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HAPI®

HAPI® Tool User Manual

Region
All Regions

HAPI® Miniflex® Cable Installation Tool

User Manual

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User Manual

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Safety Information

When using fiber optic equipment, basic precautions should always be followed to reduce the risk of injury to persons, including the following:

1. Follow all warning and instructions marked on the product.

2. Laser light can be visible or invisible and can cause serious eye injury.
    a. *Do not look directly into the end of a fiber optic connector.*
    b. *Do not look directly into the end of a fiber optic adapter having a fiber optic connector.*

3. Install dust caps or plugs onto unused fiber optic connectors or non-shuttered fiber optic adapters.

4. Open microducts should be capped off with suitable dust caps or gas block connectors when not in use.

The HAPI® tool allows Miniflex® cables to be pushed into microduct significantly faster and with less effort than traditional hand pushing. While installation distances are not necessarily longer, the time to deploy fiber and the risk of cable damage are greatly reduced.

The tool is quick and easy to assemble and use, featuring functionality to set up the tool for both left and right handed operation. The HAPI is light weight, ergonomic and low maintenance. This user guide gives a comprehensive overview of what is included in the kit, setting the tool up, using the tool, trouble shooting installation problems and details how to maintain the HAPI.

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1.0 HAPI® Tool Parts

1.1 What's in the HAPI Tool Box

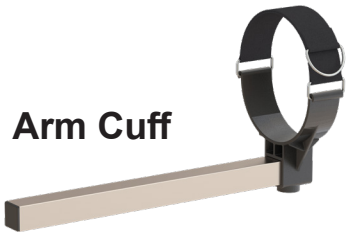
Description	Part Number
Miniflex® Cable Installation Tool	10-HAPI-01
Olives for 5 mm Microduct	10-HAPI-Olive05
Olives for 7 mm Microduct	10-HAPI-Olive07
Olives for 8 mm Microduct	10-HAPI-Olive08
Olives for 10 mm Microduct	10-HAPI-Olive10
Monopod	10-HAPI-MONOPOD

NOTE: The HAPI Tool comes with an Arm Cuff and Hand Grip included (see illustrations below)

1.2 HAPI Tool Kit

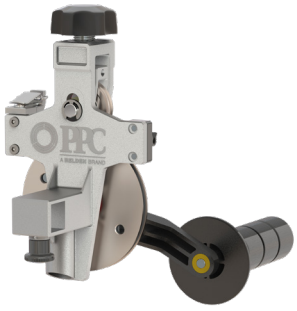
HAPI Kit in Case

Arm Cuff



Olives

Tool Body



Hand Grip

Monopod

1.3 Spare Parts

The HAPI® Tool is manufactured to last and should not need any consumables for at least 50,000 m/1,000 installations, assuming the tool is used properly and operated with care.

In addition to the Tool Kit, the following components can be re-ordered for the HAPI Tool.

Description		Part Number
Miniflex® Cable Installation Tool		10-HAPI-01
Olives	5mm Microduct Olives	10-HAPI-Olive05
	7mm Microduct Olives	10-HAPI-Olive07
	8mm Microduct Olives	10-HAPI-Olive08
	10mm Microduct Olives	10-HAPI-Olive10
Monopod		10-HAPI-MONOPOD
Adapter for Camera Tripod		10-HAPI-Adapter
Tyre/Wheel Assembly		10-HAPI-WHEEL
Microduct Olive Set: 5-10mm (2 pairs each)		10-HAPI-OLIVESET
Cable Guide		10-HAPI-GUIDE

2.0 How to Assemble the HAPI® Tool

The HAPI® Tool is supplied in a ruggedized case which contains all of the parts required to assemble and use it (see page 5 for identifying these). It can also be used with an optional camera tripod.

See the following pages for setting up the HAPI and using it.

HAPI Tool Kit with the case open, showing the contents

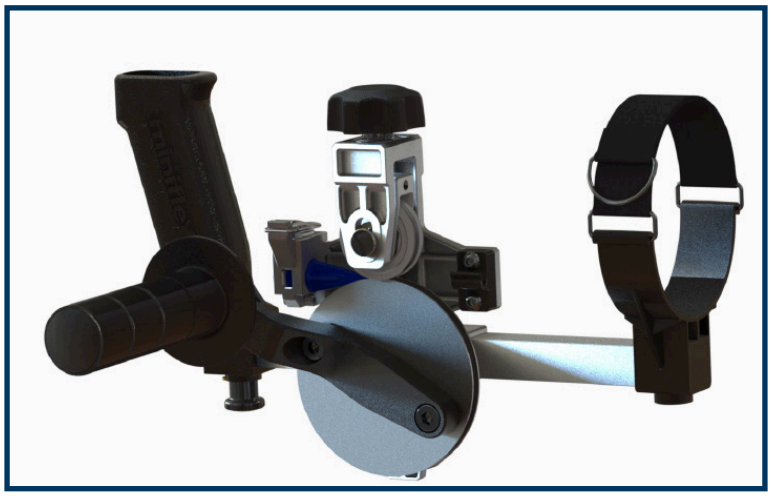
Tripod adapter

Optional camera tripod for mounting the HAPI with the supplied adapter

2.1 Tool Set Up

The HAPI® Tool can be configured for left- and right-handed operation.. The default setup is right handed (crank handle is operated by the right hand). For left handed operation, the cable guide and microduct clamp orientation is swapped, as illustrated in the image below.

Left-handed set up

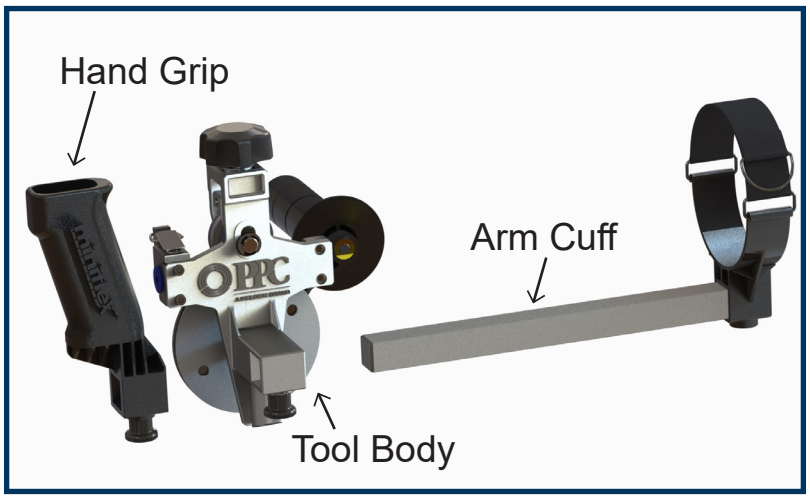


Right-handed set up

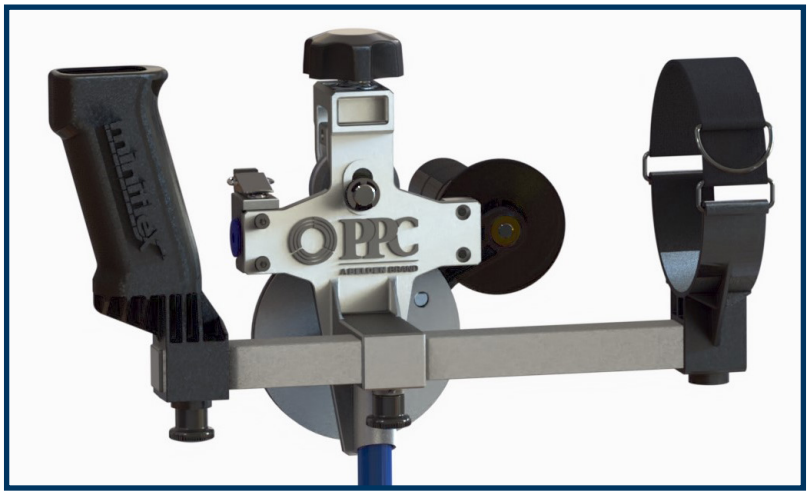
2.2 Cuff and Grip Adjustment

To operate the tool, the arm cuff and hand grip must be fitted to the tool body as shown below. Both parts are fixed to the main body via index plungers.

A series of holes located on the underside of the arm cuff allow for multi-positioning of the cuff and grip. This provides the best possible ergonomics and it is advisable to first find the most comfortable position.



Assembled with arm cuff & hand grip



2.3 Inserting the Monopod

For extended periods of use, the HAPI® Tool is supplied with a height adjustable monopod.

The pole is inserted into the base of the main body into the tapered hole.

The height is adjusted by opening the latch, sliding the pole upward or downward and locking the latch when the pole is at the desired height.

Latch open

Latch closed

2.4 Using a Suitable Pay-Off

The cable being installed should be placed onto a zero/low tension payoff stand to prevent unnecessary tyre wear.

The PPC Spool Sleeve, Reel Bag, Pizza Box and Cable Caddie are ideal cable payoffs for use with the HAPI® Tool.

Dispense the cable from the top of the reel to offer the best height alignment into the HAPI cable guide.

3.0 Using The Tool

There are a number of considerations to take into account when planning to use the HAPI® Tool to install Miniflex® cable into microducts. These are considered below and in the following pages.

3.1 Crash Test

Before using the HAPI tool, it is recommended that a crash test be performed to determine the maximum force/torque that can be safely applied to the cable. A crash test helps the operator to understand how much force can be safely applied to the crank handle without causing the cable to slip or become damaged.

The distances quoted in the chart (see 3.3 on pg. 13) are benchmark guidelines but should not be considered exact. Depending on the nature of the route and the performance of the microduct, shorter or longer distances might be achieved. The operator should not simply assume that the cable can be installed a certain distance without first performing a crash test.

The crash test will indicate to the operator the safe level of force to use when turning the drive wheel. The crash test should be undertaken whenever a different size/type/fiber count of cable or microduct is used.
The steps below outline a simple way to perform a crash test to prevent excessive force being applied.

Crash Test Method

1. Cut a short length of microduct (the length should be long enough to allow acceleration of the cable to achieve a realistic pushing speed).
2. Block the end of the duct with a suitable end cap or plug. Kinking the end of the microduct will have the same effect if no end cap is available.
3. Using a scrap length of cable that is at least 0.5 m longer than the microduct, set the tool up as outlined in sections 3.4 to 3.6 of this user guide.
4. Crank the handle as detailed in section 3.6. When the cable meets resistance at the end of the microduct, gradually apply more force until the cable slips or becomes damaged. If necessary, tighten the tensioning knob to provide maximum grip from the drive wheel.
5. When no more tension/grip can be applied and the drive wheel continues to slip or the Miniflex cable becomes damaged, the maximum pushing force has been witnessed.
6. Take note of the force being applied before the cable slipped or became damaged. This represents the maximum pushing force and should be recalled when using the HAPI tool to prevent undesirable cable damage.
7. Remember that using a different cable construction or microduct will require further crash testing.

3.2 Cable and Microduct Size Chart

The Miniflex® cable should be installed into a suitable-sized microduct.

Pushing Miniflex into an oversized duct (too large an ID) can result in cable buckling if the pushing force it too high. Pushing into an undersized duct can limit the installation distance.

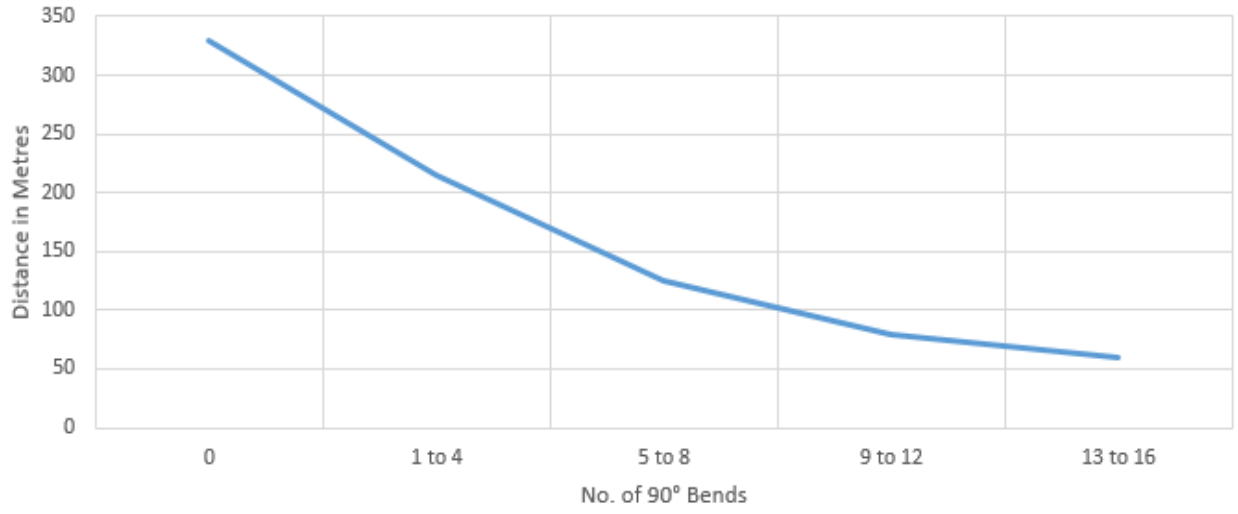
Aim to use the optimum cable and duct combination – see chart below. When the combination is not optimum, use caution when installing the cable to prevent potential fiber damage.

	Microduct Inner Diameter / Bore Size			
Miniflex Cable	3.0 - 3.5 mm	3.5 - 4.5 mm	5.0 - 6.0 mm	6.0 - 7.0 mm
2.2mm	Yes	Yes	Not Optimum	No
3.0mm	No	Not Optimum	Yes	Yes

3.3 Distance / Bend Chart

Installation distance is dependent on a number of factors including the efficiency of the microduct (low friction), the size combination (see chart in section 3.2 above) and the number of bends in the route (quantity and radius).

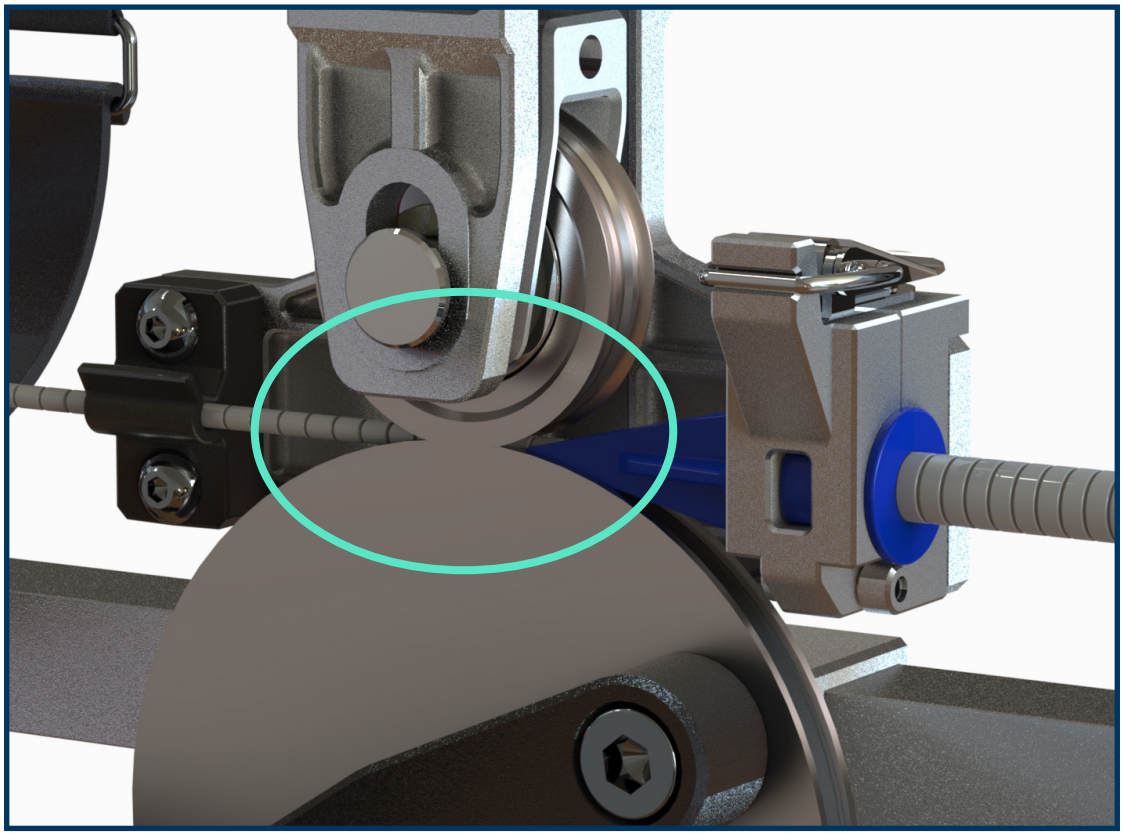
The distances expressed in the table below are approximations based on a low friction microduct (such as PPC Microduct) and bends not less than 200mm radius.



3.4 Inserting the Cable

The cable must pass through the Cable Guide and between the large (drive) wheel and the small (auxiliary) wheel. The steps below are guidelines only.

It is recommended to insert the cable prior to connecting the microduct but operators should find a practice that suits them best. Instructions for connecting the microduct to the HAPI® Tool are detailed in the section 3.5 of this document.



1. Turn the tensioning knob to raise the auxiliary wheel and allow the cable to pass between the auxiliary wheel and the drive wheel.

2. Hold the cable and thread it through or press it into the cable guide.

3. Pull about 1 m (approx. 3 ft) of cable through the tool and between the two wheels.

4. Turn the tensioning knob to lower the auxiliary wheel onto the cable.

3.5 Microduct Connection

Connecting the microduct is a process of attaching the pair of adapters/olives to the end of the microduct and retaining them in the clamp mechanism.

The HAPI® Tool is supplied with four sizes of olive to cater for a range of common microduct sizes:

The olives have internal ribs to grip the microduct. In the case of PPC Miniflex® microduct these ribs align with the Miniflex grooves.

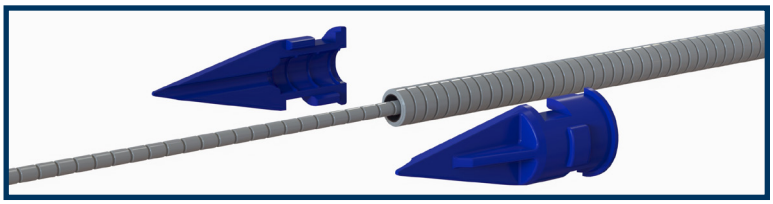
Ensure that the microduct bore is clean, dry and empty before proceeding with the installation. There are two main approached to connecting the microduct - see sections 3.5.1 and 3.5.2 that follow. It is recommended that the operator finds the method which best suits them.

Microduct Size	Olive Color
5.0 mm	Black
7.0 mm	Green
8.0 mm	Blue
10.0 mm	Red

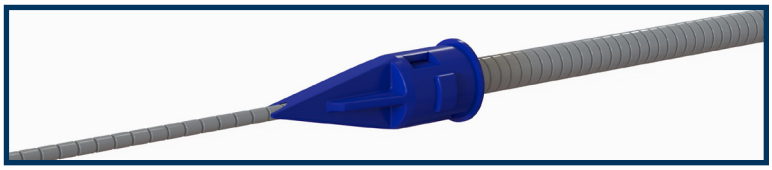
3.5.1 Microduct Connection

Option 1 – Duct into Olive then Olive into Clamp

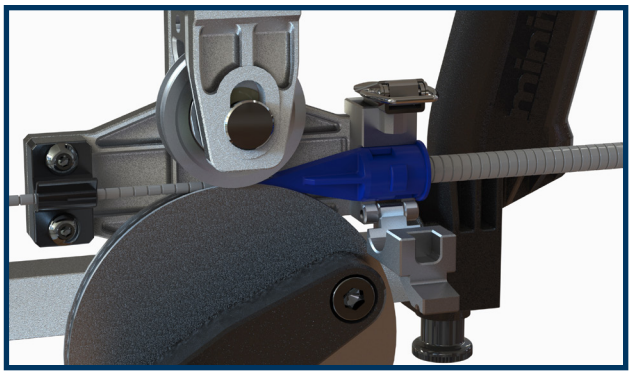
1. Feed approx. 1 m of cable into the microduct.



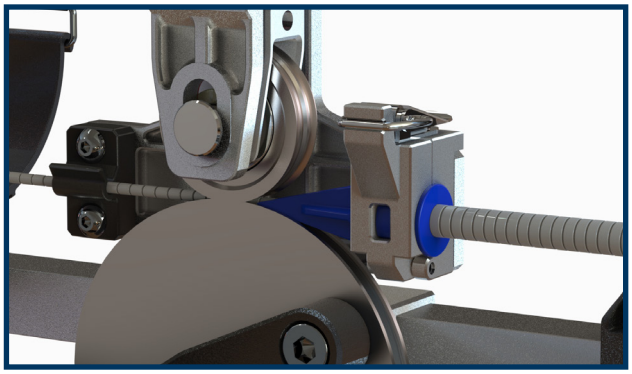
2. Select the appropriate size pair of olives and position them over the end of the microduct.



3. Seat the olives into the open microduct clamp.



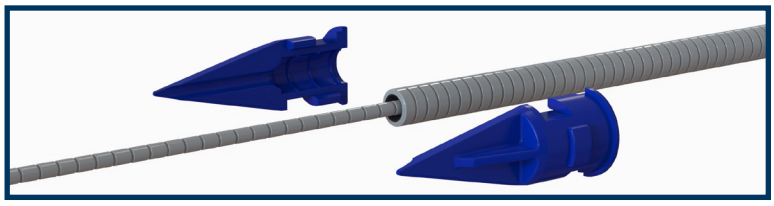
4. Close the clamp and lock the latch.



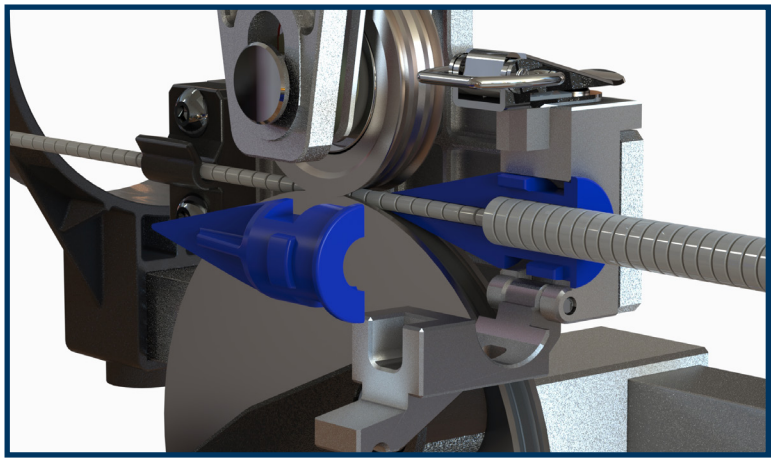
3.5.2 Microduct Connection

Option 2 – Olive into Clamp then Duct in Olive

1. Feed approx. 1 m of cable into the microduct.



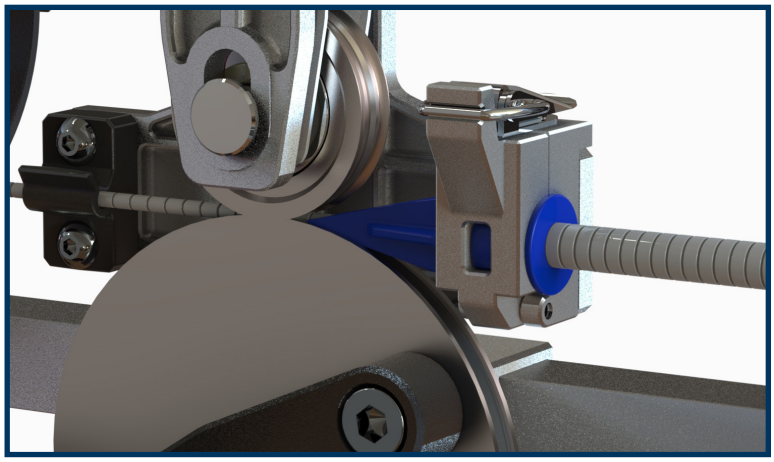
2. Seat one of the olives into the open microduct clamp.



3. Position the microduct into the seated olive.

4. Place the second olive onto the microduct.

5. Close the clamp and lock the latch.



3.6 Correct Use of the Tensioning Knob

The auxiliary wheel is lowered and raised by turning the Tensioning Knob — Clockwise to lower the wheel and counter-clockwise to raise the wheel.

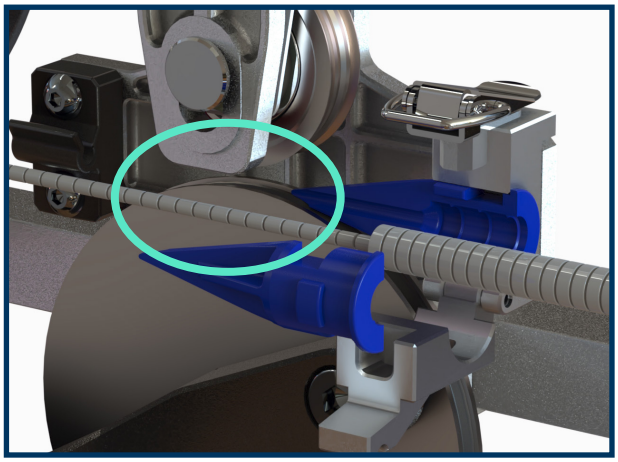
During setup, the wheel must be raised to allow the cable to be inserted, then lowered to retain the cable in its correct position between the auxiliary and drive wheels.

The tensioning system is maintained by a coil spring to balance the load placed on the cable.

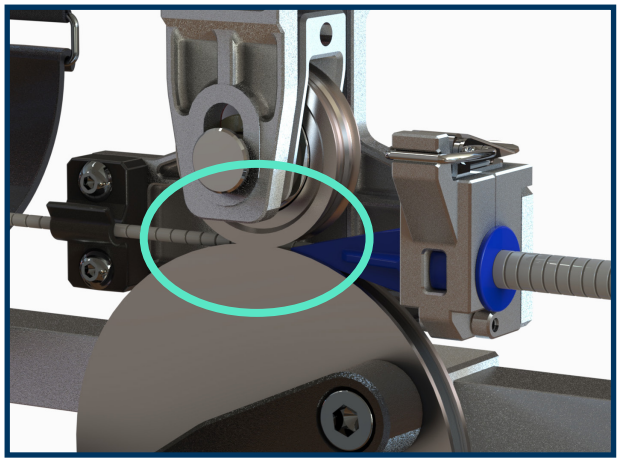
Tension is required to prevent excessive cable slip and tyre wear, however, it is not necessary to apply excessive force on the cable to install successfully.

Over-tightening the tensioning knob increases the force required to turn the drive wheel and result in excessive effort being required to turn the crank handle.

Auxiliary wheel in open position



Auxiliary wheel in closed position



3.7 Cranking the Handle

After the cable and microduct setup is complete and the cuff and grip are positioned for maximum comfort, it is time to install the cable.

It is recommended:

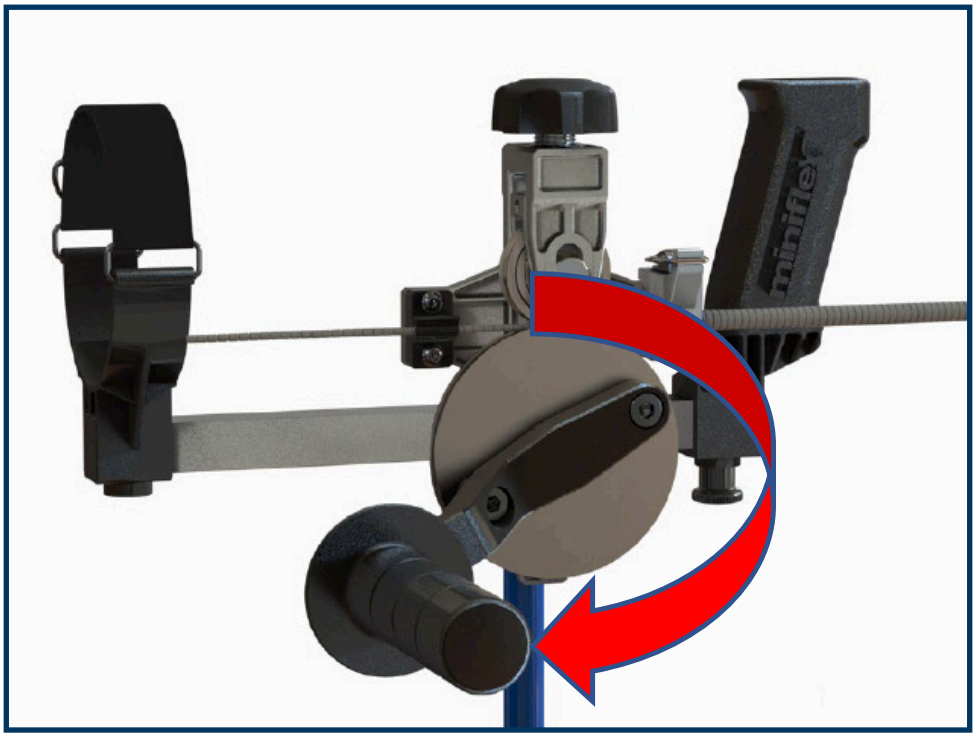
- Not to exceed 120 revolutions per minute (2 per second)
- Maintain a constant speed and force throughout the pushing phase

– The speed should be gradually decreased as the distance increases. Operators should find that this is a natural response as the force required to push the cable increases.

– The operator should look for feedback from the crank handle throughout the installation to help determine if the cable is installing correctly.

– Cable slip, a badly prepared microduct route, inappropriate cable pay-off and suboptimal cable / microduct combinations can all be identified by the kinesthetic feedback from the HAPI® Tool.

– As soon as the maximum pushing force is felt or if the cable begins to slip on the drive wheel, immediately stop turning the handle to prevent tyre wear. Consult the troubleshooting section of this user guide.



4.0 Troubleshooting

4.1 Juddering and jerking of the drive wheel during operation

This can indicate cable slip which would require the tension to be increased via the tensioning knob.

4.2 Tapping / cracking noise during the pushing process

This can indicate high friction within the route and undulations/macro bending of the cable inside the microduct. Best practice is to reduce the speed and not force the crank handle to turn.

4.3 Microduct clamp will not close

Check that the correct size microduct olives have been selected (see table in Section 3.5).

4.4 Crank Handle is hard to turn

Check that the tensioning knob is not overtightened. The maximum installation distance may be close (see chart in Section 3.3 on pg. 13). Do not force the crank handle, especially if the cable/duct size combination is not optimum (see Table in Section 3.2 on page 13).

4.5 Cable is slipping

Check that the tensioning knob is tightened sufficiently and applying enough compression onto the cable. Check that the tyre is clean and dry. Check that the tyre is not damaged or with flat spots. Replace the drive wheel if necessary (spare drive wheels can be ordered separately).

Disconnect the microduct from the HAPI® Tool and push the cable by hand. If the cable cannot be installed any further, the maximum installable distance has been achieved or the cable has met an obstacle/impassable bend in the microduct.

4.6 Olive is clashing on Drive Wheel

This can be caused by misalignment of the microduct clamp. To remedy, follow the steps outlined below:

1. Place a pair of olives into the clamp and close the latch
2. Loosen the 2 x 3mm hex screws on the reverse of the clamp assembly
3. Realign the clamp by pressing the olives in an upward direction, relative to the drive wheel
4. While maintaining this upward pressure on the olives, retighten the hex screws

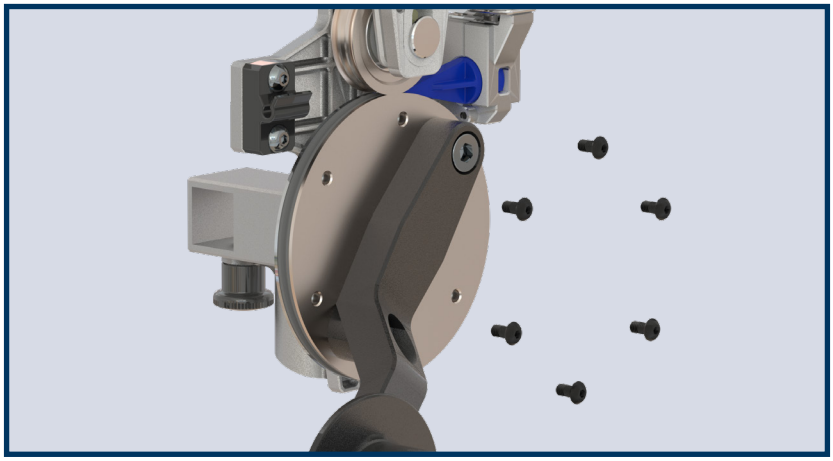
5.0 Tool Maintenance

The HAPI® Tool is manufactured to require minimal maintenance and replacement parts. Provided that the tool is used properly and operated with care, it should give the operator many kilometers and miles of trouble-free Miniflex® installation.

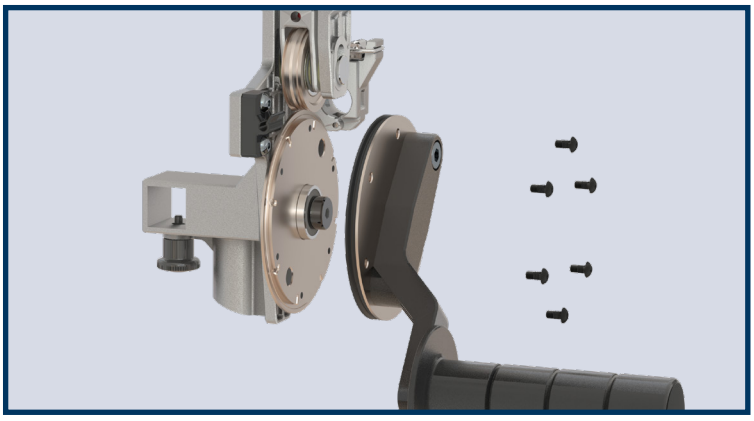
5.1 Replacing the Tyre

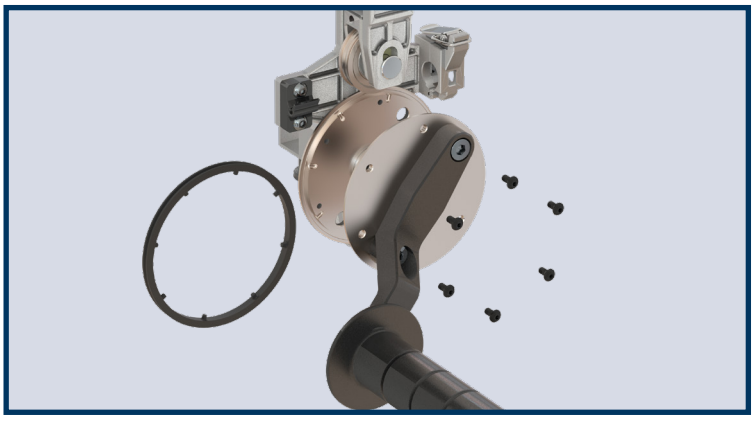
To replace the tyre on the HAPI tool, follow the steps outlined below.

1. Remove the six buttonhead M4 screws on the front of the wheel



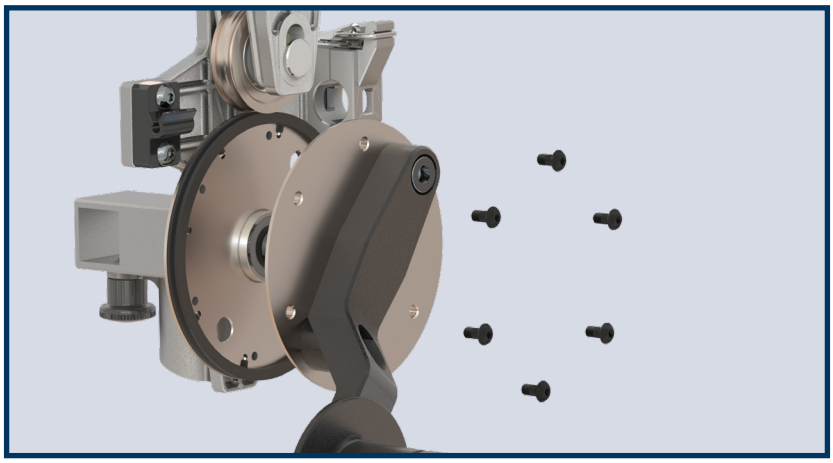
2. Separate the two halves of the wheel and remove the old tyre from the tool



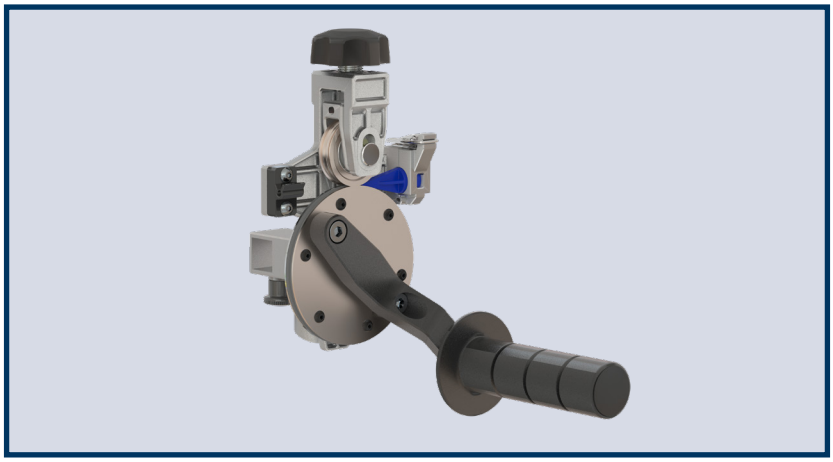


5.1 Replacing the Tyre (cont.)

3. Fit the new tyre, ensuring the pegs are aligned in the holes

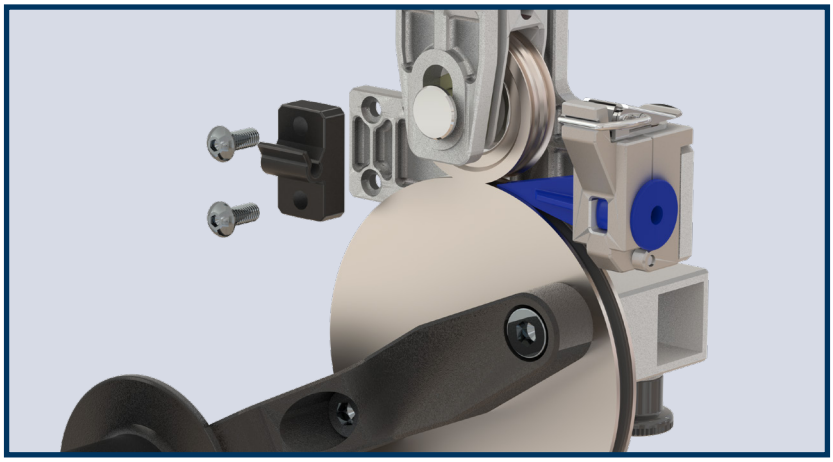


4. Fit the front half of the wheel and install the six screws



5.2 Replacing the cable guide

To replace the cable guide on the HAPI® tool, undo the 2 x 3mm dome cap Hex screw that retain the cable guide onto the HAPI frame. Fit the replacement cable guide and refit the screws, ensuring not to over-tighten.



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