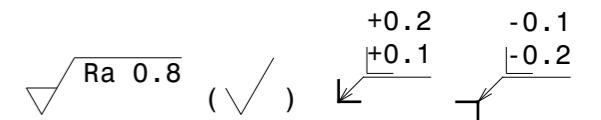


Binder M12-X Serie 876, 8P		
Pin #	Device Type	Signal/Function
1	Ground	GND
2	Button 1	Up
3	LED 1	LED Up Button
4	Button 2	Down
5	LED 2	LED Down Button
6	Button 3	Pump/Vent
7	LED 3	LED P/V Button
8	Ground	GND

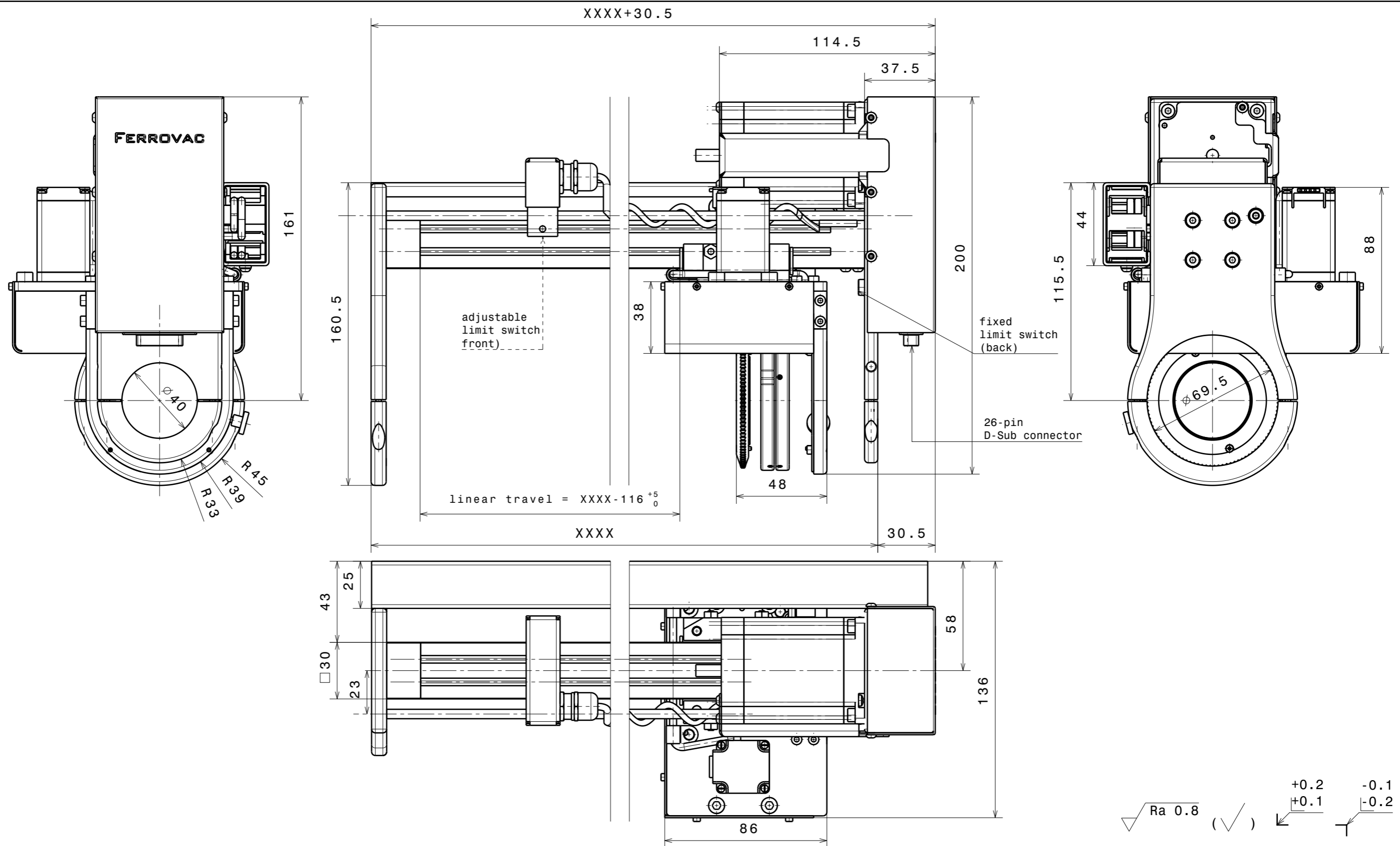


Enabel/Disable Interface
(e.g. Door Detection)

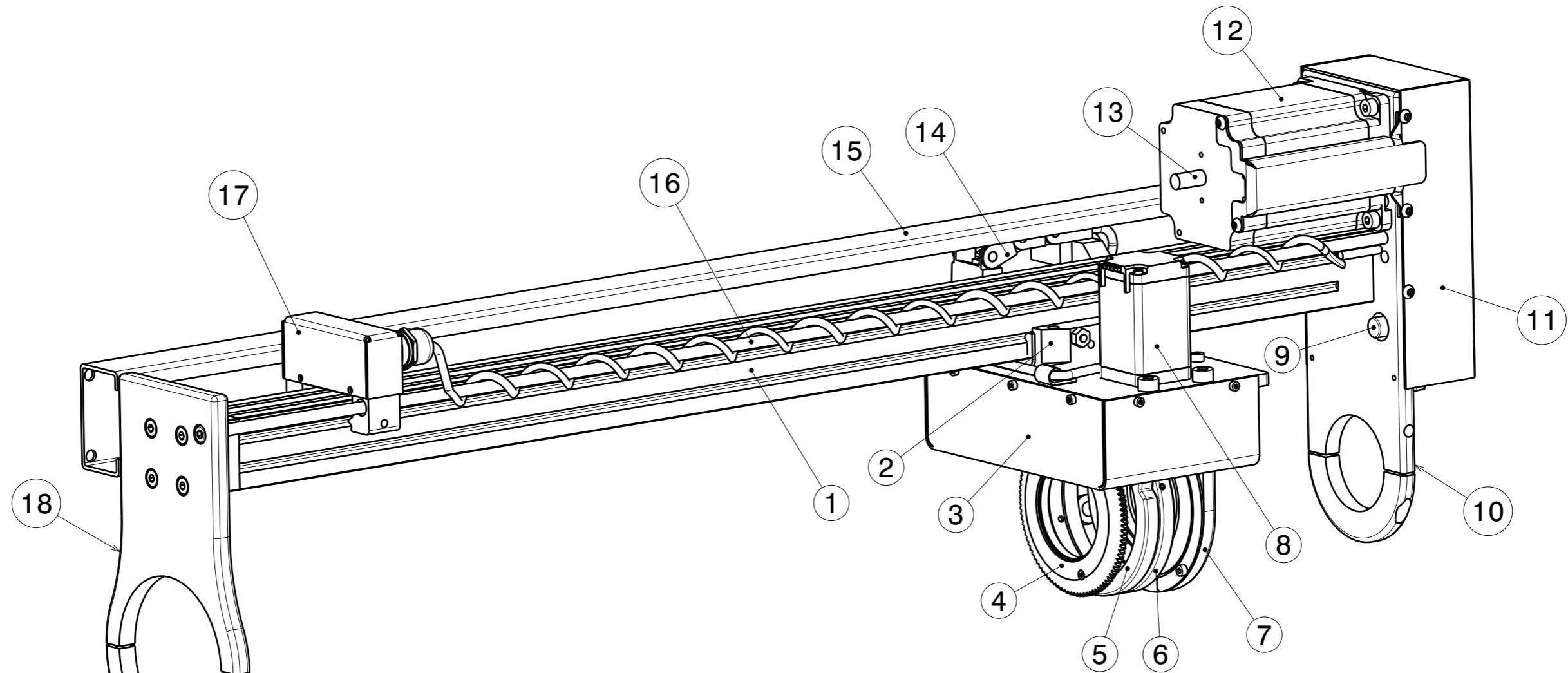
Molex 70553, 2P		
Pin #	Device Type	Signal/Function
1	Enable SW	+5VDC
2	Enable SW	Normally Open



Material: various	nominal <30mm dimensions >30mm	DIN ISO 2768-f-H DIN ISO 2768-m-K excluding Sym./Runout
Motorized Linear Drive for Sample Transporter - Light Version	Sym./Runout >30mm	DIN ISO 2768-H
	formed part dimensions	DIN ISO 2768-f-H
DRVRMOTL (LV)	Scale	Drawn C.Weiss
	1:2	Date
Ferrovac CH-8050 Zurich		Changed
	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF FERROVAC. ANY REPRODUCTION IN PART OR AS WHOLE WITHOUT OUR PERMISSION IS PROHIBITED.	DRVRMOTL (LV)
Rev.	A	



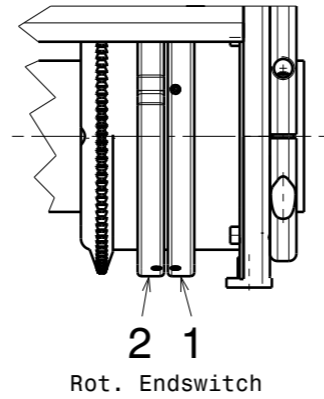
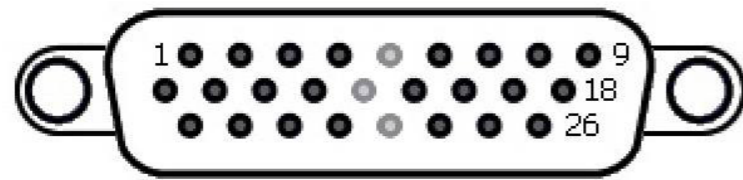
Material: various	nominal ≤30mm	DIN ISO 2768-f-H
	dimensions >30mm	DIN ISO 2768-m-K excluding Sym./Runout
	Sym./Runout >30mm	DIN ISO 2768-H
Motorized Linear and Rotary Drive for Sample Transporter	formed part dimensions	DIN ISO 2768-f-H
DRVRMOTLR	Scale	Drawn C.Weiss
		Date 13.01.2015
		Changed 16.02.2024 CW
Ferrovac CH-8050 Zurich	1:2	DRVRMOTLR-XXXX
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF FERROVAC. ANY REPRODUCTION IN PART OR AS WHOLE WITHOUT OUR PERMISSION IS PROHIBITED.	Rev. D	A3 sheet 1/3



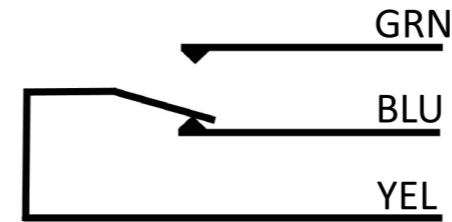
#	Name	#	Name
1	Linear Drive Spindle Unit	10	Sample Transporter Clamp (Back)
2	Linear Carrier	11	Cable / Gearbox Housing
3	Worm-Gearbox Housing	12	Linear Actuator Stepper Motor
4	Worm wheel	13	Motor Shaft Extension
5	Rotation Limit Switch Actuator 2	14	Cable Carrier/Chain
6	Rotation Limit Switch Actuator 1	15	Cable Carrier/Chain Guide Rail
7	Magnet Pickup Adapter (w. Knurled Rotational Lock Screw)	16	Cable Guide
8	Rotary Actuator Stepper Motor	17	Limit Switch (Front)
9	Limit Switch (Back)	18	Sample Transporter Clamp (Front)

$\sqrt{\text{Ra } 0.8}$ (\checkmark) \swarrow $\begin{matrix} +0.2 \\ +0.1 \end{matrix}$ \searrow $\begin{matrix} -0.1 \\ -0.2 \end{matrix}$

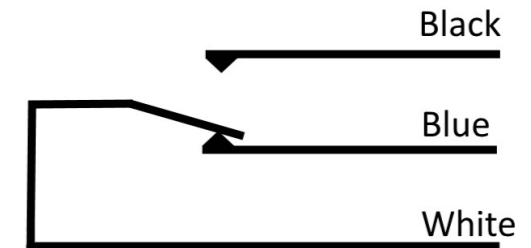
Material: various	nominal $\leq 30\text{mm}$ dimensions $> 30\text{mm}$	DIN ISO 2768-f-H DIN ISO 2768-m-K excluding Sym./Runout
Motorized Linear and Rotary Drive for Sample Transporter	Sym./Runout $> 30\text{mm}$	DIN ISO 2768-H
	formed part dimensions	DIN ISO 2768-f-H
DRVRMOTLR	Scale	Drawn C.Weiss
	1:2	Date
Rev. D		Changed
Ferrovac CH-8050 Zurich	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF FERROVAC. ANY REPRODUCTION IN PART OR AS WHOLE WITHOUT OUR PERMISSION IS PROHIBITED.	
	DRVRMOTLR - XXXX A3 sheet 2/3	



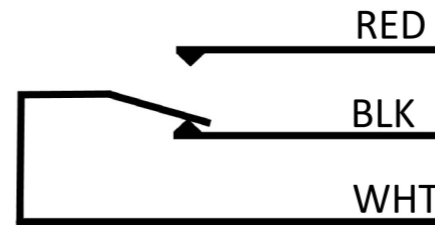
Rotation Limit Switch 1



Reed Endswitch (Front)



Rotation Limit Switch 2

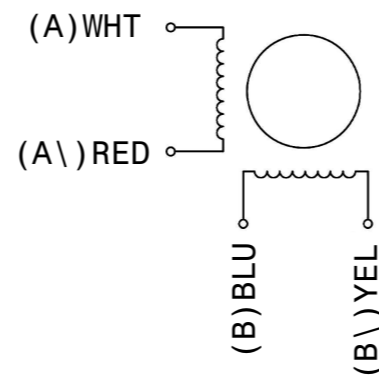


Endswitch (Back)

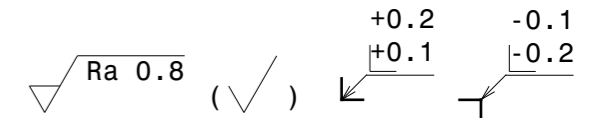
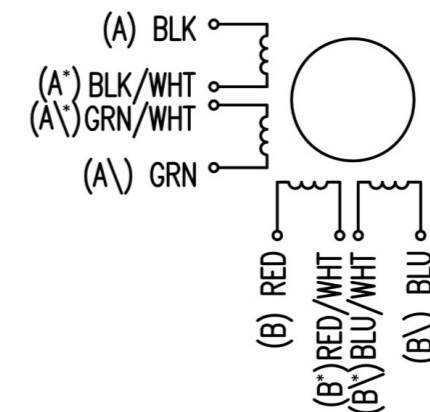


D-Sub Pin	Function	#
1	Linear Motor	(A)BLK
2	Linear Motor	(A*)BLK/WHT
3	Linear Motor	(B*)BLU/WHT
4	Rotary Motor	(A)WHT
5		
6	Rotation Limit Switch 1	GRN
7	Rotation Limit Switch 2	BLK
8	Limit Switch (Back)	1
9	Limit Switch (Front)	blue
10	Linear Motor	(A\)GRN
11	Linear Motor	(A\ *)GRN/WHT
12	Linear Motor	(B\)BLU
13	Rotary Motor	(A\)RED
14		
15	Rotation Limit Switch 1	YEL
16	Rotation Limit Switch 2	WHT
17	Endswitch (Back)	2
18	Limit Switch (Front)	white
19	Linear Motor	(B)RED
20	Linear Motor	(B*)RED/WHT
21	Rotary Motor	(B)BLU
22	Rotary Motor	(B\)YEL
23		
24	Rotation Limit Switch 1	BLU
25	Rotation Limit Switch 2	RED
26	Limit Switch (Front)	black

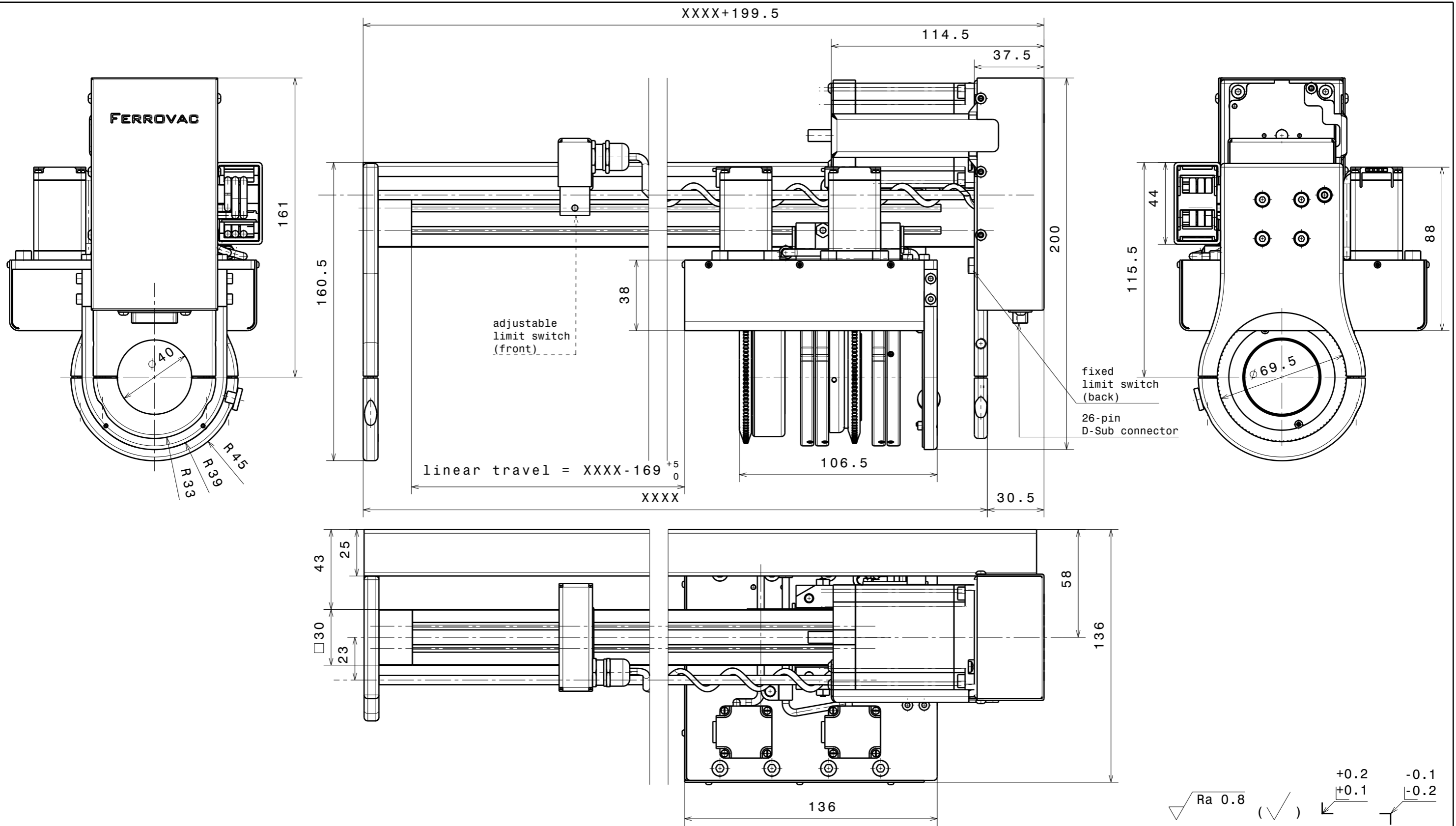
Rotary Motor Schematic



Linear Motor Schematic



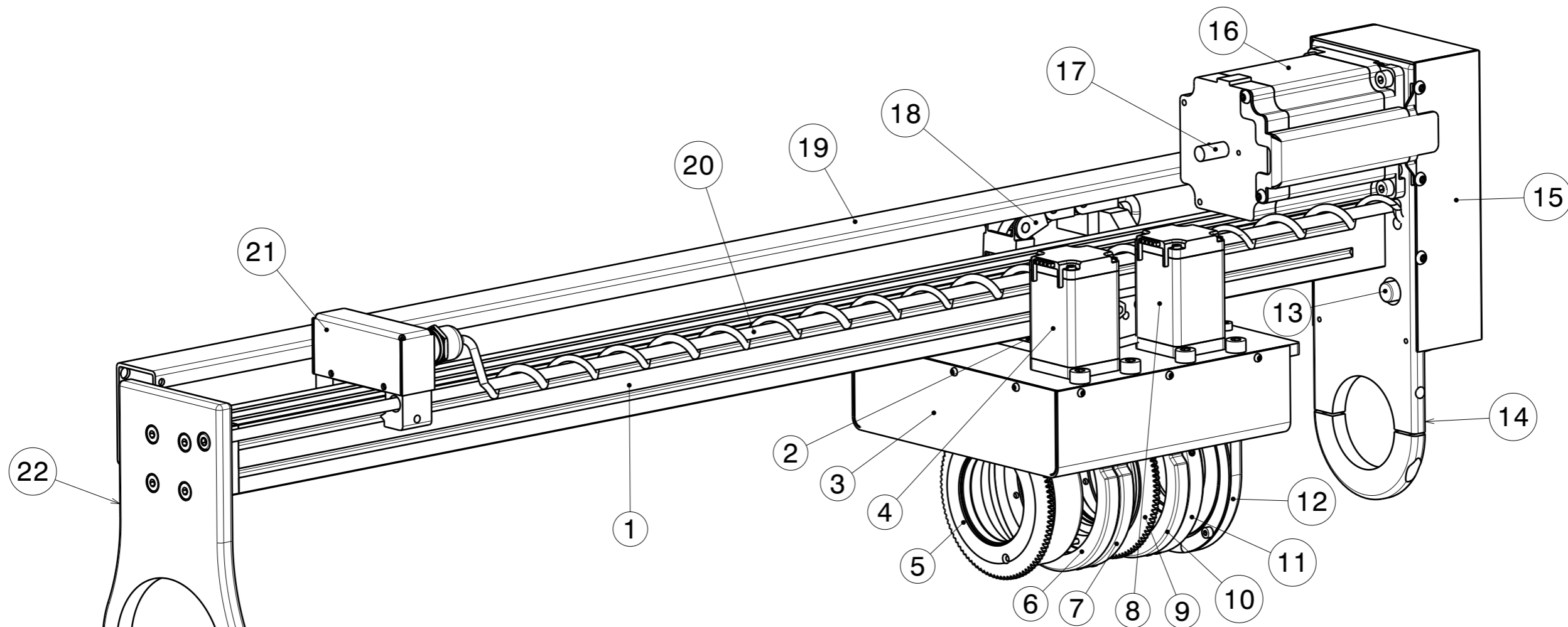
Material: various	nominal <30mm dimensions >30mm	DIN ISO 2768-f-H DIN ISO 2768-m-K excluding Sym./Runout
Motorized Linear and Rotary Drive for Sample Transporter	Sym./Runout >30mm	DIN ISO 2768-H
	formed part dimensions	DIN ISO 2768-f-H
DRVRMOTLR	Scale	Drawn C.Weiss
	1:2	Date
Rev. D		Changed
Ferrovac CH-8050 Zurich	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF FERROVAC. ANY REPRODUCTION IN PART OR AS WHOLE WITHOUT OUR PERMISSION IS PROHIBITED.	DRVRMOTLR - XXXX
		A3 sheet 3/3



Material: various		nominal ≤30mm	DIN ISO 2768-f-H
		dimensions >30mm	DIN ISO 2768-m-K excluding Sym./Runout
Motorized Linear and Double Rotary Drive for Dual-shaft Sample Transporter		Sym./Runout >30mm	DIN ISO 2768-H
DRVRMOTLRR		formed part dimensions	DIN ISO 2768-f-H
Scale	Drawn	C.Weiss	
1:2	Date	12.01.2015	
	Changed	16.02.2024 CW	
Rev.	C	DRVRMOTLRR - XXXX	
A3 sheet 1/3			

Ferrovac
CH-8050 Zurich

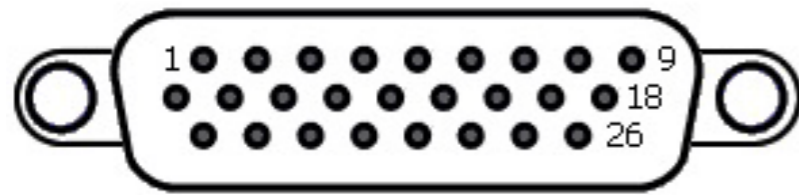
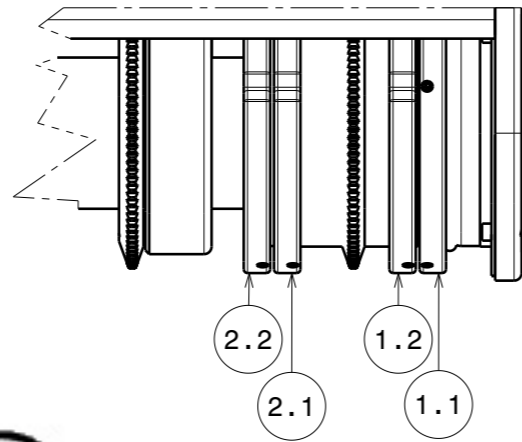
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF FERROVAC. ANY REPRODUCTION IN PART OR AS WHOLE WITHOUT OUR PERMISSION IS PROHIBITED.



#	Name	#	Name
1	Linear Drive Spindle Unit	12	Magnet Pickup Adapter (w. Knurled Rotational Lock Screw)
2	Linear Carrier	13	Limit Switch (Back)
3	Worm-Gearbox Housing	14	Sample Transporter Clamp (Back)
4	Rotary Actuator Stepper Motor 2	15	Cable / Gearbox Housing
5	Worm Wheel 2	16	Linear Actuator Stepper Motor
6	Rotation Limit Switch Actuator 2.2	17	Motor Shaft Extension
7	Rotation Limit Switch Actuator 2.1	18	Cable Carrier/Chain
8	Rotary Actuator Stepper Motor 1	19	Cable Carrier/Chain Guide Rail
9	Worm Wheel 1	20	Cable Guide
10	Rotation Limit Switch Actuator 1.2	21	Limit Switch (Front)
11	Rotation Limit Switch Actuator 1.1	22	Sample Transporter Clamp (Front)

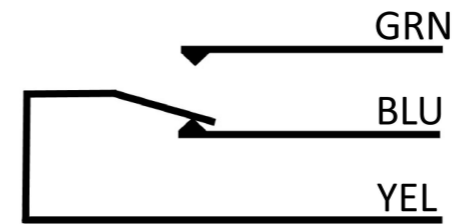
Ra 0.8 (✓) $\begin{matrix} +0.2 \\ +0.1 \\ -0.1 \\ -0.2 \end{matrix}$

Material: various		nominal $\leq 30\text{mm}$	DIN ISO 2768-f-H	
Motorized Linear and Double Rotary Drive for Dual-shaft Sample Transporter		dimensions $> 30\text{mm}$	DIN ISO 2768-m-K excluding Sym./Runout	
		Sym./Runout $> 30\text{mm}$	DIN ISO 2768-H	
DRVRLMOTLRR		formed part dimensions	DIN ISO 2768-f-H	
Ferrovac CH-8050 Zurich		Scale	Drawn C.Weiss	
		1:2	Date	12.01.2015
			Changed	16.02.2024 CW
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF FERROVAC. ANY REPRODUCTION IN PART OR AS WHOLE WITHOUT OUR PERMISSION IS PROHIBITED.		Rev. C	DRVRLMOTLRR - XXXX A3 sheet 2/3	

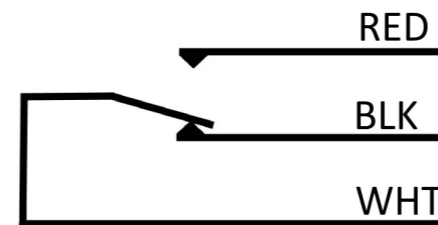


D-Sub Pin	Function	#
1	Linear Motor	(A)BLK
2	Linear Motor	(A*)BLK/WHT
3	Linear Motor	(B*)BLU/WHT
4	Rotary Motor 1	(A)WHT
5	Rotary Motor 2	(A)WHT
6	Rotation Limit Switch 1.2	BLK
7	Rotation Limit Switch 1.1	BLU
8	Limit Switch (Back)	1
9	Limit Switch (Front)	blue
10	Linear Motor	(A\)GRN
11	Linear Motor	(A\ *)GRN/WHT
12	Linear Motor	(B\)BLU
13	Rotary Motor 1	(A\)RED
14	Rotary Motor 2	(A\)RED
15	Rotary Motor 2	(B)BLU
16	Rotation Limit Switch 1.1 & 1.2	WHT & YEL
17	Endswitch (Back)	2
18	Limit Switch (Front)	white
19	Linear Motor	(B)RED
20	Linear Motor	(B*)RED/WHT
21	Rotary Motor 1	(B)BLU
22	Rotary Motor 1	(B\)YEL
23	Rotary Motor 2	(B\)YEL
24	Rotation Limit Switch 2.1	BLU
25	Rotation Limit Switch 2.1 & 2.2	WHT & YEL
26	Rotation Limit Switch 2.2	BLK

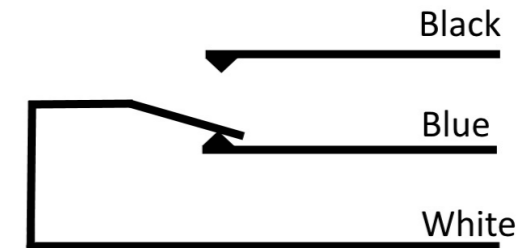
Rotation Limit Switch 1.1 & 2.1



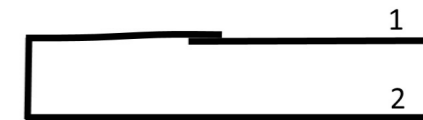
Rotation Limit Switch 1.2 & 2.2



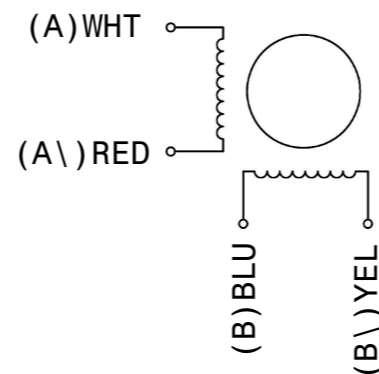
Reed Endswitch (Front)



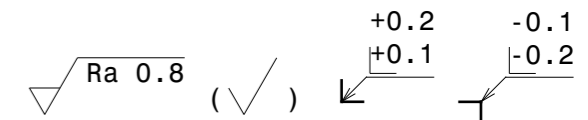
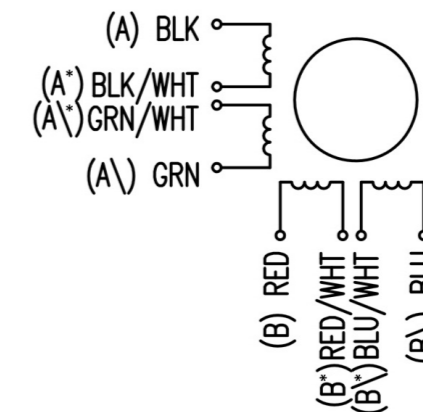
Endswitch (Back)



Rotary Motors Schematic



Linear Motor Schematic



Material: various	nominal <30mm dimensions >30mm	DIN ISO 2768-f-H DIN ISO 2768-m-K excluding Sym./Runout
Motorized Linear and Double Rotary Drive for Dual-shaft Sample Transporter DRVRMOTLRR	Sym./Runout>30mm	DIN ISO 2768-H
	formed part dimensions	DIN ISO 2768-f-H
Ferrovac CH-8050 Zurich	Scale	1:2
	Drawn	C.Weiss
	Date	12.01.2015
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF FERROVAC. ANY REPRODUCTION IN PART OR AS WHOLE WITHOUT OUR PERMISSION IS PROHIBITED.	Changed	16.02.2024 CW
	Rev.	C
		DRVRMOTLRR - XXXX A3 sheet 3/3