Installation instructions
M-8003-5184-05-A

RENISHAW
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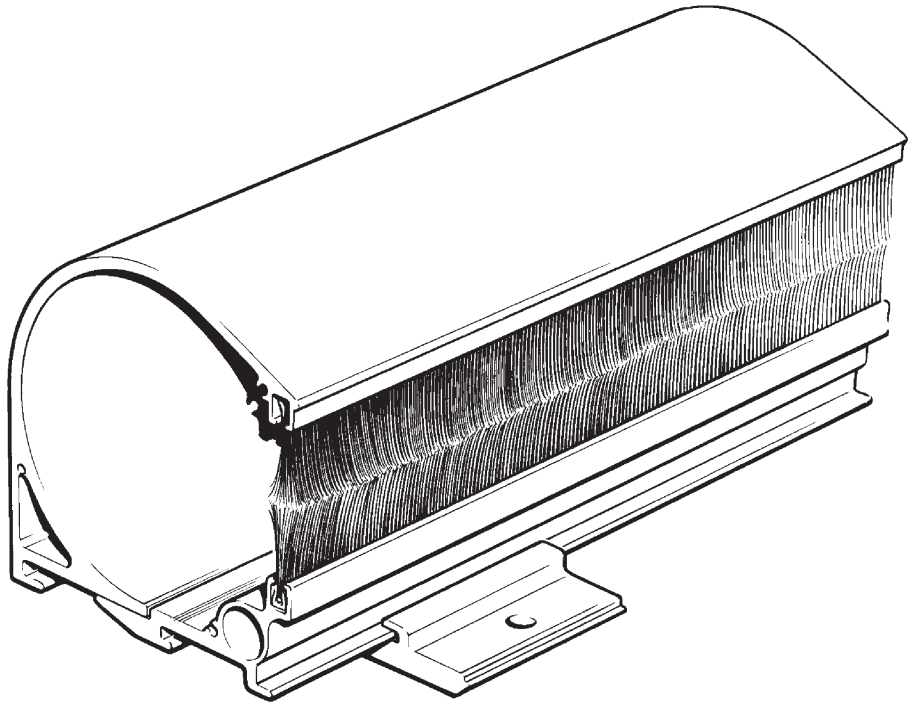
HS20 ducting manual



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Laser safety

DO NOT STARE DIRECTLY INTO THE BEAM

In accordance with EN60825-1, EN60825-2 and US standard ANSI 2136, Renishaw HS20 laser heads are Class II laser products and safety goggles are not required since the blink reaction of a human will protect the eye from damage. Do not stare into the beam or shine it into the eyes of others. It is safe to view a diffuse-reflected beam.

Maximum laser output 1 mW continuous, 633 nm.

Class II laser product.

Renishaw part no: M-8003-5184-05-A

Issued: 11 2012

Introduction

This manual describes the installation of the HS20 ducting system, recommended for use with the Renishaw HS20 laser scale systems in long axis applications.

The HS20 laser scale is an encoder system that uses the principles of interferometry to produce high resolution, high accuracy linear position feedback signals for axis lengths up to 60 m.

Fundamental to the reliability of position feedback is that a stable, accurate laser alignment needs to be maintained along the full axis length. In long range applications, alignment stability can be affected by temperature gradients formed through the beam; these are usually caused by rapidly changing environmental conditions.

Temperature gradients through the beam cause fractional changes in wavelength through the cross section of the beam, with the warmer side of the beam having a fractionally longer wavelength than the colder side. The resultant effect is “beam bending” and, ultimately, misalignment.

These gradients can vary slowly or quickly as a machine’s environment changes in response to a stimulus, such as a door opening, a heater switching on, or sunlight shining on the machine.

The HS20 ducting system protects against the formation of thermal gradients by including an “air feed” system that stirs the air over the entire axis length.

The HS20 ducting system is based upon a standard extrusion supplied in 3 m lengths. To provide application flexibility, this extrusion can be mounted by either of two methods: with standard brackets, a cross section of 155 mm × 121 mm is required along the axis whereas, with low profile brackets, the required section is reduced to 118 mm × 121 mm.

Parts list

The various components that make up the ducting system are supplied in kit format. Detailed below are the part numbers for the duct kit, the two different accessory kits and the individual parts included within each kit.

Many of the parts are identified in Figure 1.

Description	Qty
3 m Duct kit A-8003-4122	
Main body (3 m)	1
Cover extrusion (3 m)	1
Brush strip (3 m)	2
3 m Duct standard accessory kit A-8003-4290	
Air connector	1
Duct alignment slide	1
Joint cover assembly	1
Support bracket	3

Description	Qty
3 m Duct low profile accessory kit A-8003-4291	
Air connector	1
Duct alignment slide	1
Joint cover assembly	1
Locking bracket	2
Retainer	2
Bracket – low profile	3
Single axis kit A-8003-4121	
End cover plate	2
Screw, self-tap	10
Installation instructions	1
Pneumatics kit A-8003-4375	
Filter/regulator	1
Tubing, 10 mm O.D. nylon	2 m
Tool, 3/8” BSP tap	1

Duct assembly

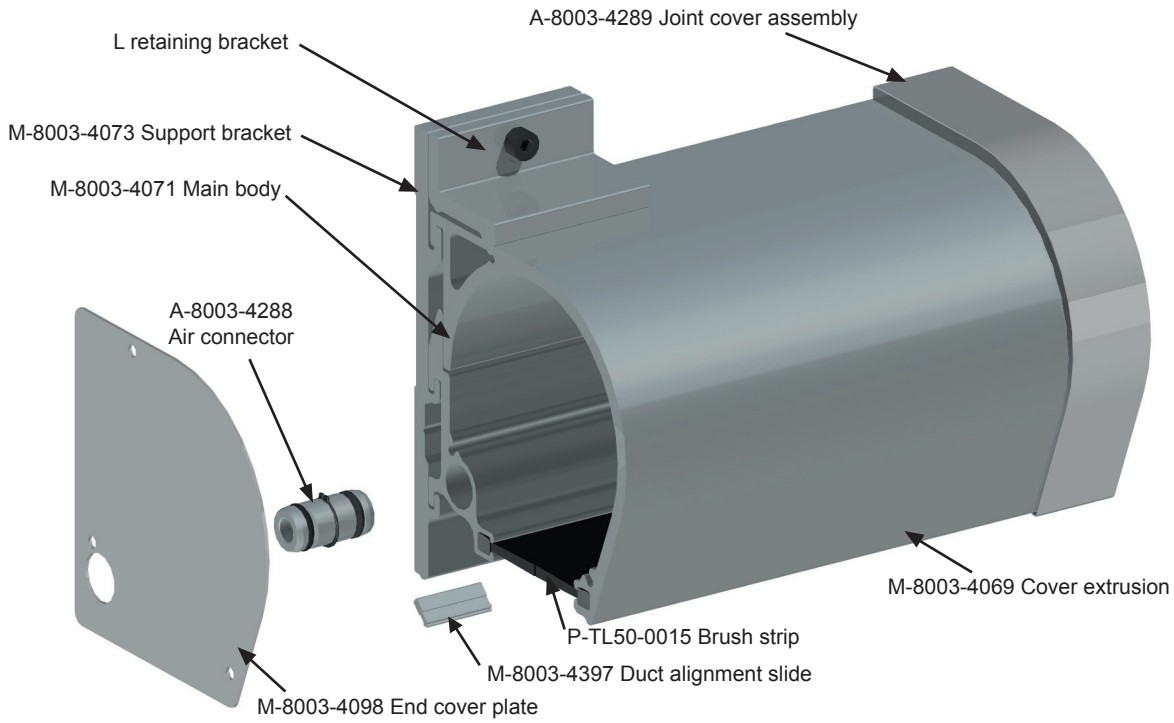


Figure 1 – Main parts assembly drawing (standard ducting)

Typical supplied quantities

For each 3 m Duct kit (A-8003-4122) ordered, one 3 m Duct accessory kit should also be ordered with it (A-8003-4290 or A-8003-4291).

Each finished axis length of ducting should have one Single axis kit ordered for it (A-8003-4121).

Optionally, each axis could have one Pneumatics kit ordered for it (A-8003-4375). Alternatively, customers may choose to utilise their own air filter and regulator. An overview of kit configuration is shown in Figure 2.

Example:

A gantry axis is mounted on a 30 m bed. There are HS20s providing position feedback for each side of the gantry (X1 and X2). The following quantities should be ordered:

20 qty	3 m Duct kit	A-8003-4122
20 qty	3 m Duct standard accessory kit	A-8003-4290
(*or 20 qty*	*3 m Duct low profile accessory kit*	*A-8003-4291)*
2 qty	Single axis kit	A-8003-4121
1 qty	Pneumatics kit (optional)	A-8003-4375

Notes:

HS20 laser X1 covers a distance of 30m and therefore requires 10 lengths of 3 m ducting (A-8003-4122). HS20 laser X2 also covers a distance of 30m and therefore requires an additional 10 lengths of 3 m ducting. This makes a total of 20 ducting kits. Each of these kits requires an accessory kit. Therefore either 20 standard accessory kits (A-8003-4290) or 20 low profile accessory kits (A-8003-4291) must be ordered.

X1 and X2 are treated as two separate axes, therefore they require a single axis kit (A-8003-4121) for each axis, making a total of two kits.

To prevent contamination of the air inside the duct from oil or water, a recommended pneumatics kit is available from Renishaw (A-8003-4375). This offers double filtration through a 5 µm filter and 0.3 µm mist separator. Both of these items automatically drain to prevent the system from becoming blocked. However, if the user chooses to supply an alternative feed, then it is essential that the air feed is well filtered, clean and dry, and meets the following specification:

Basic filtration	5 µm (with autodrain)
Mist separation	0.3 µm (with autodrain)
Output pressure	2 bar – 3 bar (29 psi – 44 psi)
Output flow rate	200 l/min

Particle filtration and mist separation units must be autodraining to prevent moisture being sprayed into the beam path.

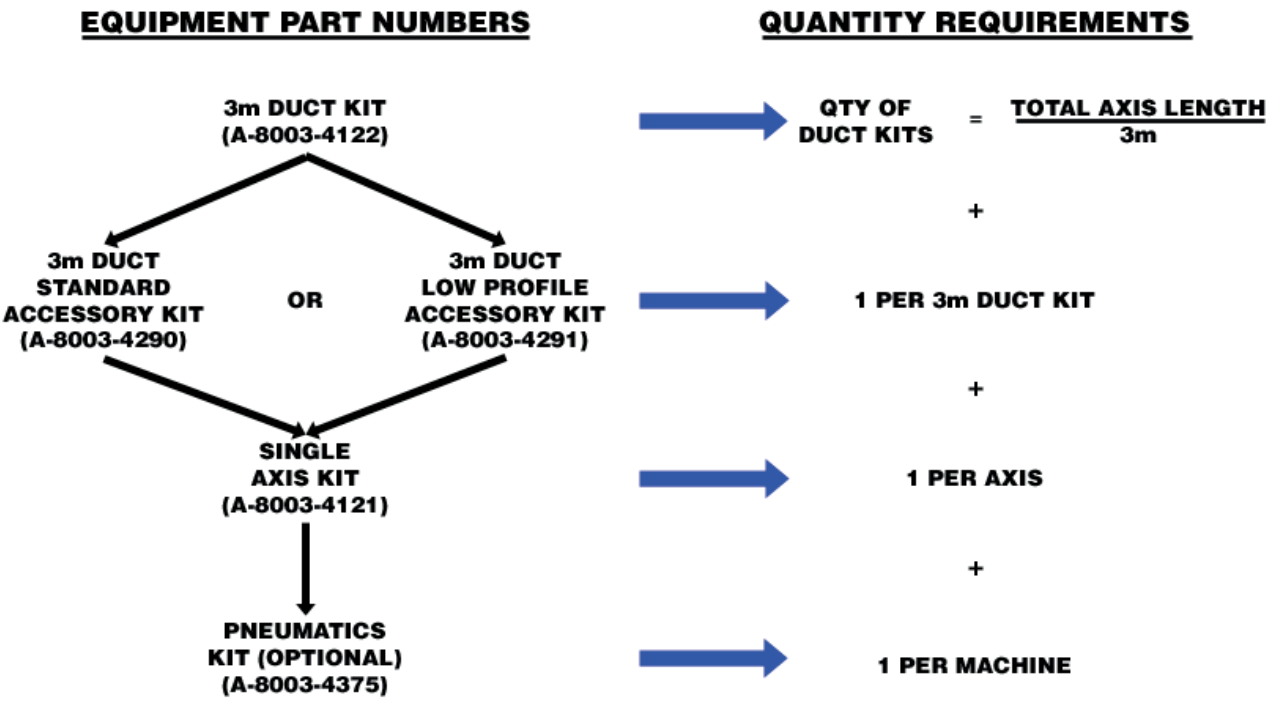
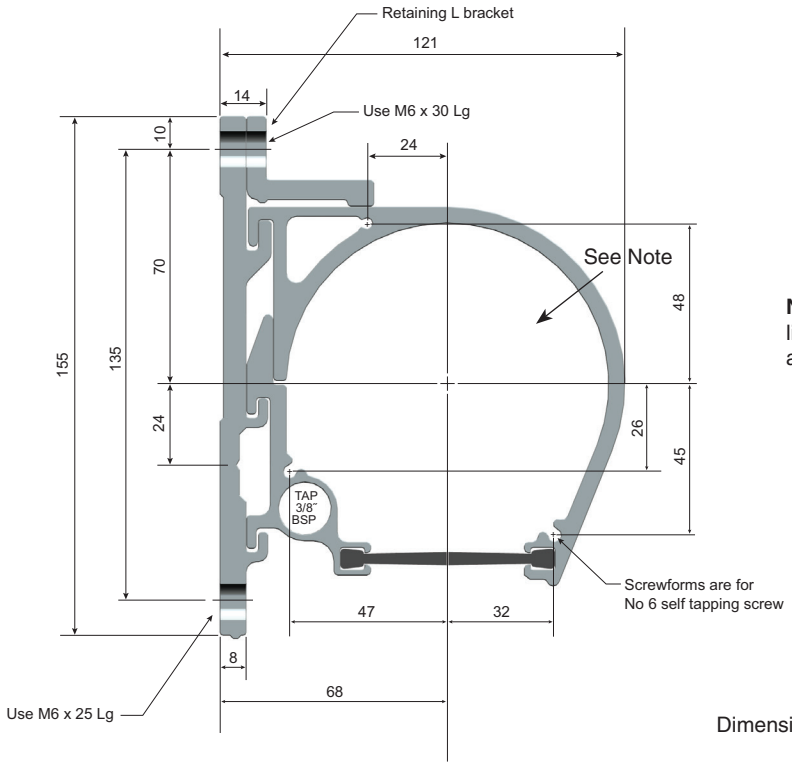


Figure 2 – Ordering guide (per axis)

Standard vs low profile accessory kits

The main difference between standard and low profile accessory kits is the amount of space that the mounting bracket takes up on the machine. The standard accessory kit consists of a one-piece bracket mounted using M6 (¼") cap head screws (not supplied) outside the ducting cross section. The retaining L bracket snaps off from the mounting bracket and is held in place using the same cap head screw that is used to hold down one side of the ducting (see Figure 3).



Note: This ledge is centre line reference of duct for alignment purposes.

Figure 3 – Standard ducting cross section

Low profile ducting is fixed using M6 (¼") cap head screws (not supplied) underneath the ducting itself with a smaller bracket. This allows the bracket to be fitted in areas where there is limited mounting space (see Figures 4 and 5).

This low profile design with hidden cap head screws requires that the ducting be held in place by an alternative locking bracket and retainer.

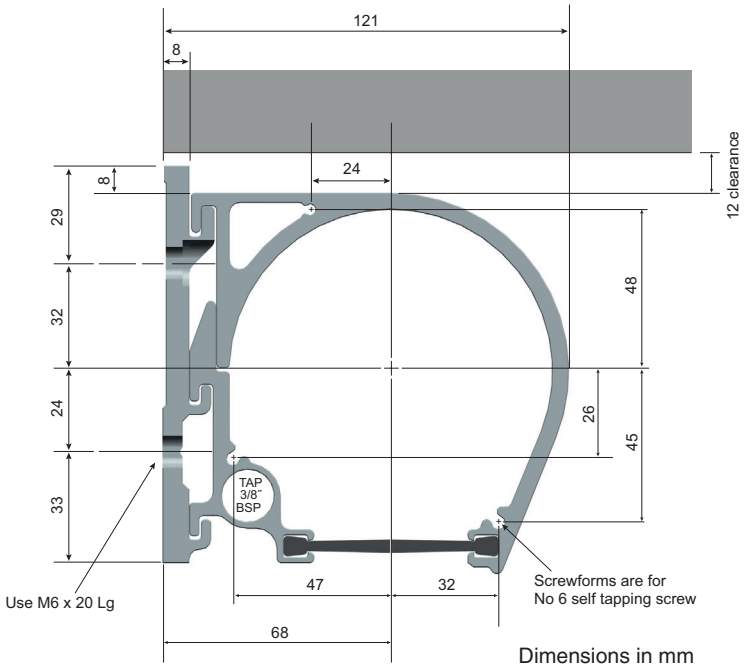


Figure 4 – Low profile ducting cross section

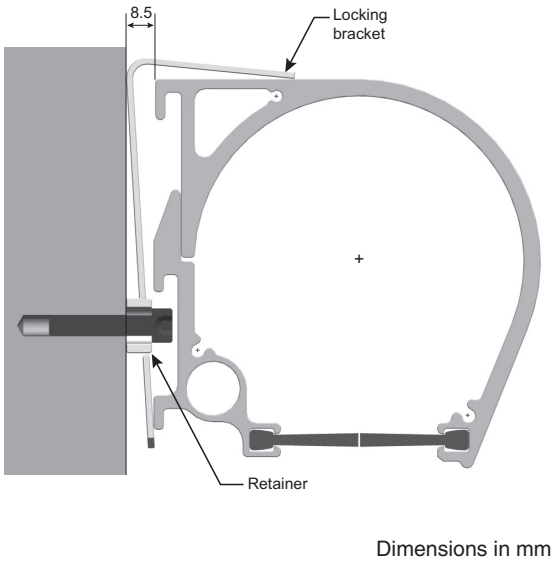


Figure 5 – Low profile ducting (view includes locking bracket)

Installation

The ducting may be installed in two different horizontal orientations (see Figure 6).

Note: The ducting may *not* be installed vertically.

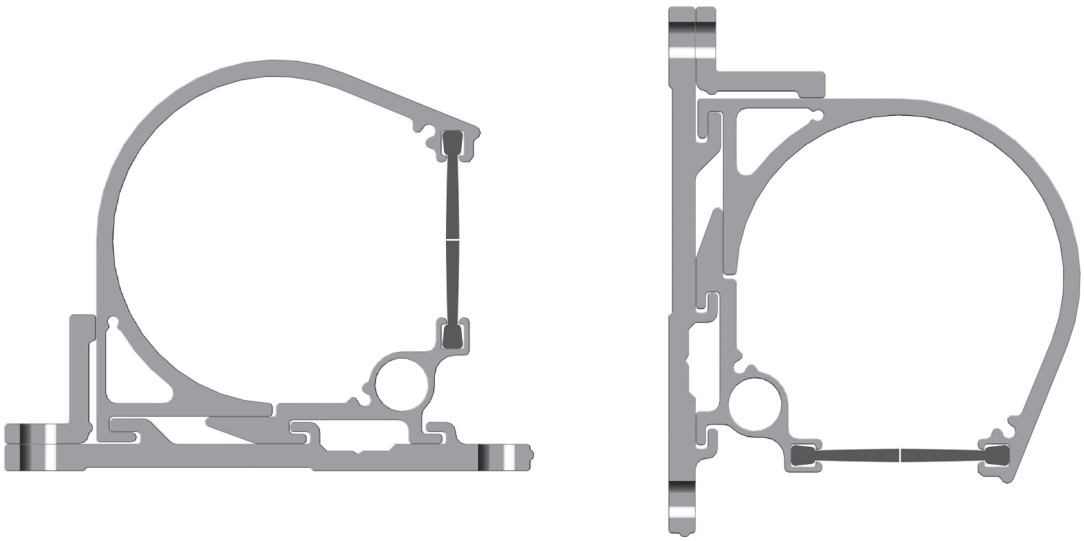


Figure 6 – Duct mounting orientations

Ensure that there is adequate access to fit and adjust the brackets and ducting before starting the installation (see Figures 3 and 4).

Each 3 m section has a length tolerance of ±2 mm. Therefore it may be that main body sections and cover extrusions do not always line up perfectly with each other. After installation only the cover extrusions can be removed for access and these are completely independent of the main body extrusion position. Allow any extra lengths to build up and only cut at the end of the run of ducting. Do not cut each individual section to match its corresponding half.

Standard ducting

1. Prepare the machine for the ducting by drilling and tapping M6 (¼") mounting holes as necessary for the number of support brackets being used (see Figure 7). Three support brackets are used for each 3 m length of ducting.

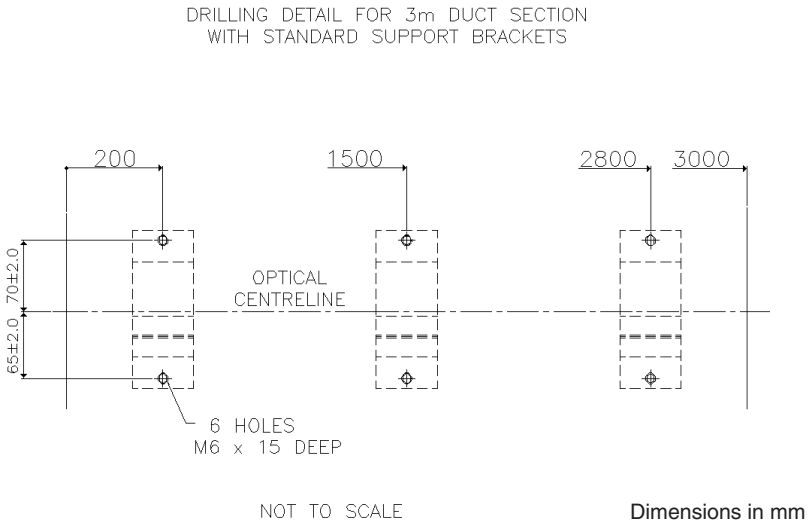


Figure 7 – Drilling detail for standard support brackets

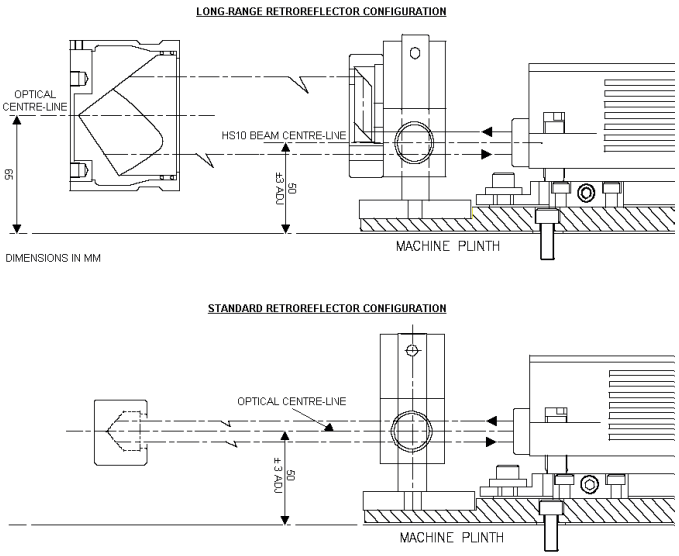


Figure 8 – Optical centre line definition

2. Prepare the main body and cover extrusions for fitting by sliding a brush strip into the square-sided channel on each extrusion (one per extrusion length).
3. Clamp each support bracket and snap off the L bracket on the end of the bracket (see Figure 9).
4. Fit the support brackets to the machine using suitable M6 (¼") cap head screws (not supplied). Lightly tighten the cap head screws to hold the support brackets in place.

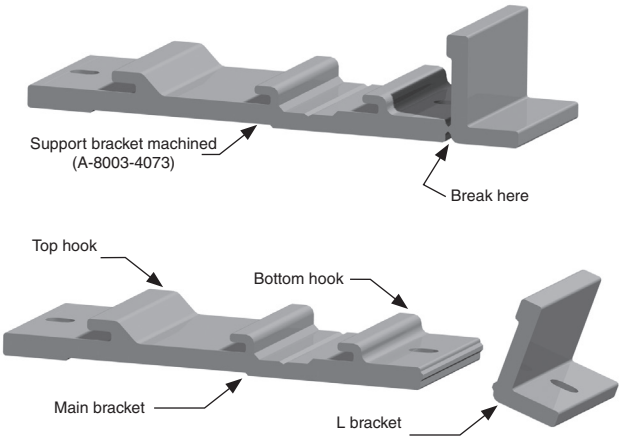


Figure 9 – Support bracket preparation

5. Place the main body extrusion on to the bottom locating hooks on the support brackets. Fit an air joint assembly to one end and fit the second extrusion on to the air joint and support brackets. Repeat along the axis length. Measure and cut the final length to fit as required.

6. Adjust the height of the support brackets to ensure that the ducting will sit level along the axis length. Fully tighten the bracket screws nearest the brush seal.

7. Once the main body sections are fitted, it is preferable to fit all cover extrusions apart from the two end sections. This is to allow access to the retroreflector at either end of the axis during the laser alignment procedure. When fitting the cover, it is advisable to move the machine to the near field with respect to the laser, then start fitting the cover extrusion from the same end. After fitting each extrusion, move the machine slowly through the duct to ensure that there is no collision between the retroreflector and the duct.

8. Fit a cover extrusion on to the top hook of the support brackets. Use a duct alignment slide (A-8003-4397) between adjoining cover extrusions (see Figure 10).

9. Remove the cap head screw from the support bracket and fit the L retaining bracket. Replace the cap head screw to hold it in place. Apply light pressure to the retaining bracket to ensure a close fit and tighten the cap head screw fully.

10. Fit a second cover extrusion on to the support brackets and position it with 1 mm to 2 mm clearance from the fitted section to allow for later removal. As before, fit the L retaining bracket on top of the ducting. Repeat along the length of the axis. Measure and cut the final length to fit as required.

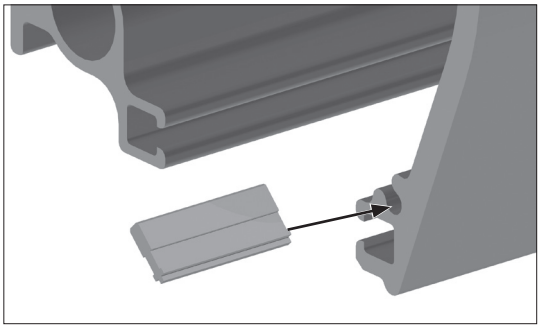
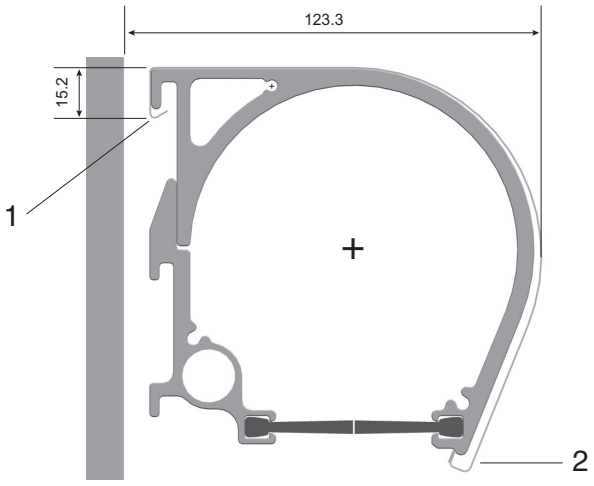


Figure 10 – Duct alignment slide location

11. Fit the end plate to the far end of the ducting using the self-tapping screws (supplied).

12. Fit a joint cover to each joint of the ducting. Hook the joint cover on to the back of the cover extrusion (1) and clip into place under the front edge (2) of the cover extrusion (see Figure 11).



Dimensions in mm

Figure 11 – Joint cover fitting

Low profile ducting

1. With the exception of the locking brackets, this ducting is fitted in the same manner as the standard ducting. These low profile brackets are used to hold the low profile ducting in place and are fitted in a different position to the standard support brackets. The hole positions for the low profile support brackets are shown in Figure 12.

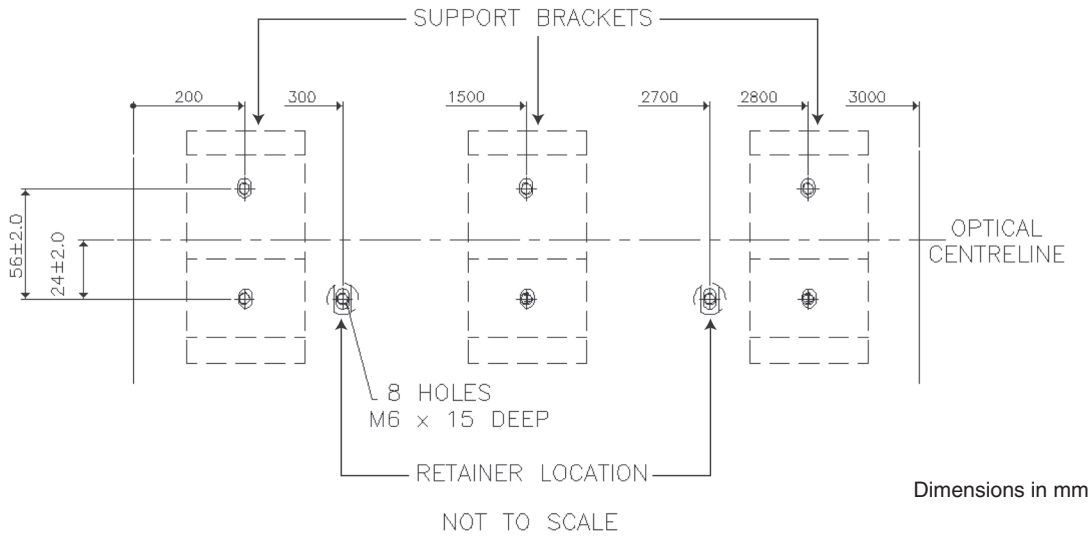


Figure 12 – Drilling detail for low profile brackets

2. Fit an M6 (¼") cap head screw through the retainer and tighten with the flats of the retainer held in a vertical orientation (see Figure 13). Use the mid-position of the slot as an initial height adjustment.
3. Place the main body extrusion (thin profile) on to the bottom locating hooks on the low profile support brackets. Fit an air joint assembly to one end and fit the second extrusion on to the air joint and low profile support brackets. Repeat along the axis length. Measure and cut the final length to fit as required.
4. Adjust the height of the low profile support brackets to ensure that the ducting will sit level along the axis length.
5. Once the main body sections are fitted, it is preferable to fit all cover extrusions apart from the two end sections. This is to allow access to the retroreflector at either end of the axis during the laser alignment procedure. When fitting the cover, it is advisable to move the machine to the near field with respect to the laser, then start fitting the cover extrusion from the same end. After fitting each extrusion, move the machine slowly through the duct to ensure that there is no collision between the retroreflector and the duct.
6. Fit a cover extrusion on to the hook of the low profile support brackets. Use a duct alignment slide (A-8003-4397) between adjoining cover extrusions (see Figure 10).

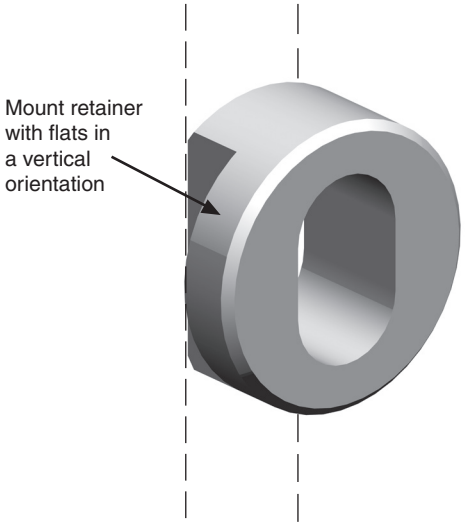


Figure 13 – Retainer fitting

7. To lock, slide the locking bracket down between the machine and the ducting and align with the retainer. Press down firmly on the locking bracket until it “snaps” forward and engages with the retainer. When in position, the spring force of the bracket forces it over the round section of the retainer to hold it in place.

8. To unlock for removal, push down on the top of the locking bracket (unlock 1 – see Figure 14), simultaneously applying pressure to the bottom of the bracket (unlock 2 – see Figure 14) to force it away from the ducting. Release the pressure at unlock 1 and allow the locking bracket to relax upwards. Remove the locking bracket.

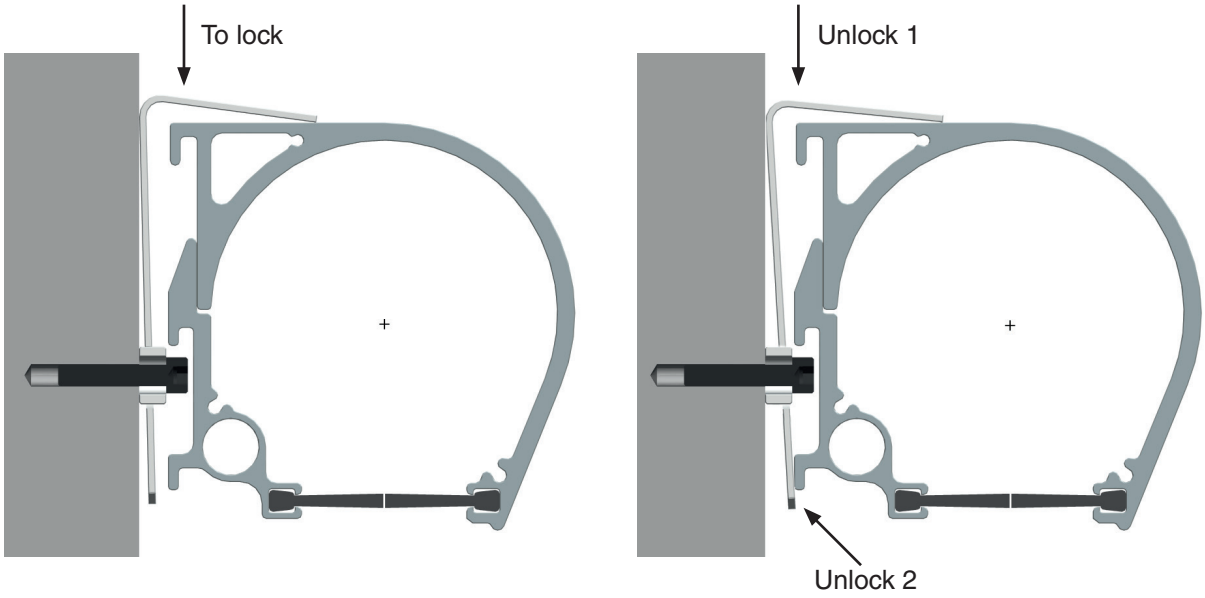


Figure 14 – Locking bracket operation

Air regulator fittings

Use of the Renishaw pneumatics kit is optional. When used, it is essential that there is a constant, filtered, dry air feed applied to the ducting installation. The following instructions detail a common approach to installing an air regulator system:

1. Once the ducting has been installed, tap the air hole at both ends of the ducting with the 3/8" BSP tap provided in the pneumatics kit, if purchased.
2. Choose either a straight or 90° fitting (both supplied in the pneumatics kit), depending on space available. Fit this into the end of the ducting closest to the regulator.
3. Fit a 3/8" BSP taper plug (provided in the pneumatics kit) into the far end of the ducting to seal the duct.
4. Fit 10 mm O.D. nylon tubing (included with the regulator kit) to the chosen fitting. Connect the other end to the output of the regulator.
5. Attach a suitable air supply to the 3/8" hosetail input of the regulator.
6. Turn on the air supply and adjust the regulator to output between 2.0 bar and 3.0 bar (≈29 psi to 44 psi) air pressure. This will produce approximately 0.5 bar (≈7 psi) pressure drop along a 60 m ducting installation. If this is not available on site, the long lengths of ducting may be fed from both ends using an output pressure from the regulator of 1.0 bar to 1.5 bar (≈14 psi to 21 psi).

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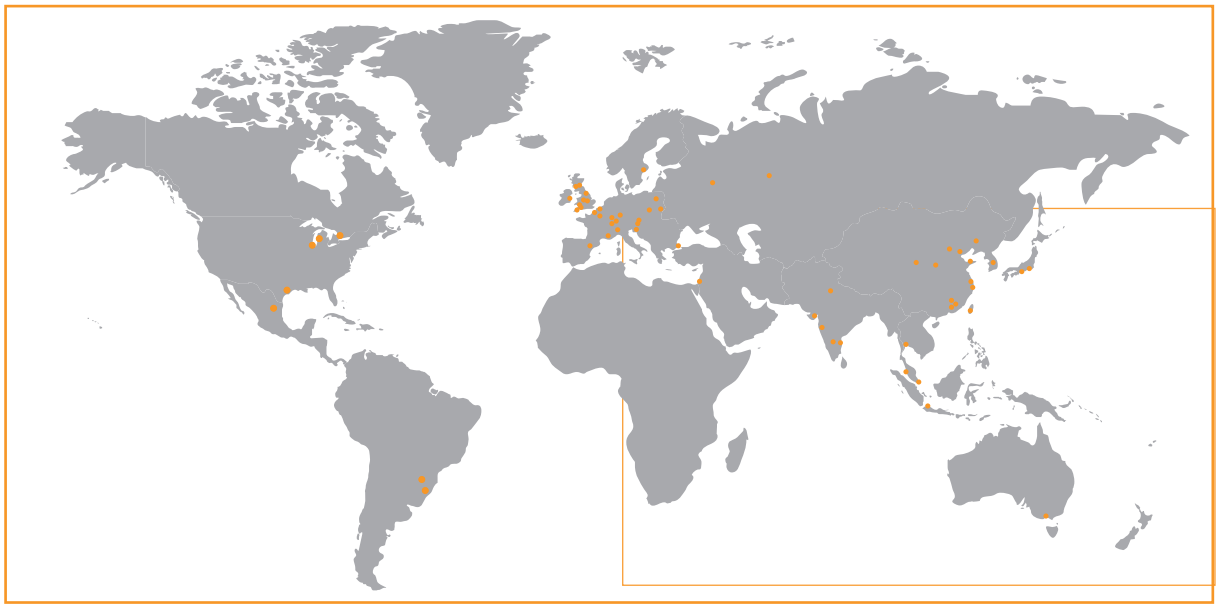

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