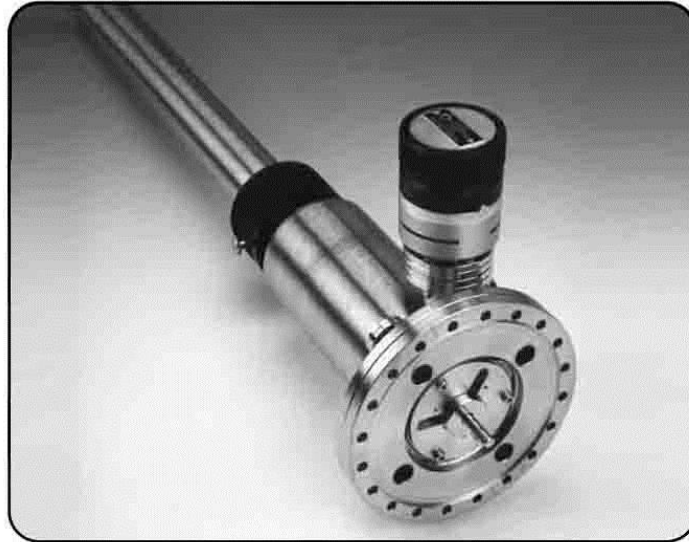


Operating and Maintenance Handbook

Linear Rack and Pinion Transfer Devices: LRP and RLRP Series



REVISION	DATE	COMMENTS	INITIALS
1	Jan 1994	Original release	MJD
2	Aug 2015	VACGEN Branding	AJL

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WARRANTY

1. Subject to fair wear and tear and the due, observance of any installation user, storage, operating or maintenance instructions the Seller undertakes to replace or, at its option repair free of charge to the purchaser, any goods which the purchaser can establish are defective by reason of defective workmanship or materials which are returned to the Seller, carriage paid, within 12 months of the date of dispatch by the Seller. In the event, however, that the Seller supplies spare parts either direct, or that are fitted or installed or replaced by the Sellers' service center such spare parts will be subject to a warranty period of six months only.
2. The Purchaser cannot return any product for warranty repair without the prior approval of VACGEN and the issue of a Goods Return Number (GRN). This shall be obtained by contacting the service center at VACGEN. All returned products must be accompanied by a completed Declaration of Contamination form. Customers must, in the first instance, contact the local selling agent.
3. We reserve the right to decline to service equipment, we consider is in any way hazardous until a clearance or safety certificate, in a form satisfactory to VACGEN, has been completed and returned by the customer.

REPAIR

The following additional terms and conditions apply in the event that the customer elects to use the services of VACGEN workshop on a chargeable basis.

1. At its own cost the customer shall dispatch the equipment to the workshop, carriage paid, suitably packaged, protected and insured, bearing, a Goods Return Number (GRN) and a completed Declaration of Contamination certificate obtained from VACGEN in advance of shipment.
2. During the period that the equipment is on VACGEN premises, VACGEN will insure the equipment against all risks.
3. Vacuum Generator will provide an acknowledgement of the receipt together with an estimate of the repair charges. Such estimates are carried out on a visual basis and are therefore intended as a guide only. Formal fixed price repair quotations are available and involve the disassembly of the equipment to determine the full extent of the work necessary to restore the equipment to an acceptable standard. In the event that the customer chooses not to proceed with the repair VACGEN will make a charge to cover this examination effort.

Note:

The above are extracts from VACGEN Conditions of sale. Complete copies can be obtained from: VACGEN, Maunsell Road, Castleham Industrial Estate St. Leonards on Sea, East Sussex, TN38 9NN, United Kingdom.

1.0 Introduction

The LRP series transporters are rack and pinion devices offering rapid linear motion of samples over distances of up to 914mm, in a manner that is both repeatable and reliable. The LRP series has been designed specifically for sample introduction and transfer systems. The RLRP series of transporters combine both linear and rotary motion in a single device. The rotary motion is available at any point during the linear travel, which makes this device ideal for a wide variety of sample handling applications.

Two variants of both the linear and rotary linear translators are available. The LRP2 and RLRP2 are mounted on a 70mm OD flange and are capable of carrying loads of up to 0.3kg. The LRP6 and RLRP6 transporters are mounted on 150mm OD flanges and are capable of carrying loads of up to 3.0kg.

There are a number of attachments and accessories available for this device, including a friction clutch, a rotating sleeve (for the RLRP series), electrical feedthroughs, sample holders and a kit to convert LRP transporters to the RLRP versions. The device has been designed to ensure that it is simple to use and easily serviced when necessary.

2.0 Specification

2.1 Specification for LRP2 and RLRP2 Series (see Figure 1)

Travel

LRP203 and RLRP203:	305mm
LRP204 and RLRP204:	460mm
LRP206 and RLRP206:	610mm
LRP209 and RLRP209:	914mm

Mounting Flange: 70mm OD

Maximum Load: 0.3kg Fully Extended

Bakeout Temperature: 230°C Maximum

Operating Temperature: -20°C to +200°C

Linear Shaft Diameter: 19.0mm (3/4 inch) for the LRP2 and RLRP2

Rotary Shaft Diameter: 5.0mm for the RLRP2

Pressure Range: Atmosphere to 10^{-11} mbar

Linear Lock: Fitted as Standard

2.2 Specification for LRP6 and RLRP6 Series (see Figure 2)

Travel LRP604 and RLRP604: 460mm
 LRP609 and RLRP609: 914mm

Mounting Flange: 150mm OD
 Maximum Load: 3.0kg Fully Extended
 Bakeout Temperature 230°C Maximum
 Operating Temperature: -20°C to +200°C

Linear Shaft Diameter: 28.6mm for the LRP6 and RLRP6
 Rotary Shaft Diameter: 9.0mm for the RLRP6

Pressure Range: Atmosphere to 10^{-11} mbar
 Linear Lock: Fitted as Standard

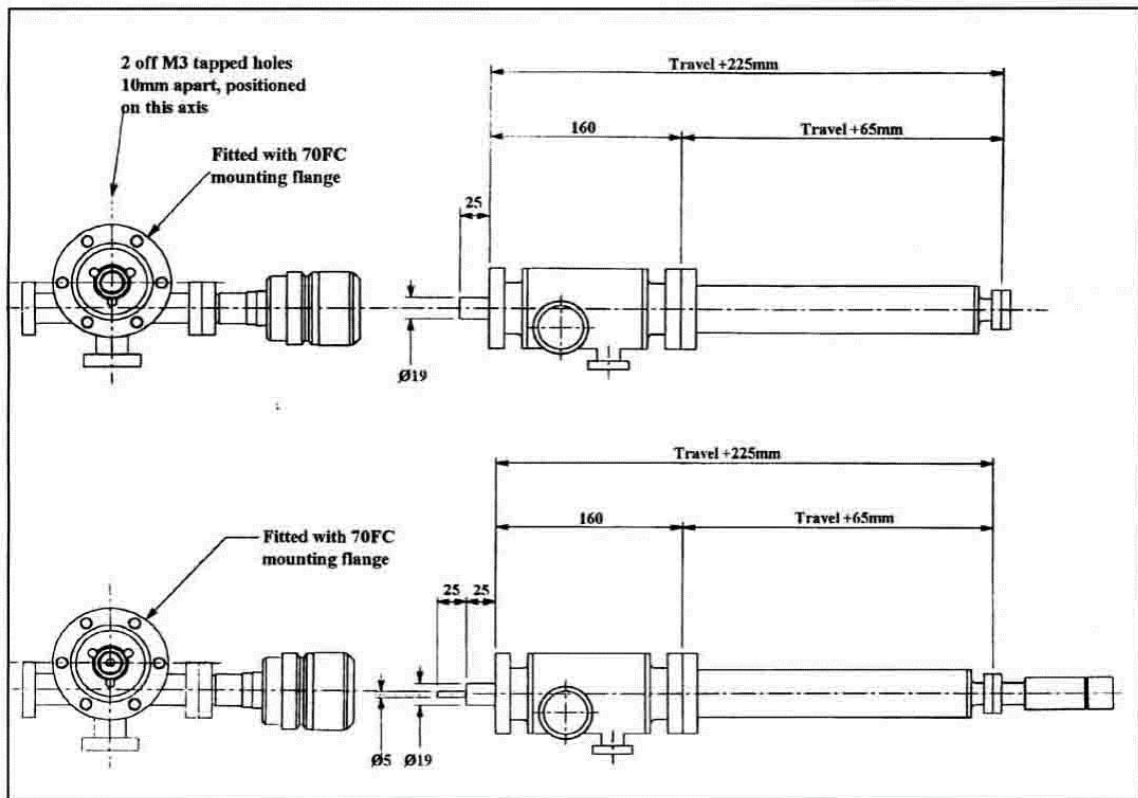


Figure 1-

LRP2 and RLRP2 Transporters

3.0 Construction

The vacuum envelope is constructed from stainless steel and all joints are welded. The internal bearing housing is made from a high grade aerospace aluminum alloy. Mounted into this housing are 6 stainless steel radial bearings for the linear movement.

The shaft is a one piece stainless steel item that incorporates both the rack for the drive and the bearing surfaces for the linear movement. The rotary motion of the RLRP devices is provided by a secondary shaft running through the main shaft and supported by stainless steel bearings.

This shaft is driven by a rotary drive mounted on the end of the device. An optional rotating sleeve is available for all the RLRP transporters (see section 9.0) which permits the rotary motion to be operated from a position close to the linear drive. This may be useful if long travel transporters are being used for sample handling operations which, for example, require both the linear and rotary motion capability of the device.

The bearing system is arranged so as to give equal support to the rack no matter what orientation the device is mounted in. Simple eccentric adjustment is provided to maintain internal clearances throughout the life of the device.

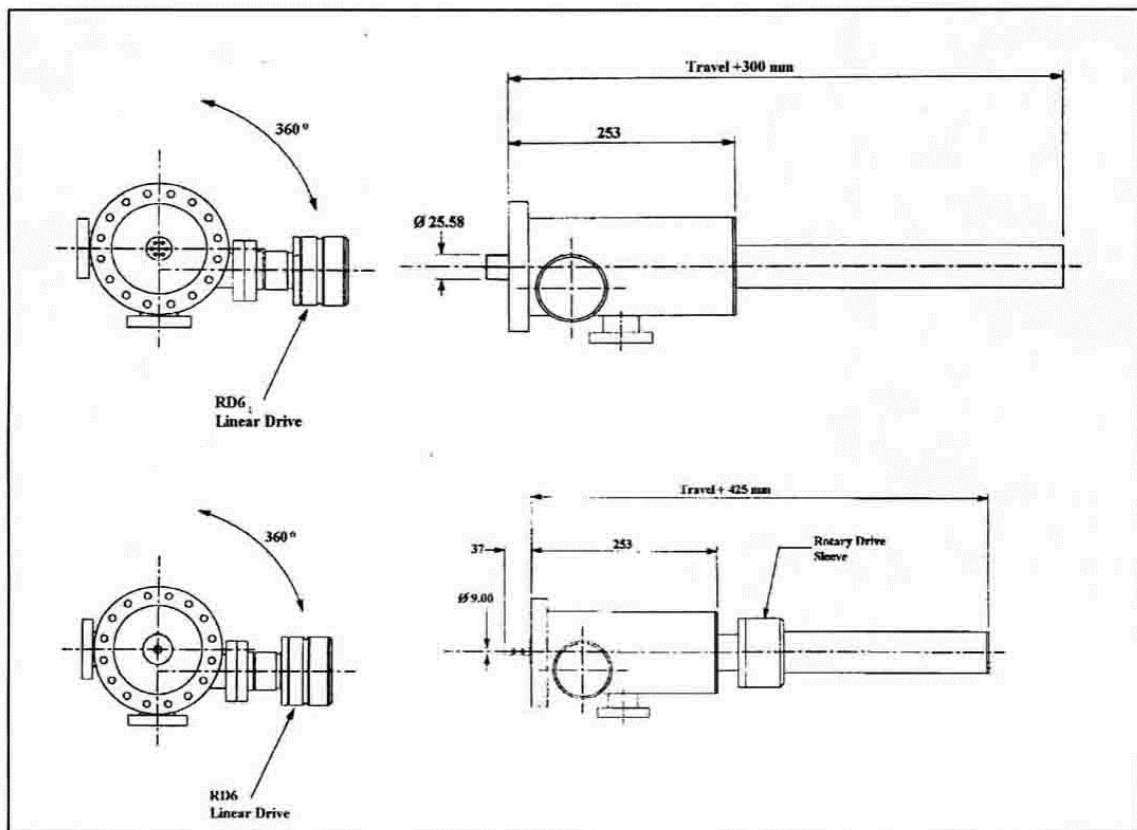


Figure 2 - LRP6 and RLRP6 Transporters

4.0 Installation Guidelines

The transporters may be mounted in any orientation, but if the axis of movement is not positioned horizontally then it is strongly advised that the friction clutch option is fitted to the linear rotary drive (MRD91FD for the R/LRP2 and MRD6FD for the R/LRP6 - see section 9.0). This is because it is possible for the device to free wheel to its end stops causing possible damage to both the LRP2 and the workload.

Care must be taken not to damage the transporter rack when installing the device, as this will cause the device to feel rough in use and will also reduce its life span.

If the device is mounted in a position other than vertical then the transporter may require some external support (for example a prop from the system bench or from the floor) to prevent damage to itself or to the vessel. This is especially true of the long travel transporters which can exert considerable forces on the vacuum vessel flange if not adequately supported.

The transporter is provided with mounting holes to allow sample holders or other fixtures to be attached to the linear or rotary shafts. The arrangement of the mounting holes varies according to the type of transporter as indicated below:-

LRP2	2 off in-line M3 Tapped Holes, 10mm apart on the 19.0mm diameter shaft
RLRP2	5.0mm diameter rotating shaft - no mounting holes
LRP6	3 off M4 and 3 off 8 x 32t.p.i. UNC, on the 28.58mm diameter shaft
RLRP6	2 off in-line Tapped Holes on the 9.0mm diameter rotating shaft

5.0 Operation

The LRP and RLRP transporters are simple and robust devices which will give excellent service throughout their life. Care must be taken to remain within the design specification when the device is in use, especially when it is fully extended, as it may be possible to cause a permanent 'set' in the shaft, or "dimpling" of the shaft at the contact point with the bearings. Such overloading could be caused by indelicate use of other equipment such as a wobble stick or even a second transporter.

Rapid motion of the linear shaft is possible between the end stops, but it should be noted that repeated crash stops against the end stops should be avoided as permanent damage may occur.

6.0 Bakeout

The transporter may be baked to 230°C without any dismantling. It is however recommended that the transporter is baked with the shaft fully retracted within the housing.

7.0 Motorisation

Motorisation of the LRP2 and RLRP2 transporters is possible, but there are no provisions made for limit switches internally within the device. This is not a problem for the rotation, as it is capable of 360° continuous motion; however, if motorisation of the rotary motion of the RLRP2 (and RLRP6) transporter is required it will be necessary to change the RD93 drive (which cannot be motorised) for a RD91M drive - see section 9.0 below). For the linear movement it is vital to ensure that the motor cannot drive to the end of the rack. Limit switches must be provided by the user for the LRP2 and RLRP2 transporters (for example, in-vacuum contact closures or microswitches); the LRP6 and RLRP6 devices can be retrofitted with a microswitch kit for the linear motion. Alternatively, the motor controller software must be programmed with software limits that can never be overridden.

8.0 Maintenance

Little routine maintenance is required due to the simple design of the transporter. However, routine inspections should be carried out to ensure that the movement of the device has not become rough or tight, as this would indicate that the rotary drive for the linear motion, or the support bearings, require servicing. If this is the case it is recommended that the complete transporter is returned to the VACGEN service department for repair. The shaft must be fully retracted during transit.

9.0 Spares and Accessories

Order Code Description

ZRLRP2S3	Rotating Sleeve for RLRP203 Transporter
ZRLRP2S4	Rotating Sleeve for RLRP204 Transporter
ZRLRP2S6	Rotating Sleeve for RLRP206 Transporter
ZRLRP2S9	Rotating Sleeve for RLRP209 Transporter
ZRLRP6S4	Rotating Sleeve for RLRP604 Transporter
ZRLRP6S9	Rotating Sleeve for RLRP609 Transporter
ZRD91	Replacement Drive for the R/LRP2 Linear Motion
ZRD93	Replacement Drive for the RLRP2 Rotary Motion
ZRD6	Replacement Drive for the R/LRP6 Linear Motion
ZRD91M	Motorised Rotary Drive for R/LRP2 and RLRP6 Rotary Motions and R/LRP2 Linear Motion
ZRD6MI	Motorised Rotary Drive for the R/LRP6 Linear Motion <i>Please quote the part code of the translator when ordering replacement rotary drives</i>
MRD91FD	Slipping Clutch for the R/LRP2 Linear Motion
MRD6FD	Slipping Clutch for the R/LRP6 Linear Motion

