

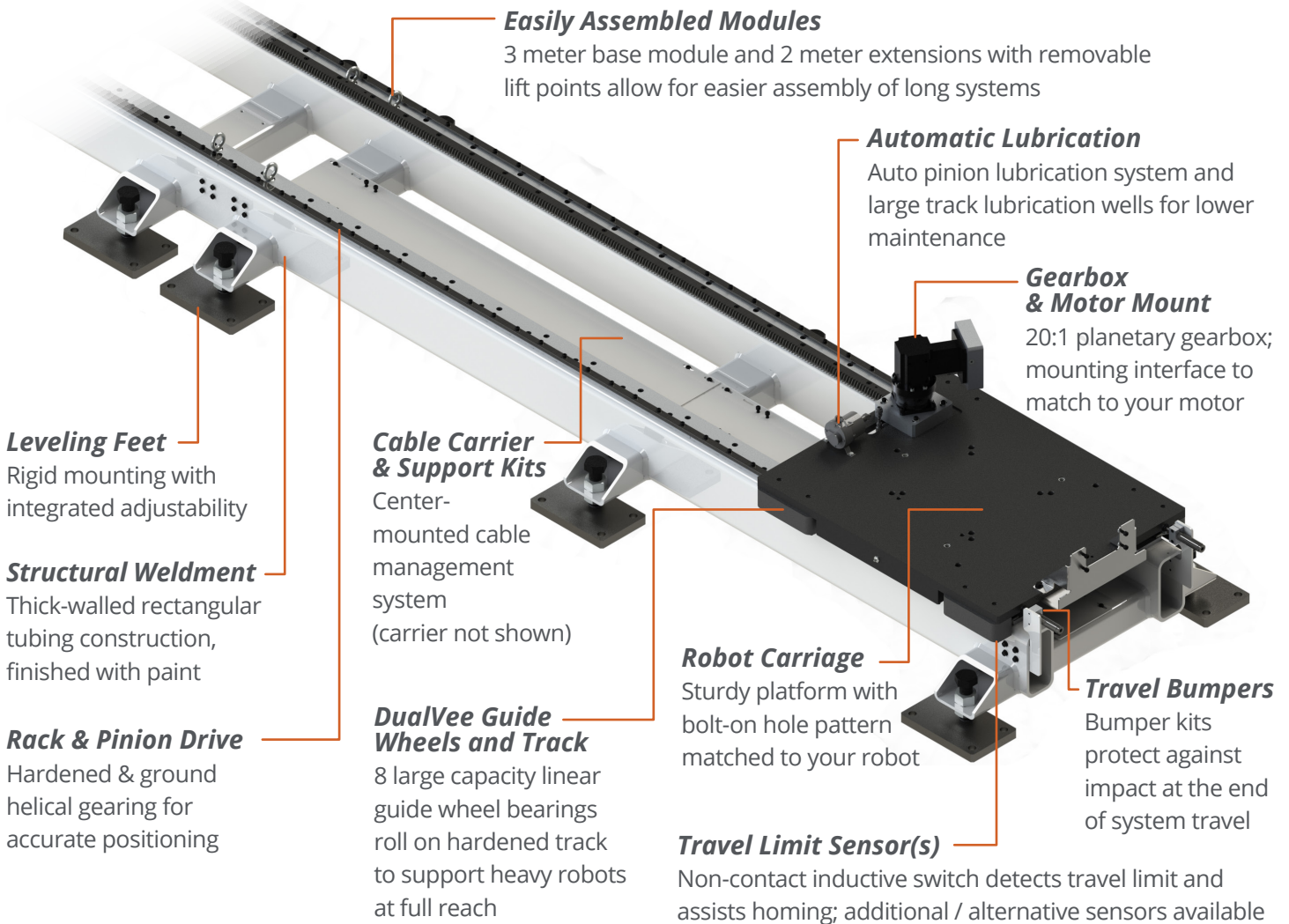
DualVee[®] ***RTU***

***HIGH CAPACITY ROBOT
TRANSFER UNIT***

DUALVEE® RTU OVERVIEW

Features

The DualVee® RTU is designed from the ground up to provide accurate and durable motion for large robots and cobots. The following features are available on standard systems:



Included Elements:

- Robust rack-driven module(s)
- Carriage with hole pattern matching your selected robot
- 20:1 planetary gearbox as standard
- Motor mount matched to your drive motor of choice
- Homing sensor kit

Add-ons:

- Travel bumper kits
- Additional limit sensor kit
- Cable carrier support kits
- Drive motor

Basic Specs:

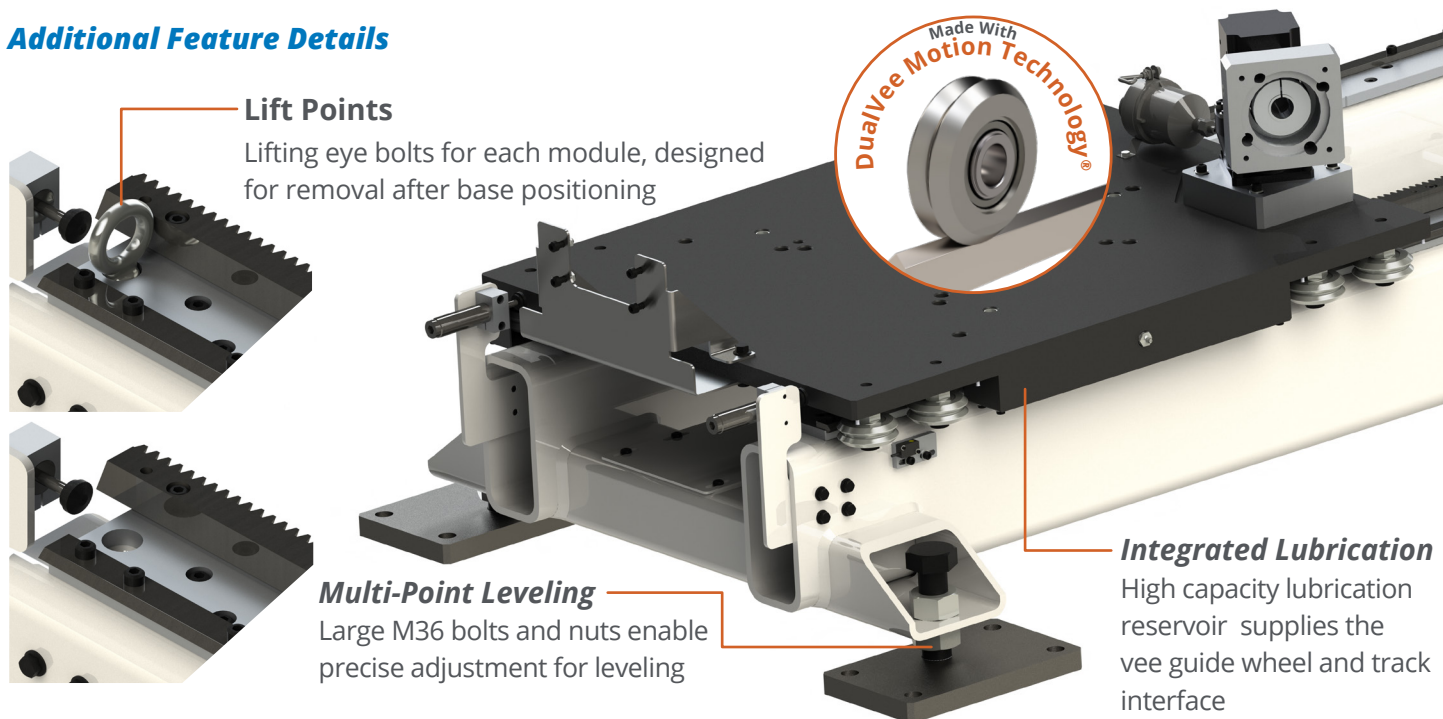
- Accuracy within 0.034 mm / 1 m
- Speeds up to 0.5 m/s [1.64 ft/s]
- Accelerations up to 0.981 m/s²
- Max loads of approx. 52.4 kN [11.7 klbf]

Need Customization? Talk to Us!

- Complete mechatronics solution
- Removing included elements
- Alternate gearbox
- Cable carrier with pre-installed cables
- Custom lengths
- Additional machining or alternate finishing

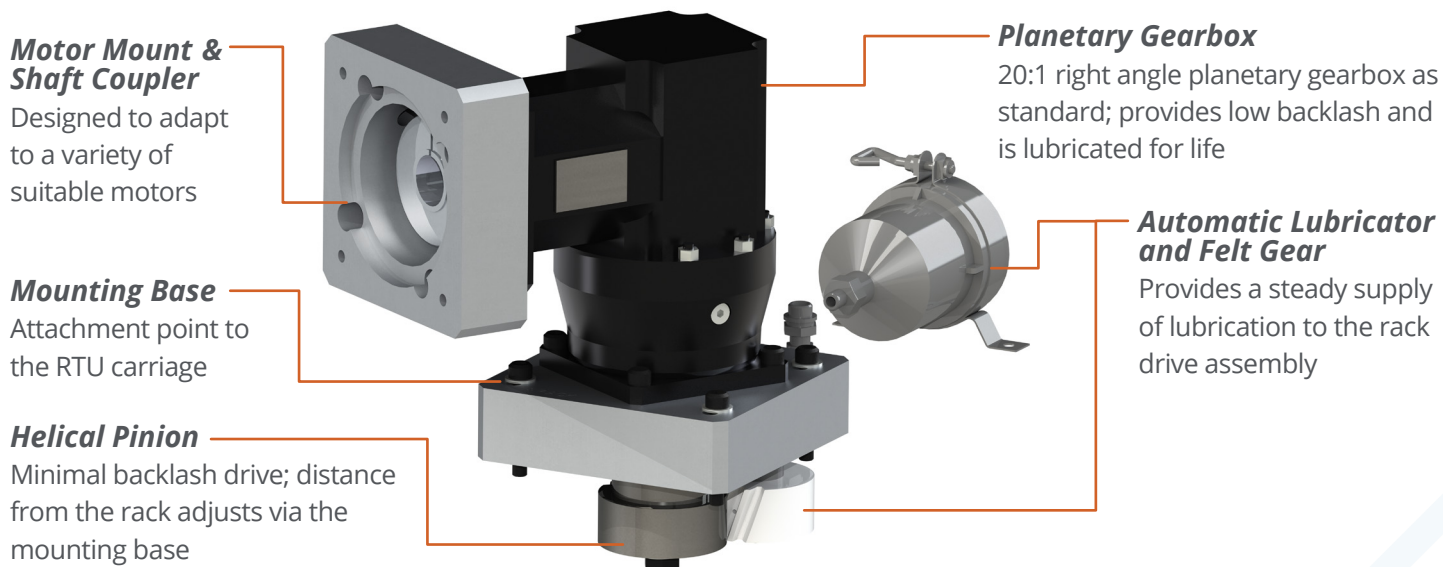
DUALVEE® RTU OVERVIEW

Additional Feature Details



Gearbox & Motor Mount Kit

This kit includes several required elements for driving the DualVee® RTU system. Talk to our Application Engineers to match a gearbox & mount kit to your specified motor. If you require assistance with motor selection, want a customized gearbox, or need a complete mechatronics solution, our experts are here to help!



Included Elements:

- 20:1 planetary gearbox, 90-degree right angle
- Motor mounting flange to fit drive motor
- Shaft coupler to connect to drive motor
- Helical pinion for rack & pinion system
- Automatic lubricator system (125 cc) with felt gear
- Mounting base with pinion adjustment feature

Gearbox Basic Specs:

- Backlash: 4 arcmin
- Nominal output torque @ 1500 rpm: 180 Nm
- Max torque during acceleration: 288 Nm
- Max input speed, continuous: 2500 RPM
- Max input speed, cyclical: 4500 RPM

DUALVEE® RTU ACCESSORIES

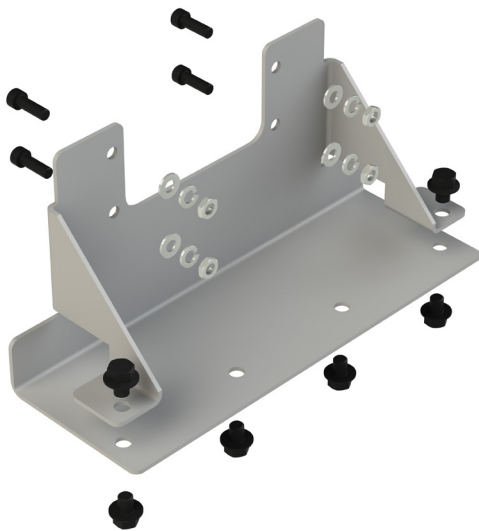
Cable Carrier

The DualVee® RTU is designed to use the following cable carrier: IGUS E4-56-12.

This cable carrier can be included on request. Contact our Application Engineers if you require a custom cable carrier system.

Cable Carrier Mounting Kits

Bishop-Wisecarver offers two mounting kits designed for the IGUS E4-56-12, of varying heights.



DVRTU4CCME412K
Standard Version



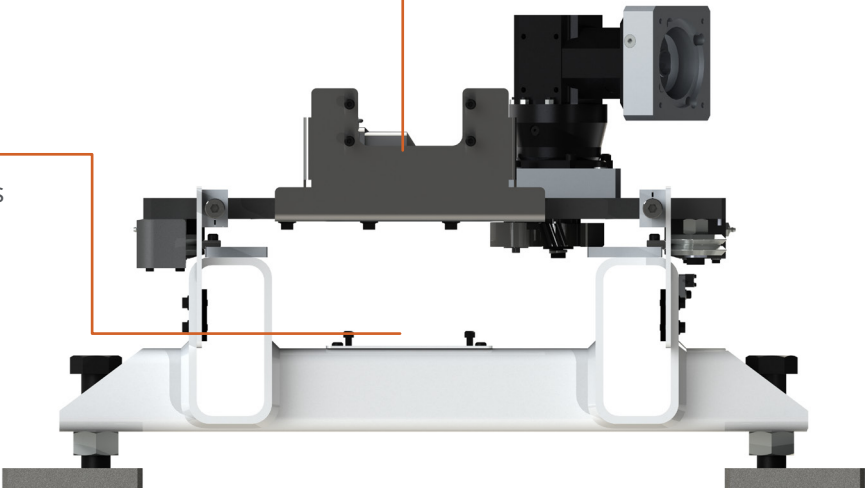
DVRTU4CCME4122K
Tall Version

Cable Carrier Mounting Kit

The moveable end of the cable carrier attaches to the cable carrier mounting kit on the carriage.

Cable Carrier Support Plate

The fixed end of the cable carrier attaches to the cable carrier support plate.

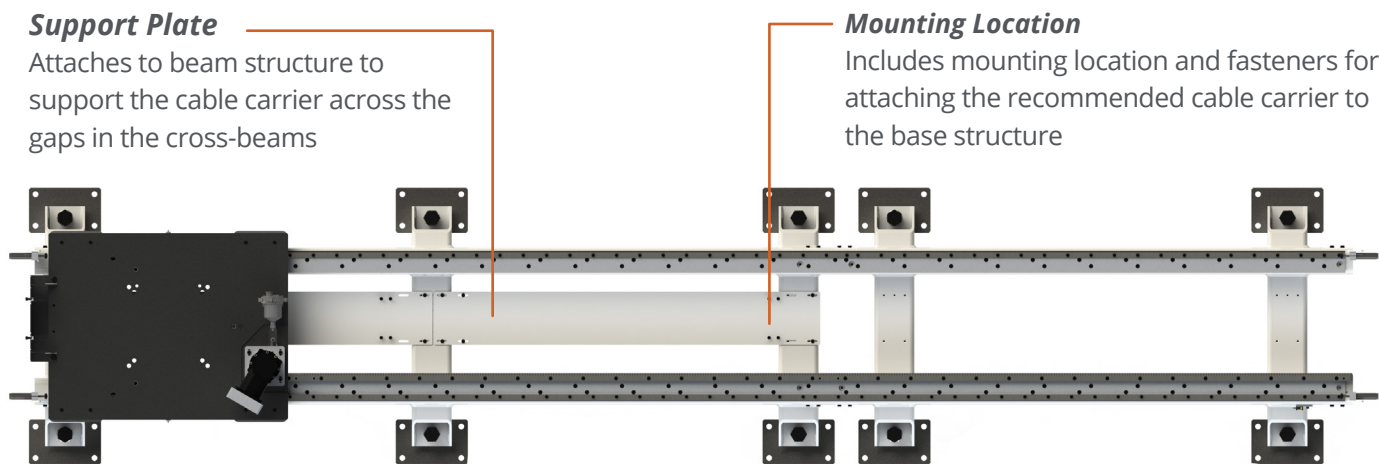
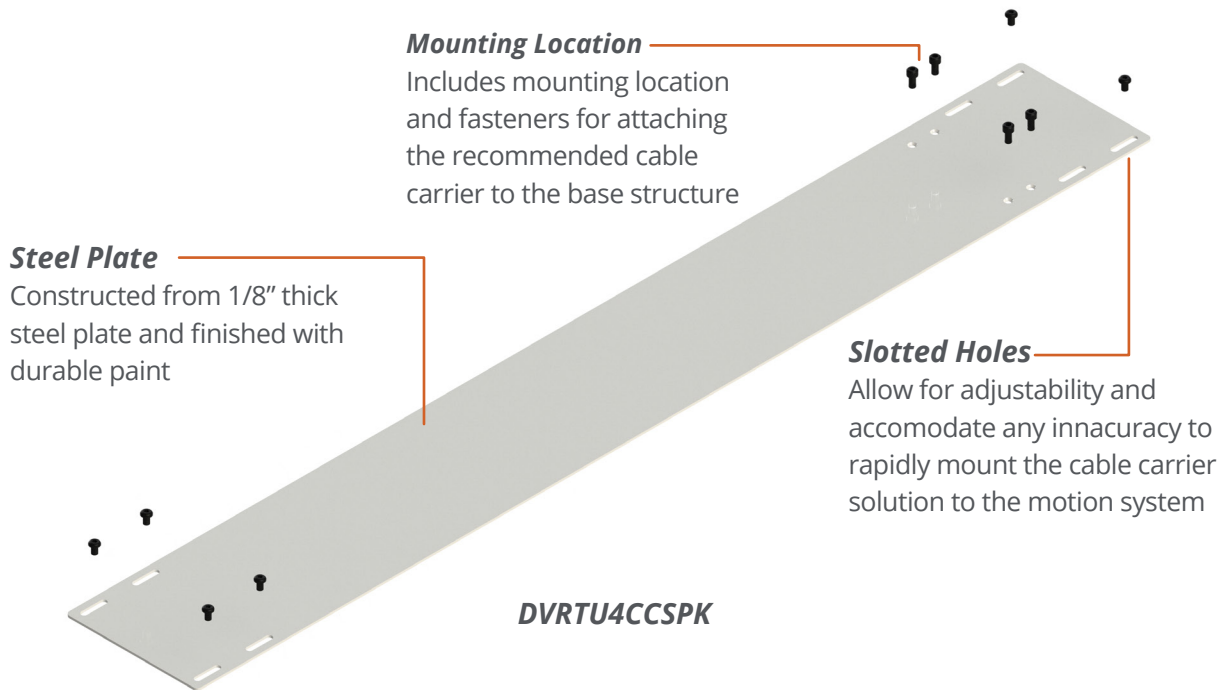


Part Number Scheme			
PREFIX	SIZE	PLATE TYPE	KIT
DVRTU	4	CCME412 (Standard)	K
		CCME4122 (Tall)	

DUALVEE® RTU ACCESSORIES

Cable Carrier Support Plate Kit

The recommended cable carrier is able to operate unsupported over medium distances, but as an option, provide additional support for the cable carrier in the areas that span between the base structure cross-beams. This kit of parts includes the steel plate finished in matching paint and all necessary fasteners. Use multiple plate kits to span longer travel distances.



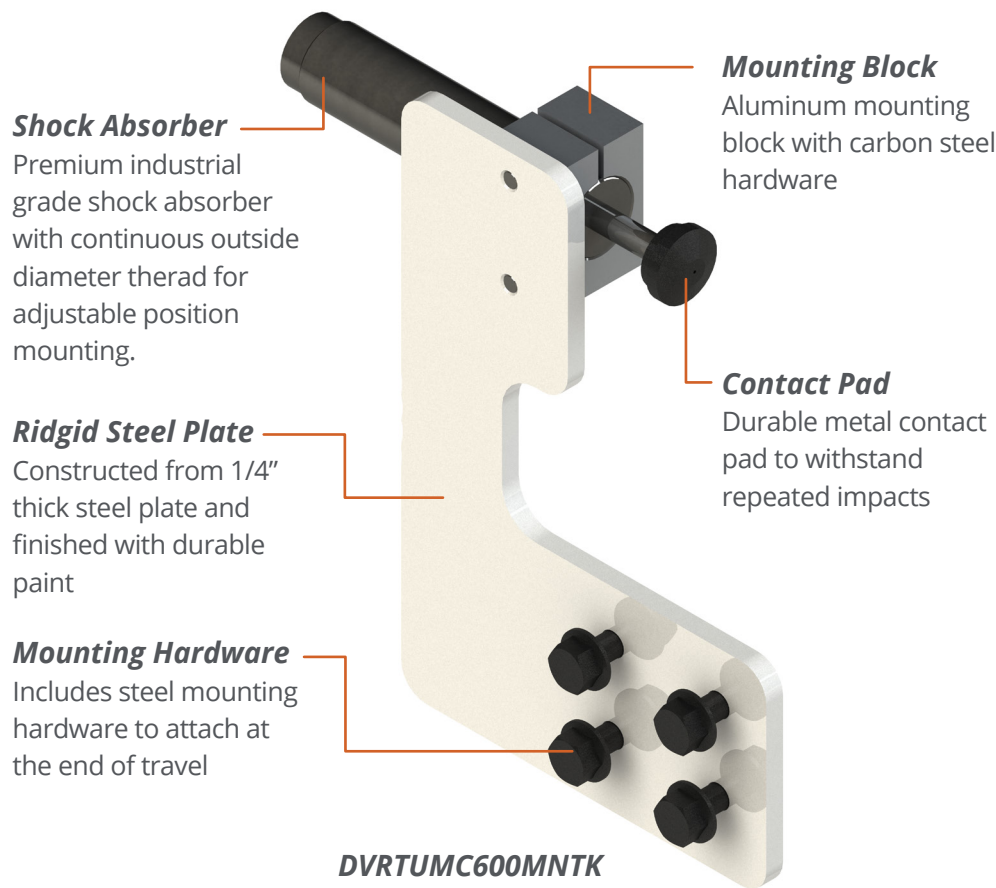
Part Number Scheme			
PREFIX	SIZE	DESCRIPTION	KIT
DVRTU	4	CCSP	K

Longer travel RTU systems will require multiple cable carrier support kits.

DUALVEE® RTU ACCESSORIES

Travel Bumper Mounting Kits

Optional bumpers absorb impact energy at the end of travel in emergency situations to help prevent damage and improve safety. Mounting kits attach to the base structure using carbon steel fasteners and can be attached in a variety of locations including to the inside of the beam as shown below, or to the outside of the beam. Bishop-Wisecarver recommends the use of two bumper kits at each end of travel.



Included Elements:

- Steel bracket with painted finish
- Mounting hardware
- Shock absorber with mount block

Basic Specs:

- Energy capacity of 134 Nm per cycle
- Lifetime use up to 25 million cycles
- Oil dampening with spring return

Part Number Scheme			
PREFIX	SHOCK ABSORBER	DESCRIPTION	KIT
DVRTU	MC600	MNT	K

Not included on RTU system assembly as standard. Add option to order.
Each kit contains one shock absorber. Recommended to add four kits per RTU system.

DUALVEE® RTU ACCESSORIES

Travel Limit Sensor Kits

Non-contact inductive proximity sensors are an important option for enhancing the safe operation of any motion system. The standard RTU motion system includes one (1) travel limit sensor (LP4SNSRINDWPOK) mounted on the starting end and is useful for position homing and for end of travel sensing. Add an additional optional sensor at the opposite end of travel to detect overtravel conditions and trigger an emergency stop condition that could prevent damage or injury. Choose from a variety of sensor specifications to suit your application.

Sensor

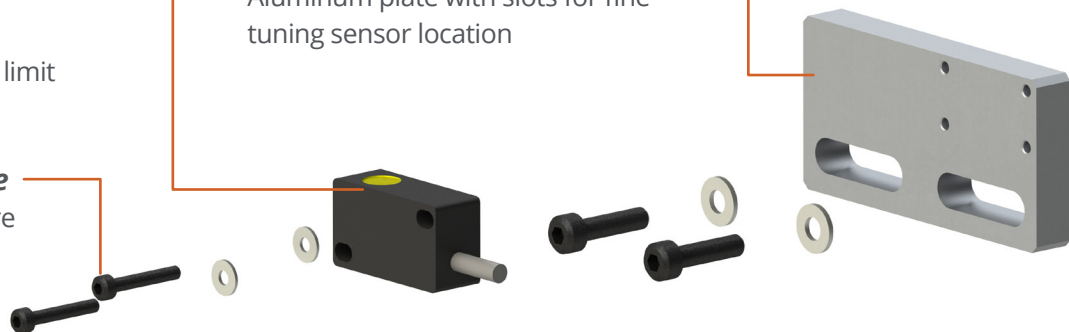
Non-contact inductive proximity sensor for homing and / or travel limit detection

Mounting Hardware

Includes steel hardware to attach the sensor and adjustable plate

Adjustable Mounting Plate

Aluminum plate with slots for fine-tuning sensor location

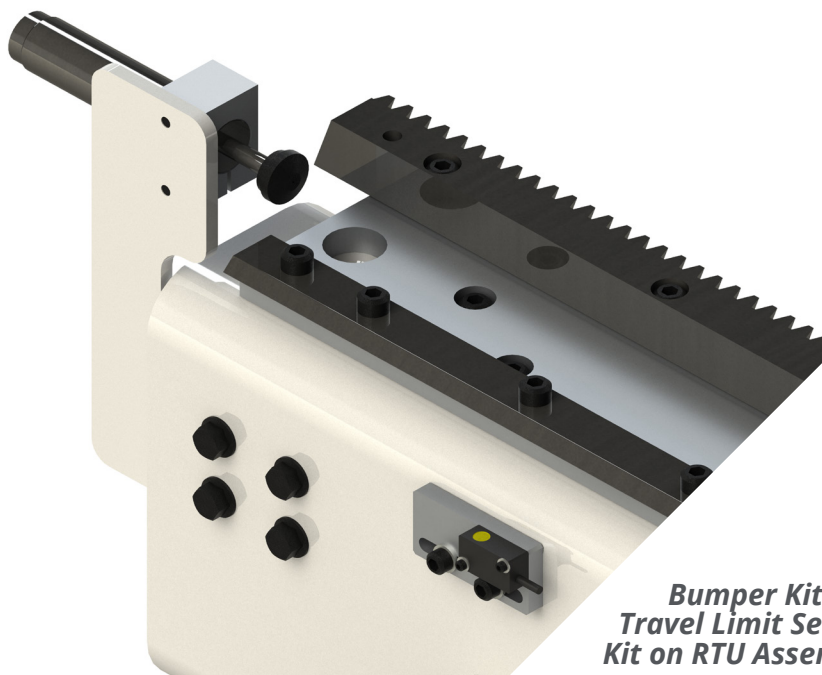


Included Elements:

- Proximity sensor with 2 meter cable
- Mounting hardware
- Adjustable mounting plate

Basic Specs:

- Operating voltage: 6-30 VDC
- Repeatability: $\leq 3\%$ sensing dist. (~0.03 mm)
- Hysteresis: $< 10\%$ sensing dist. (~0.1 mm)
- Voltage drop (sensor on): < 1.8 V
- Max output current: 200 mA
- Switching frequency: 1 kHz
- Absorption at 24 VDC: < 12 mA
- Temp. range: -13 to 158 °F (-25 to 70 °C)
- Ingress protection: IP67

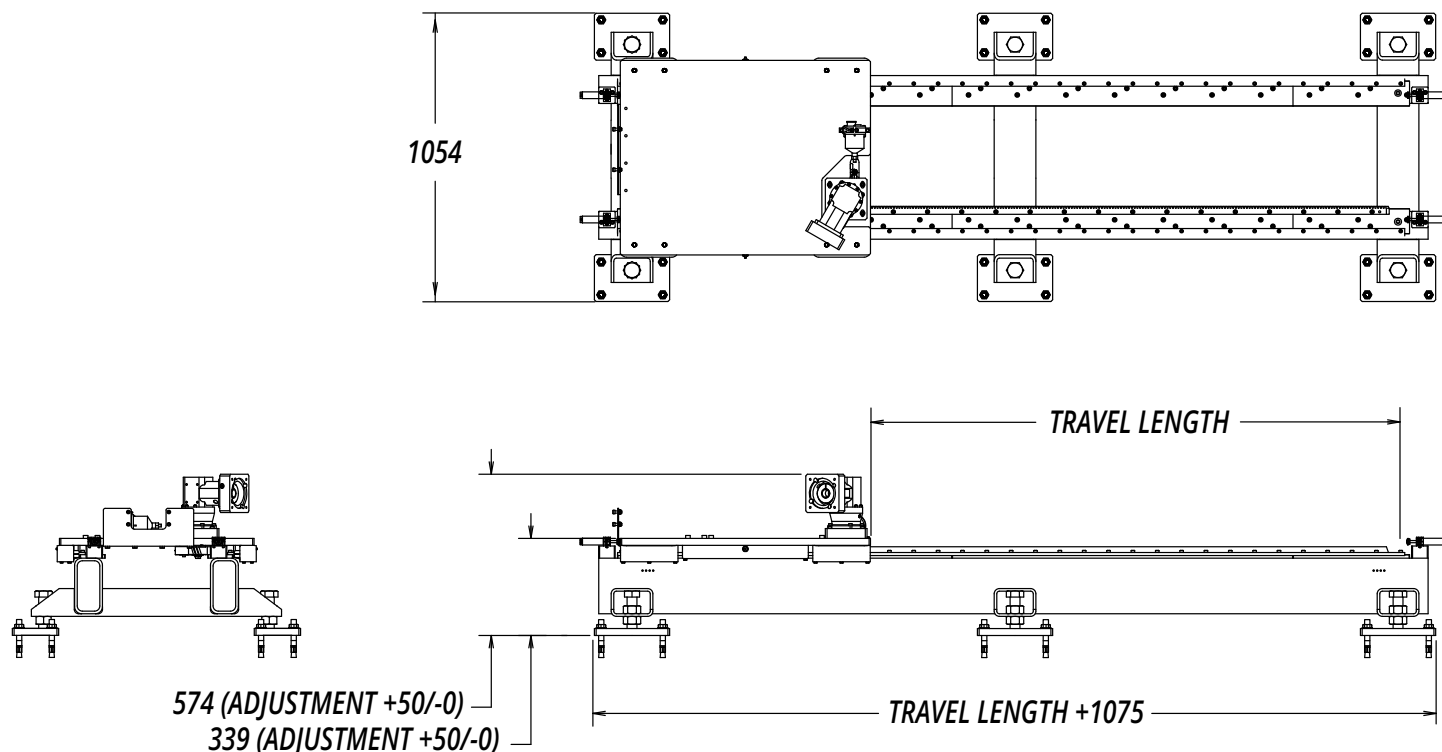


Bumper Kit and Travel Limit Sensor Kit on RTU Assembly

Sensor Kits	
SENSOR TYPE	SENSOR KIT STOCK CODE
PNP Normally Open	LP4SNSRINDWPOK (default)
PNP Normally Closed	LP4SNSRINDWPCK
NPN Normally Open	LP4SNSRINDWNOK
NPN Normally Closed	LP4SNSRINDWNCK

DIMENSIONS AND PART NUMBERS

Overall Dimensions



All values in mm unless specified.

Foot number and spacing varies with travel length. Contact BW for your specific floor mounting pattern.

Actual robot mounting hole pattern will match specified robot, which may impact plate dimensions and overall dimensions; Contact BW for details and updated drawings.

Base System Part Numbers

Part Number Scheme						
PREFIX	TRACK / WHEEL MATERIAL	ROBOT	PEDESTAL (COMING SOON)	-	TRAVEL LENGTH	LENGTH UNIT
DVRTU	4C (Size 4 carbon steel as standard)	Enter letter from Example Robots table; contact us for other robots	N0 (No pedestal)	-	Enter value 2 to 8 (1 meter increments, except 3 m, are standard)	M

Part Number Example:

DVRTU4CFN0-4M = DualVee RTU, size 4 carbon steel, Fanuc M-20iD compatible, no pedestal, 4 meter travel length.

*Robots listed here are for example only; many more robots are compatible with DualVee RTU. Contact us to specify robots not listed here.

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Example Robots	
MANUFACTURER + MODEL NUMBER*	ROBOT
ABB IRB 1600	A
ABB IRB 2400	B
ABB IRB 2600	C
FANUC M-10iD	E
FANUC M-20iD	F
FANUC M-710iC	H
Universal Robotics UR 20	M
Yaskawa GP12	R
Yaskawa GP25	S

LOAD CALCULATIONS

Working Load Capacity

RTU LOAD CAPACITIES	AXIAL L_A		RADIAL L_R		PITCH M_P		YAW M_Y		ROLL M_R		THRUST	
	N	LBF	N	LBF	N-M	LBF-FT	N-M	LBF-FT	N-M	LBF-FT	N	LBF
	52,416	11,784	57,200	12,859	13,593	10,026	14,834	10,941	12,648	9,328	9,948	7,337

Sizing and Selection Tips

The following equation is for the purpose of estimating the applied load factor to the wheel plate and track plate only. System drive components are not accounted for, but should also be considered. Working load capacities are based on empirical data on guide wheels used in general applications with static and dynamic load conditions. Guide wheels can routinely achieve travel life of one million cycles or higher when these specified load capacities are observed.

Step 1: Calculate all forces applied to the wheel plate

Any forces applied on the wheel plate need to be considered, including inertial forces, gravitational forces, external forces such as tool pressure, impact loading, and payload. The most conservative calculations will use max foundational loading values from robot manufacturer catalogs.

If assistance is required in resolving specific loads into the resultant forces, please contact our Applications Engineering staff.

Step 2: Calculate load factor for the wheel plate

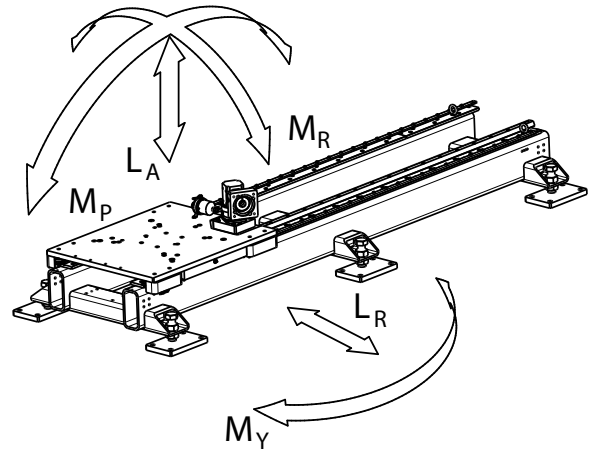
$$L_F = \frac{F_R}{L_R} + \frac{F_A}{L_A} + \frac{T_P}{M_P} + \frac{T_Y}{M_Y} + \frac{T_R}{M_R} \leq 1$$

WHERE

- L_F = Load factor
- F_R = Resultant radial load
- F_A = Resultant axial load
- T_P = Resultant Pitch Moment Load
- T_Y = Resultant Yaw Moment Load
- T_R = Resultant Roll Moment Load
- L_R = Radial Working Load Capacity
- L_A = Axial Working Load Capacity
- M_P = Pitch Moment Load Capacity
- M_Y = Yaw Moment Load Capacity
- M_R = Roll Moment Load Capacity

Since the robot can only be extended in one horizontal direction, it is often possible to use T_R = max applied horizontal moment and T_P = 0.

If the load factor L_F is >1, consider a larger size system.



Step 3: Calculate estimated life with adjustment factor

The Life Estimate below shares units with the Life Constant.

$$\text{Life Estimate} = \left(\frac{L_C}{(L_F)^3} \right) A_F$$

WHERE

- L_F = Load Factor
- L_C = Life Constant
- A_F = Adjustment Factor

Life Constant L_C		
WHEEL SIZE	KILOMETERS OF TRAVEL LIFE	INCHES OF TRAVEL LIFE
4XL	218	8.58×10^6

Adjustment Factor A_F	
CONDITIONS	A_F
Clean, adequate lubrication, low duty, low shock, low vibration	1.0 - 0.7
Moderate contamination, medium duty, medium shock, low to medium vibration	0.7 - 0.4
Heavy contamination, limited lubrication, high duty, high acceleration, medium to high shock, high vibration	0.4 - 0.1