

**Secoroc Rock Drilling Tools**

***DiscovOre & Arrow 3S  
In-The-Hole Tools***

**Atlas Copco**





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# ***DiscovOre & Arrow 3S In-The-Hole Tools***

## ***We hunt, we gather and we explore***

We've been doing it for thousands of years. You have to be strong, fast and precise. And so do your tools. Beautiful in their simplicity, robust in their strength and unmatched in speed.

For today's explorers, Atlas Copco is proud to introduce DiscovOre head assembly and Arrow 3S auto-lock overshoot. Speed, Safety, Simplicity.

### **APPLICATION PRODUCT HIGHLIGHTS**

***Patent pending***

- No spring pins
- No spearhead
- Reduced risk of jammed inner tubes
- Automatic locking overshoot
- Robust latches
- Reduced length
- Improved latch engagement
- Quick conversion head for all hole orientations
- Robust spindle
- Stabilized bearing assembly
- Latch lock



# Highlights

## No spring pins

The innovative design of the DiscovOre head assembly eliminates all spring pins. The latch pins are replaced with a patent pending hook design. The retracting case pin is replaced with an assembly rod and bolt. As for the spear head pin, we've eliminated the spear head altogether.

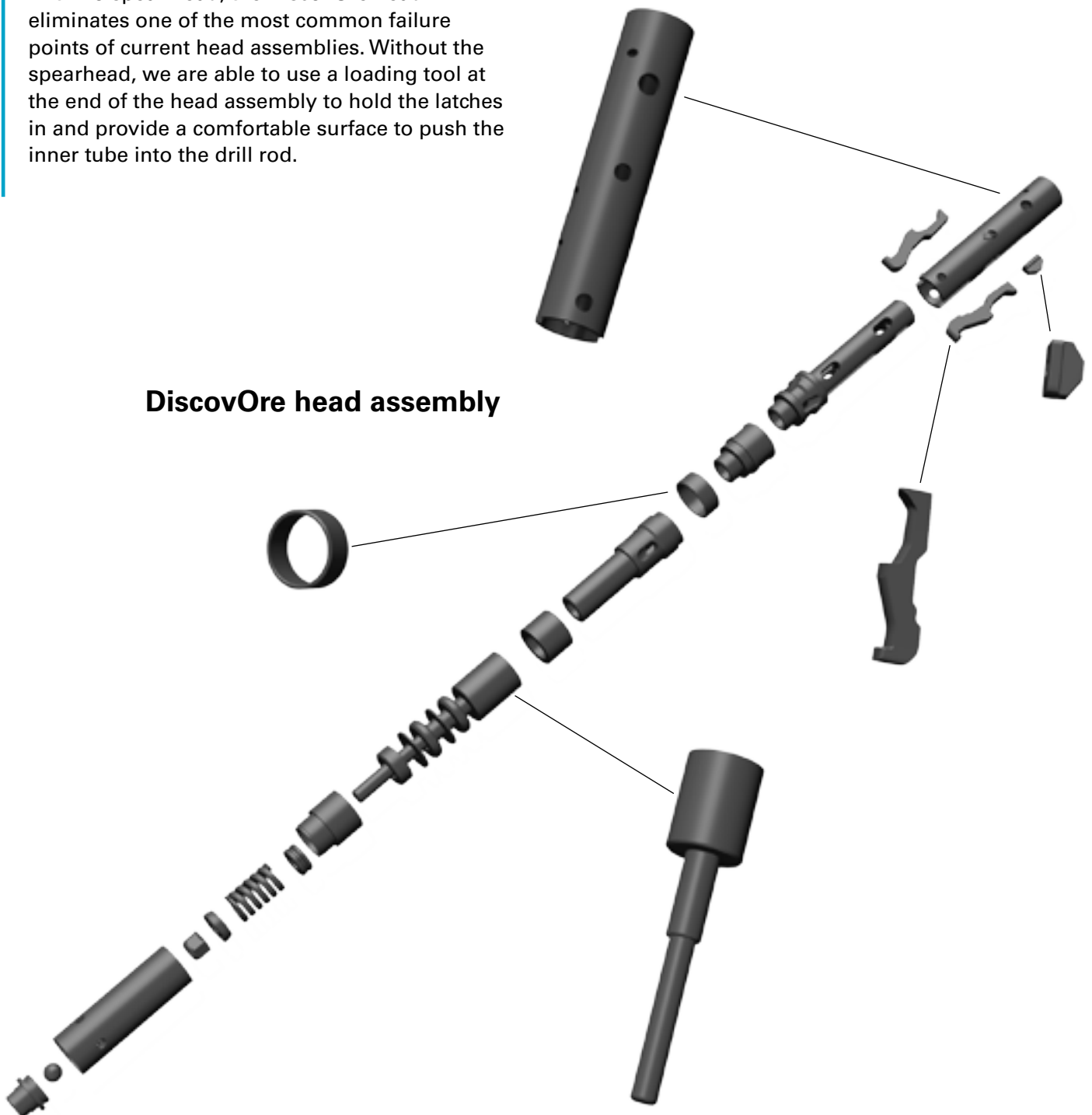
## No spearhead

With no spear head, the DiscovOre head eliminates one of the most common failure points of current head assemblies. Without the spearhead, we are able to use a loading tool at the end of the head assembly to hold the latches in and provide a comfortable surface to push the inner tube into the drill rod.

## Reduced risk of jammed inner tubes

With its leveraged latch design, the DiscovOre head increases your chances of releasing an inner tube jammed in the core barrel. Just like adding a cheater bar to a wrench for a stuck bolt, the DiscovOre latch is extended past the engagement surface to apply a substantially greater amount of force to unlatch. This is achieved without adding extra parts or links that complicate the assembly.

DiscovOre head assembly



## Arrow 3S overshoot



### Automatic locking overshoot

In fast paced production, it's easy to forget to manually engage a lock. The Arrow 3S Overshoot will automatically lock onto the head assembly. No tools are required to unlock and release; even under tension. Disengage the lock and release the overshoot from the head assembly with one hand. The double length release sleeve will reach the head faster if you need to release the overshoot in the hole. With a pointed end and fluid passage grooves along the length of the body, the overshoot will reach the bottom of the hole faster.

### Robust latches

The innovative DiscovOre latch design eliminates many of the problems of current head assemblies, while providing added benefits:

- Wide engagement surface ensures the head assembly will stay in contact with the locking coupling.
- Thick, single piece design is simple to assemble and can handle more abuse.
- Independent latches. At least one latch will always engage the locking coupling.
- Spring loaded. The spring acts directly on the latch so it can easily conform to the surface of internal variable diameter drill rods. The latches will also self-adjust as they wear down.

### Reduced length

The DiscovOre head is nearly 10" shorter than current underground head assemblies.

### Improved latch engagement

The DiscovOre adapter coupling does not have a drive tang; ensuring nothing will prevent the latches from engaging. Instead, there is a window in the locking coupling to engage a drive key in the DiscovOre head assembly to ensure it rotates with the drill string. This also reduces wear and stress on the latches, increasing service life and reliability.

### Quick conversion head for all hole orientations

The DiscovOre head can be used for all hole orientations. Just change the mid body to suit your needs. The overall length for both surface and underground head assemblies are 30". This allows you to use the same adapter coupling for both applications; eliminating the need to pull the rods when converting.

### Robust spindle

The DiscovOre head is built to take a beating. The increased diameter of the spindle will reduce the chances of bending when dropped or subjected to rough handling.

### Stabilized bearing assembly

The bearings are spread further apart to reduce the vibrations while drilling. This results in a higher percentage of consolidated core recovery.

### Latch lock

The latch lock are a standard feature in the DiscovOre underground head; holding the latches engaged into the adapter coupling until the retracting case is pulled by the overshoot.

# Product features and functionalities

The DiscovOre Head Assembly and Arrow 3S Overshot incorporates design features that eliminate many of the common problems found on other head assemblies.

## Assembly rod

The DiscovOre Head Assembly is held together with an assembly rod and bolt instead of the more common spring pins. The use of a hammer and punch is not needed to assemble or disassembly the head assembly.

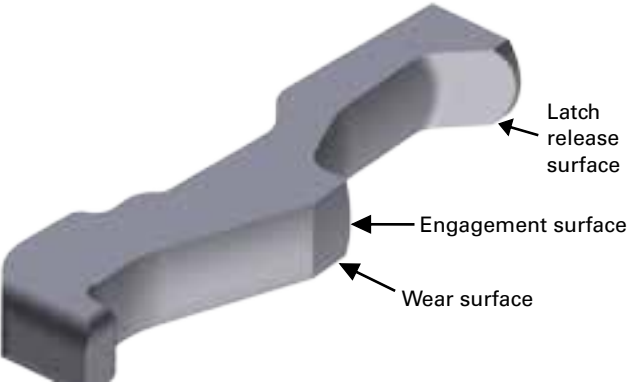


The assembly bolt uses a special wedge lock washer to prevent it from unthreading.

## Leveraged latches

The latches are held in place by hooking them into the window in the latch body. There are no spring pins. The latches are rotated into the latch body with a spring in between them to ensure consistent engagement with the locking coupling.

The latch release surface is above the locking coupling increases engagement surface. This increases the force applied to disengage the latches and increase your chances of unjamming an inner tube stuck in the core barrel. The ability to unjam an inner tube stuck in the core barrel is dependent on many factors, including; wireline diameter and condition, wireline hoist capacity, hoist drum diameter and spooled wireline diameter. These are the factors that will limit the ability to release a stuck DiscovOre head assembly.



## Landing indicator

The DiscovOre head assembly uses a ball and bushing landing indicator system. We recommend using the Atlas Copco reset tool to reset the valve to avoid head and valve damage and to safely apply the required leverage to reset the valve. This valve can be changed for a fluid retention system when required. The DiscovOre reset tool has a socket embedded into the handle for the assembly bolt.

## Positive latch engagement

The independent latches will always engage the locking coupling even if one is obstructed by the drive tang. For underground, a drive key is used, instead of the latch, to rotate the head. This helps to ensure 100% latch engagement by removing the drive tang on the DiscovOre locking coupling while ensuring the head will rotate with the drillstring to reduce wear on the latches.

## Compatibility

The surface head assembly is compatible with existing spearhead type core barrel outer tube assemblies. The underground head assembly uses the same adapter coupling that is used for surface applications. The DiscovOre underground locking coupling is needed to engage the drive key and ensure head rotation and proper latch engagement.

| Application | Compatibility with spearhead type system  |                     |
|-------------|---|---------------------|
|             | Outer tube assembly   | Inner tube assembly |
| Surface     | 100%  | 100%                |
| Underground | Required:<br>Adapter coupling<br>- Surface type<br><br>Locking coupling<br>- DiscovOre design | 100%                |

## Loading tool

The latch lock is standard on all underground head assemblies. It can be removed for down holes while underground or installed on surface for extra security and for dry hole lowering. When the latch lock is installed, the use of the DiscovOre loading tool may be required. The loading tool will hold the

latch lock disengaged so the head assembly can be inserted into the drill string. It will automatically disengage when the latches are fully inserted. If the latch lock is installed on a down hole, it is recommended to use the overshoot to lower the inner tube assembly into the drill string until the latches are past the rod threads, then release the overshoot.



## Conversion

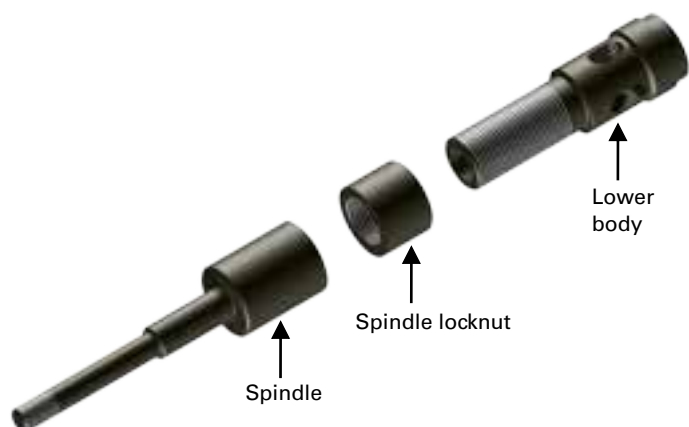
Whether your DiscovOre head assembly is in the surface or underground configuration, it can easily be converted by changing a few parts. The DiscovOre core barrel uses the same adapter coupling in all hole orientations, so it is not required to pull rods to change it after converting the heads. This is convenient when drilling surface holes that are horizontal and pumping in the inner tube assembly is required or when underground and drilling a down hole.

## Stabilized bearing

The bearing assembly contains an addition bearing at the end of the spindle to reduce play and for less vibration during drilling, resulting in more consolidated core inside the inner tube and reducing the chances of core blockage.

## Robust spindle

The DiscovOre lower body is externally threaded to accept a large diameter spindle. The increased diameter greatly increase the strength of the spindle to avoid bending during rough handling. The inner tube length is adjusted at this connection.



## Locking overshoot

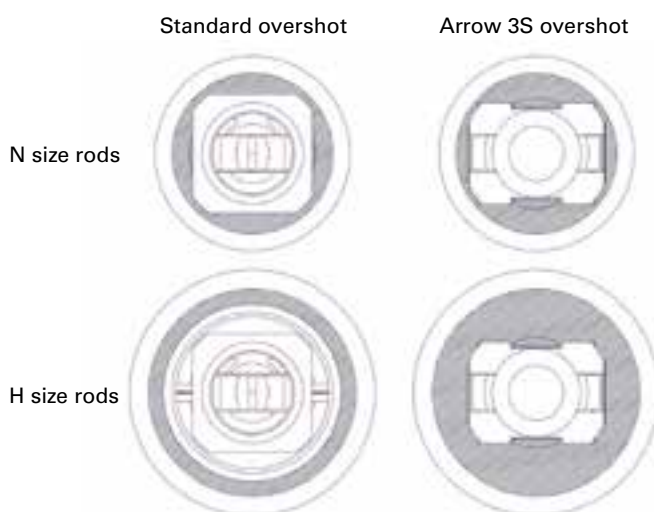
Based on our popular Safety overshoot, the DiscovOre overshoot will automatically lock onto the head assembly once it is connected. The slim body with grooves will cut through the water more efficiently for a faster drop speed, increasing your production. The extended length release sleeve has extra weight to reach the head assembly faster and to ensure the overshoot is released.

The pivoting body makes for easier handling outside of the drill string. The simple, robust design will give you consistent reliable performance.



## Arrow 3S overshoot

Based on our popular Safety overshoot, the Arrow 3S overshoot will automatically lock onto the head assembly once it is connected. The slim body with grooves will cut through the water more efficiently for a faster drop speed, increasing your production. The extended length release sleeve has extra weight to reach the head assembly faster and to ensure the overshoot is released. The pivoting body makes for easier handling outside of the drill string. The simple, robust design will give you consistent reliable performance.





## DiscovOre latch advantages

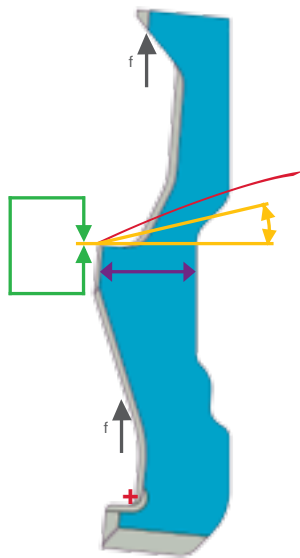
**Thick, robust design can withstand rough handling and the toughest conditions.**

**More than 50% less interference with locking coupling to unlatch compared to center pivot head assemblies.**

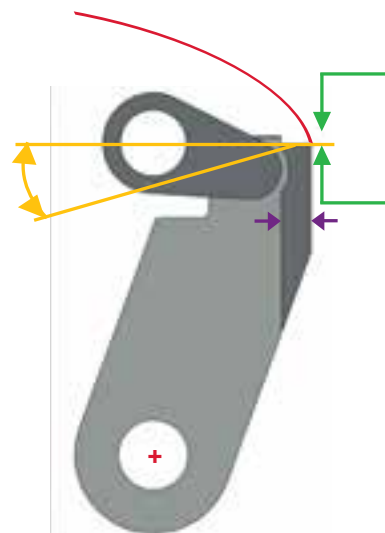
**Smaller angle of interference reduces wear on engaging surfaces.**

**Leveraged latch arm increases unlatch force substantially compared to standard head assemblies.**

**Independent latch pivots create a flatter arc path, decreasing the force required to unlatch.**



DiscovOre latch



Competitor latch

# DiscovOre compatibility with other designs

The DiscovOre core barrel is compatible with most core barrel designs existing on the market. Most components are interchangeable. To convert other design core barrel into DiscovOre in most cases there is only need to replace head assembly & overshot head (surface application). In underground application (horizontal and up-hole drilling) additionally there is requirement to change locking coupling (DiscovOre design) and make sure that surface type adapter coupling is used (or the type with welded drive key). See explanation of different types of locking and adapter couplings on next page. DiscovOre core barrels are compatible ONLY with Arrow 3 S overshots.

Core barrel set up

Surface drilling

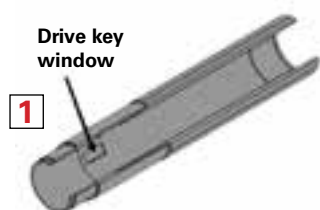
Underground drilling

|                  |                   |                |                           |                    |                        |                     |                                |                         |  |
|------------------|-------------------|----------------|---------------------------|--------------------|------------------------|---------------------|--------------------------------|-------------------------|--|
|                  | DiscovOre Surface | Excure Surface | O-series & copies Surface | Link latch Surface | DiscovOre Under-ground | Excure Under-ground | O-series & copies Under-ground | Link latch Under-ground |  |
| Head assembly    |                   |                |                           |                    |                        |                     |                                |                         |  |
| Locking coupling |                   |                |                           |                    |                        |                     |                                |                         |  |
| Adapter coupling |                   |                |                           |                    |                        |                     |                                |                         |  |
|                  |                   | ✓              | ✓                         | ✓                  |                        | ✗                   | ✓                              | ✗                       |  |
|                  |                   | ✓              | ✓                         | ✓                  |                        | ✗                   | ✓                              | ✗                       |  |

✓ Compatible

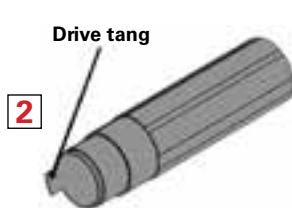
✗ Not compatible

# Locking and Adapter couplings – compatibility with DiscovOre



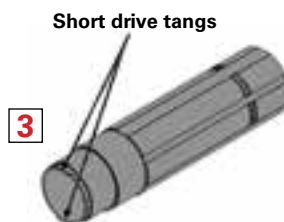
**DiscovOre locking coupling**

- Window in locking coupling engages drive key in DiscovOre head assembly to ensure rotation.
- Head assembly latches will always fully engage the locking coupling, reducing mismatches.
- Used for drilling underground drilling and optionally for surface.



**Existing surface locking coupling**

- DiscovOre head assembly is 100% compatible.
- DiscovOre latches are independent, if one latch lands on the drive tang, the other will still engage the locking coupling, reducing the chances of a mismatch.
- Used for surface drilling only.



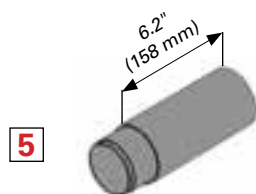
**Existing underground locking coupling**

- DiscovOre head assembly is NOT compatible with this locking coupling.
- Used for underground drilling only.



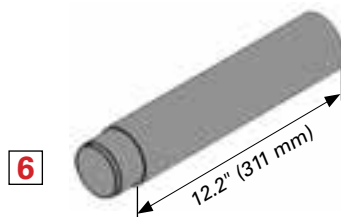
**O-Series underground locking coupling**

- DiscovOre head assembly is compatible with this locking coupling ONLY if it is used with the welded drive key coupling (7).
- Used for underground drilling only.



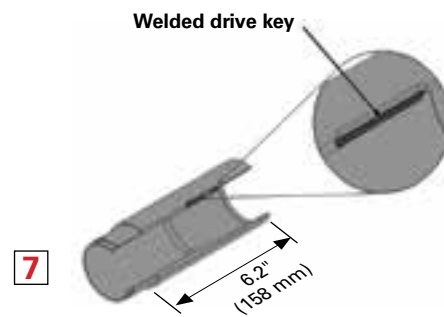
**Existing surface adapter coupling**

- The DiscovOre head assembly uses this adapter coupling for both surface and underground configurations.



**Long underground adapter coupling**

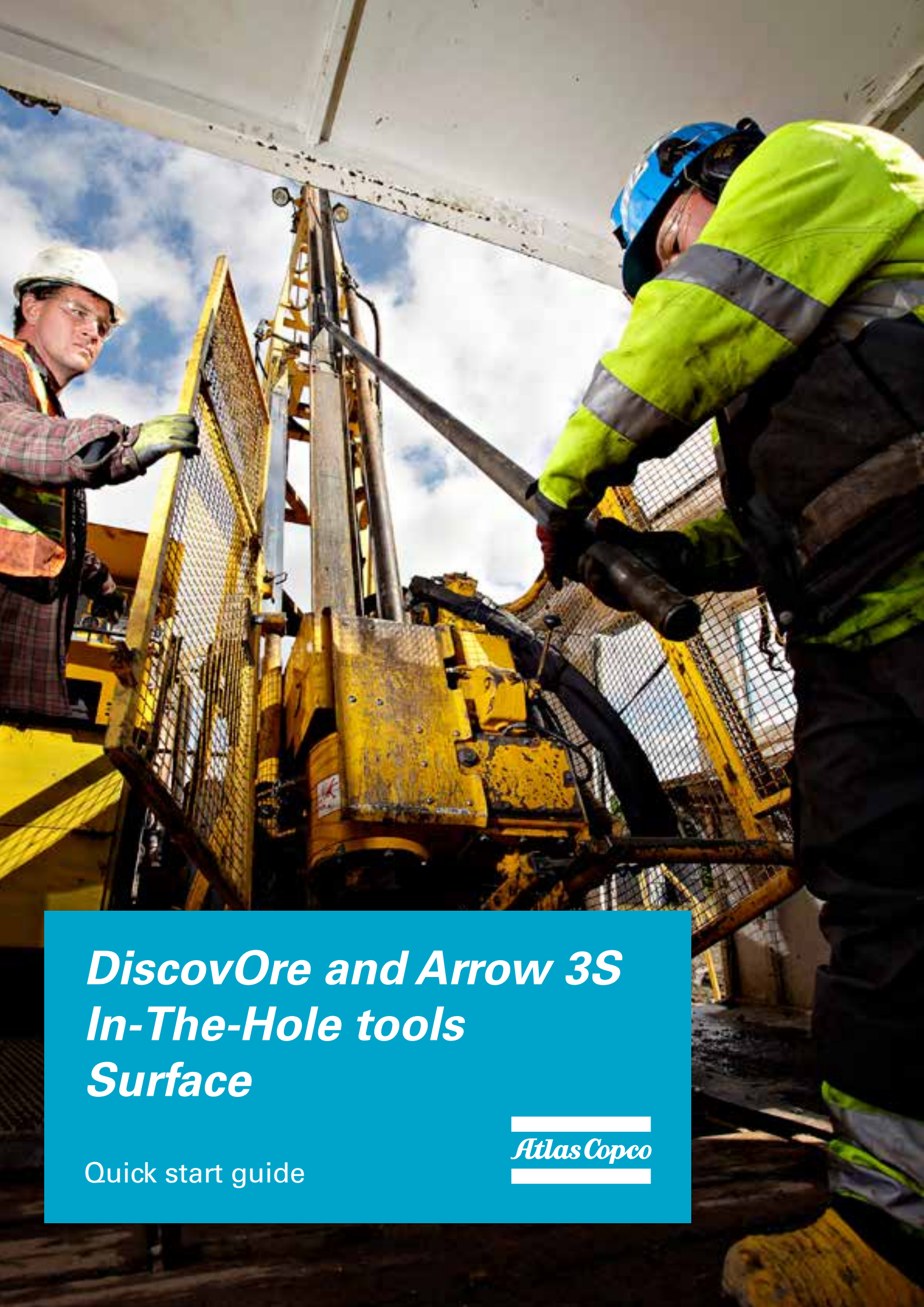
- This adapter coupling is NOT compatible with the DiscovOre head assembly.
- CAUTION:** If the core barrel in the hole has this installed, the DiscovOre head assembly will not latch properly. Replace this with the proper adapter coupling prior to using the DiscovOre head assembly.
- The DiscovOre underground head assembly is 10" shorter than most existing underground systems. This length must be compensated for at the adapter coupling. It is important to ensure the core barrel has the correct adapter coupling installed prior to using the DiscovOre head assembly underground.



**Existing underground drive coupling**

- The DiscovOre head assembly is compatible with this drive coupling.
- Although it is recommended to use the DiscovOre locking coupling and adapter coupling for optimal performance and safety.





# ***DiscovOre and Arrow 3S In-The-Hole tools Surface***

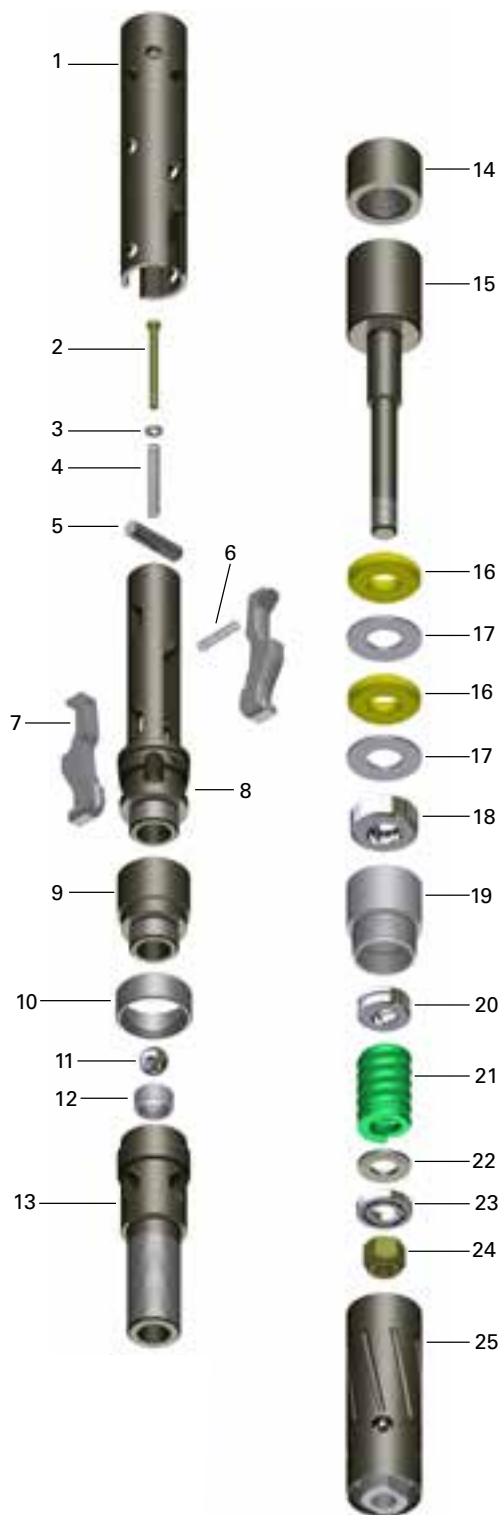
Quick start guide

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*Atlas Copco*

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# DiscovOre Head Assembly – N & N2 Surface



| Item | Description               | Part Number |            | Qty |
|------|---------------------------|-------------|------------|-----|
|      |                           | N Size      | N2 Size    |     |
| –    | N Head Assembly – Surface | 3760017200  | 3760017221 | 1   |
| 1    | Retracting case           | 3760017233  |            | 1   |
| 2    | Assembly bolt             | 3760017239  |            | 1   |
| 3    | Wedge lock washer         | 3760017235  |            | 1   |
| 4    | Spring – Retracting case  | 3760017236  |            | 1   |

| Item | Description               | Part Number |            | Qty |
|------|---------------------------|-------------|------------|-----|
|      |                           | N Size      | N2 Size    |     |
| 5    | Assembly rod              | 3760017228  |            | 1   |
| 6    | Spring – Latch            | 3760017237  |            | 1   |
| 7    | Latch                     | 3760017222  |            | 2   |
| 8    | Latch body                | 3760017220  |            | 1   |
| 9    | Mid body – Surface        | 3760017223  |            | 1   |
| 10   | Landing shoulder          | 3760005100  | 3760005241 | 1   |
| 11   | 22 mm ball                | 3760012099  |            | 1   |
| 12   | Landing indicator bushing | 3760012100  |            | 1   |
| 13   | Lower body                | 3760017211  |            | 1   |
| 14   | Locknut – Spindle         | 3760017212  |            | 1   |
| 15   | Spindle                   | 3760017217  |            | 1   |
| 16   | Shut off valve – Yellow   | 3760008328  |            | 2   |
| 17   | Valve adjusting washer    | 3760006237  |            | 2   |
| 18   | Thrust bearing            | 3760006461  |            | 1   |
| 19   | Spindle bearing           | 3760017219  |            | 1   |
| 20   | Hanger bearing            | 3760006462  |            | 1   |
| 21   | Compression spring        | 3760006463  |            | 1   |
| 22   | Washer – Bearing          | 3760017230  |            | 1   |
| 23   | Ball bearing              | 3760017234  |            | 1   |
| 24   | Nyloc nut                 | 3760017240  |            | 1   |
| 25   | Inner tube cap assembly   | 3760017232  | 3760017243 | 1   |

## N to N2 DiscovOre Conversion – Surface

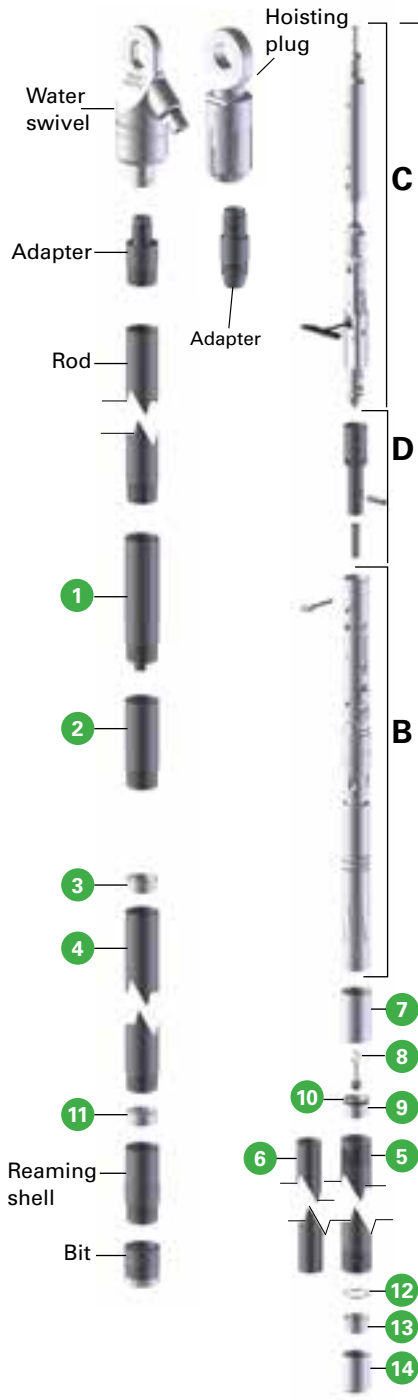
| Description                | Part Number |
|----------------------------|-------------|
| N2 Landing shoulder        | 3760005241  |
| N2 Inner tube cap assembly | 3760017243  |

| N Head Assy spare parts kit (2000 m / 6600 ft) | 3760017247 | Qty |
|--|------------|-----|
| N-D Latch                                      | 3760017222 | 2   |
| N-D Assembly rod                               | 3760017228 | 1   |
| Assy bolt 1/4" x 20" flanged                   | 3760017239 | 2   |
| Wedge lock washer 1/4"                         | 3760017235 | 2   |
| Spring 0.360" x 0.051" x 3"                    | 3760017236 | 2   |
| NO Landing shoulder 3PLB                       | 3760005100 | 1   |
| NO Hard shut off valve – Yellow                | 3760008328 | 2   |
| 22 mm Stainless steel ball                     | 3760012099 | 1   |
| Landing indicator bushing                      | 3760012100 | 6   |
| Spring 0.300" x 0.030" x 1.50"                 | 3760017237 | 2   |

| N2 Head Assy spare parts kit (2000 m / 6600 ft) | 3760017256 | Qty |
|---|------------|-----|
| N-D Latch                                       | 3760017222 | 2   |
| N-D Assembly rod                                | 3760017228 | 1   |
| Assy bolt 1/4" x 20" flanged                    | 3760017239 | 2   |
| Wedge lock washer 1/4"                          | 3760017235 | 2   |
| Spring 0.360" x 0.051" x 3"                     | 3760017236 | 2   |
| NO2 Landing shoulder 3PLB                       | 3760005241 | 1   |
| NO Hard shut off valve – Yellow                 | 3760008328 | 2   |
| 22 mm Stainless steel ball                      | 3760012099 | 1   |
| Landing indicator bushing                       | 3760012100 | 6   |
| Spring 0.300" x 0.030" x 1.50"                  | 3760017237 | 2   |



# DiscovOre Core Barrel Assemblies – N, N2 & N3 Surface



| Item | Description  | Part Number    |                |            |            |                |            |            |
|------|--|----------------|----------------|------------|------------|----------------|------------|------------|
|      | Core barrel type   | N3 core barrel | N core barrel  |            |            | N2 core barrel |            |            |
|      | Rod connection   | N0 rod         | N0 rod         | NT rod     | NM0 rod    | N0 rod         | NT rod     | NM0 rod    |
|      | 1.5 m / 5 ft Core barrel assy complete   | 3760017299     | 3760017209     | 3760017205 | 3760017207 | 3760017357     | 3760017355 | 3760017374 |
|      | 3.0 m / 10 ft Core barrel assy complete  | 3760017298     | 3760017208     | 3760017204 | 3760017206 | 3760017356     | 3760017354 | 3760017373 |
| A    | 1.5 m / 5 ft inner tube assy complete  | 3760017297     | 3760017203     |            |            | 3760017353     |            |            |
| A    | 3.0 m / 10 ft inner tube assy complete   | 3760017296     | 3760017202     |            |            | 3760017352     |            |            |
| B    | Head assembly complete   | 3760017200     |                |            |            | 3760017221     |            |            |
| C    | Overshot assembly complete   | 3760017250     |                |            |            |                |            |            |
| D    | Dry hole kit (optional)  | 3760017249     |                |            |            |                |            |            |
| 1    | Locking coupling   | 3760006026     |                | 3760006027 | 376012737  | 3760006026     | 3760006027 | 376012737  |
| 2    | Adapter coupling   | 3760006028     |                |            |            |                |            |            |
| 3    | Landing ring   | 3760006243     |                |            |            | 3760006329     |            |            |
| 4    | 1.5 m / 5 ft outer tube  | 3760004837     |                |            |            |                |            |            |
| 4    | 3.0 m / 5 ft outer tube  | 3760004839     |                |            |            |                |            |            |
| 5    | 1.5 m / 5 m inner tube   | 3760004835     |                |            |            | 3760006136     |            |            |
| 5    | 3.0 m / 10 ft inner tube   | 3760004836     |                |            |            | 3760006137     |            |            |
| 6    | 1.5 m / 5 m Split inner tube   | 3760006076     | Not Applicable |            |            |                |            |            |
| 6    | 3.0 m / 10 ft Split inner tube   | 3760008294     | Not Applicable |            |            |                |            |            |
| 7    | Adapter  | 3760006293     | Not Applicable |            |            |                |            |            |
| 8    | Piston plug  | 3760006283     | Not Applicable |            |            |                |            |            |
| 9    | Piston   | 3760006294     | Not Applicable |            |            |                |            |            |
| 10   | O-ring   | 0663919600     | Not Applicable |            |            |                |            |            |
| 11   | Inner tube stabilizer  | 3760006244     |                |            |            | 3760008317     |            |            |
| 12   | Stop ring  | 3760006285     | 3760006240     |            |            | 3760006326     |            |            |
| 13   | Core lifter  | 3760006286     | 3760006241     |            |            | 3760006327     |            |            |
| 14   | Core lifter case   | 3760006287     | 3760006242     |            |            | 3760006328     |            |            |
|      | Spare Part Kits (2000 m / 6600 ft drilling)  |                |                |            |            |                |            |            |
|      | Spare parts kit head assembly  | 3760017247     |                |            |            | 3760017256     |            |            |
|      | Spare parts kit overshot   | 3760017265     |                |            |            |                |            |            |
|      | Consumables kit core barrel  | 3760016576     | 3760016574     |            |            | 3760016575     |            |            |
|      |  |                |                |            |            |                |            |            |
|      | Universal components common for most DCDMA core barrel specific size (Excore, O-Series, Link Latch design etc. |                |                |            |            |                |            |            |

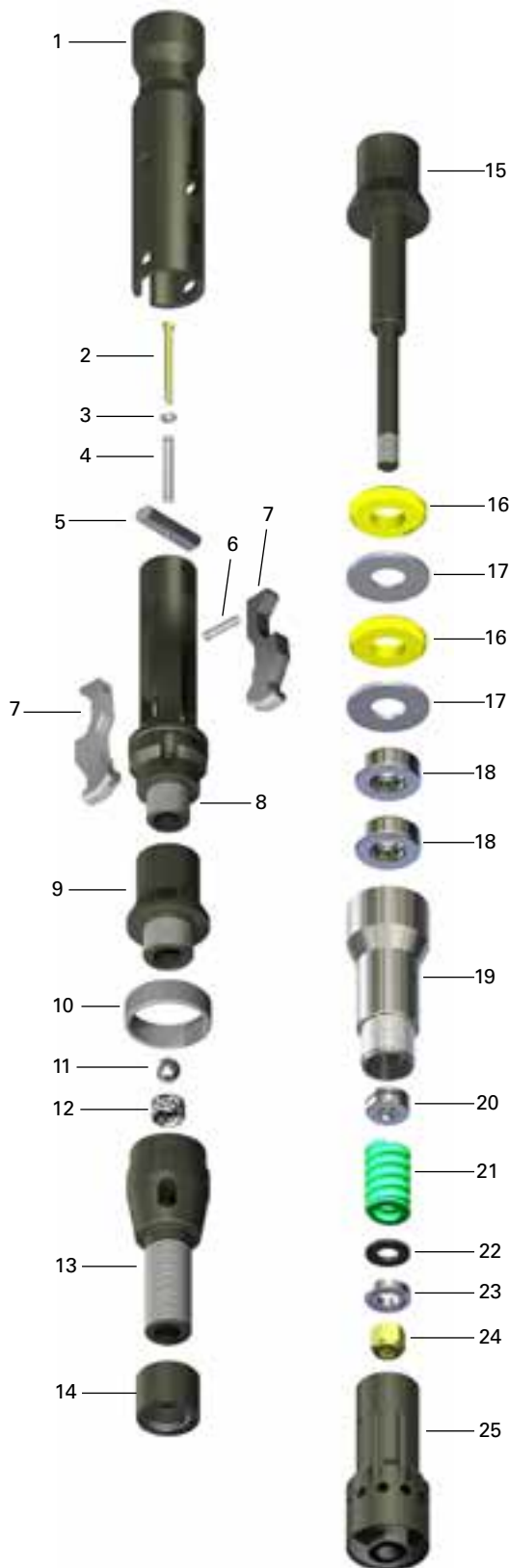
| N core barrel consumables kit 2000 m/ 6600 ft<br>3760016574 |             |     |
|---|-------------|-----|
| Description   | Part Number | Qty |
| Core lifter   | 3760006241  | 40  |
| Core lifter case  | 3760006242  | 8   |
| Landing ring  | 3760006243  | 4   |
| Inner tube stabilizer                                       | 3760006244  | 4   |
| Stop ring   | 3760006240  | 8   |

| N2 core barrel consumables kit 2000 m/ 6600 ft<br>3760016575 |             |     |
|--|-------------|-----|
| Description  | Part Number | Qty |
| Core lifter  | 3760006327  | 40  |
| Core lifter case   | 3760006328  | 8   |
| Landing ring   | 3760006329  | 4   |
| Inner tube stabilizer  | 3760008317  | 4   |
| Stop ring  | 3760006326  | 8   |

| N3 core barrel consumables kit 2000 m/ 6600 ft<br>3760016576 |             |     |
|--|-------------|-----|
| Description  | Part Number | Qty |
| Core lifter  | 3760006286  | 40  |
| Core lifter case   | 3760006287  | 8   |
| Landing ring   | 3760006243  | 4   |
| Inner tube stabilizer  | 3760006244  | 4   |
| Stop ring  | 3760006285  | 8   |



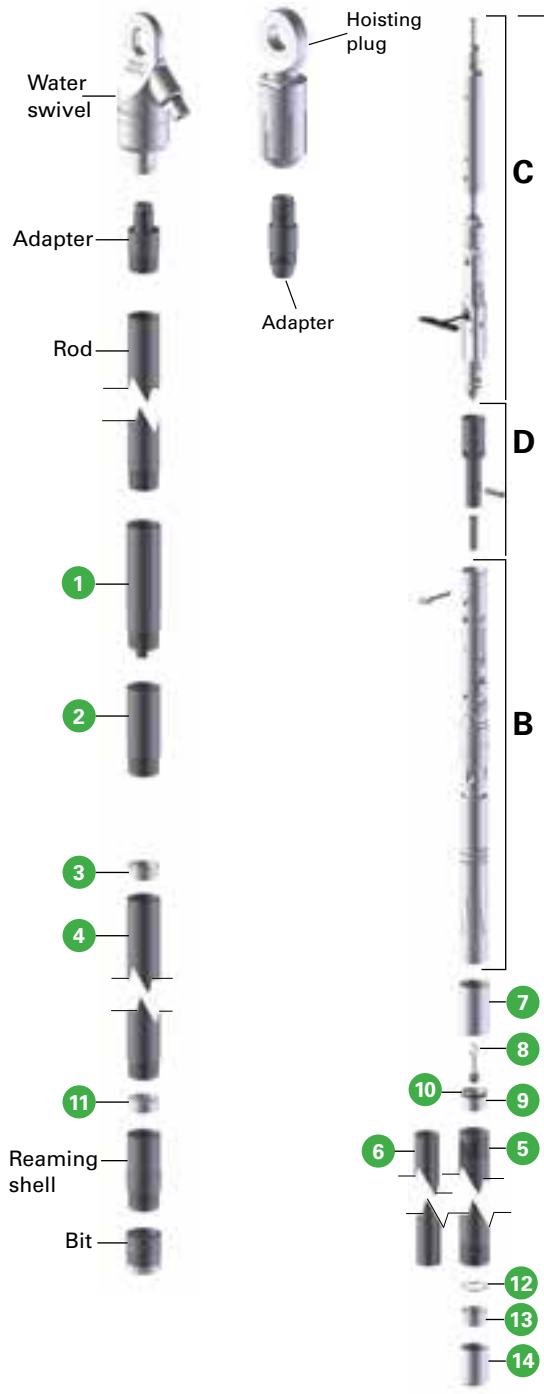
# DiscovOre Head Assembly – H Surface



| Item | Description               | Part Number | Qty |
|------|---------------------------|-------------|-----|
| –    | H Head Assembly – Surface | 3760017300  | 1   |
| 1    | Retracting case           | 3760017318  | 1   |
| 2    | Assembly bolt             | 3760017239  | 1   |
| 3    | Wedge lock washer         | 3760017235  | 1   |
| 4    | Spring – Retracting case  | 3760017236  | 1   |
| 5    | Assembly rod              | 3760017324  | 1   |
| 6    | Spring – Latch            | 3760017334  | 1   |
| 7    | Latch                     | 3760017317  | 2   |
| 8    | Latch body                | 3760017333  | 1   |
| 9    | Mid body – Surface        | 3760017325  | 1   |
| 10   | Landing shoulder          | 3760005150  | 1   |
| 11   | 22 mm ball                | 3760012099  | 1   |
| 12   | Landing indicator bushing | 3760012100  | 1   |
| 13   | Lower body                | 3760017311  | 1   |
| 14   | Locknut – Spindle         | 3760017212  | 1   |
| 15   | Spindle                   | 3760017322  | 1   |
| 16   | Shut off valve – Yellow   | 3760008379  | 2   |
| 17   | Valve adjusting washer    | 3760006252  | 2   |
| 18   | Thrust bearing            | 3760006471  | 2   |
| 19   | Spindle bearing           | 3760017323  | 1   |
| 20   | Hanger bearing            | 3760006462  | 1   |
| 21   | Compression spring        | 3760006463  | 1   |
| 22   | Washer – Bearing          | 3760017230  | 1   |
| 23   | Ball bearing              | 3760017234  | 1   |
| 24   | Nyloc nut                 | 3760017240  | 1   |
| 25   | Inner tube cap assembly   | 3760017315  | 1   |

| H Head assy spare parts kit (2000 m / 6600 ft) | 3760017347 | Qty |
|--|------------|-----|
| H-D Latch                                      | 3760017317 | 2   |
| H-D Assembly rod                               | 3760017324 | 2   |
| Assembly bolt 1/4" x 20"                       | 3760017239 | 4   |
| Wedge lock washer -1/4"                        | 3760017235 | 4   |
| Spring 0.360" x 0.051" x 3"                    | 3760017236 | 3   |
| Spring 0.36" x 0.042 x 1.750                   | 3760017334 | 2   |
| 22 mm Stainless steel ball                     | 3760012099 | 1   |
| Landing indicator bushing                      | 3760012100 | 6   |
| HO Landing shoulder 3PLB                       | 3760005150 | 1   |
| HO Hard shut off valve – Yellow                | 3760008379 | 2   |

# DiscovOre Core Barrel Assemblies – H & H3 Surface

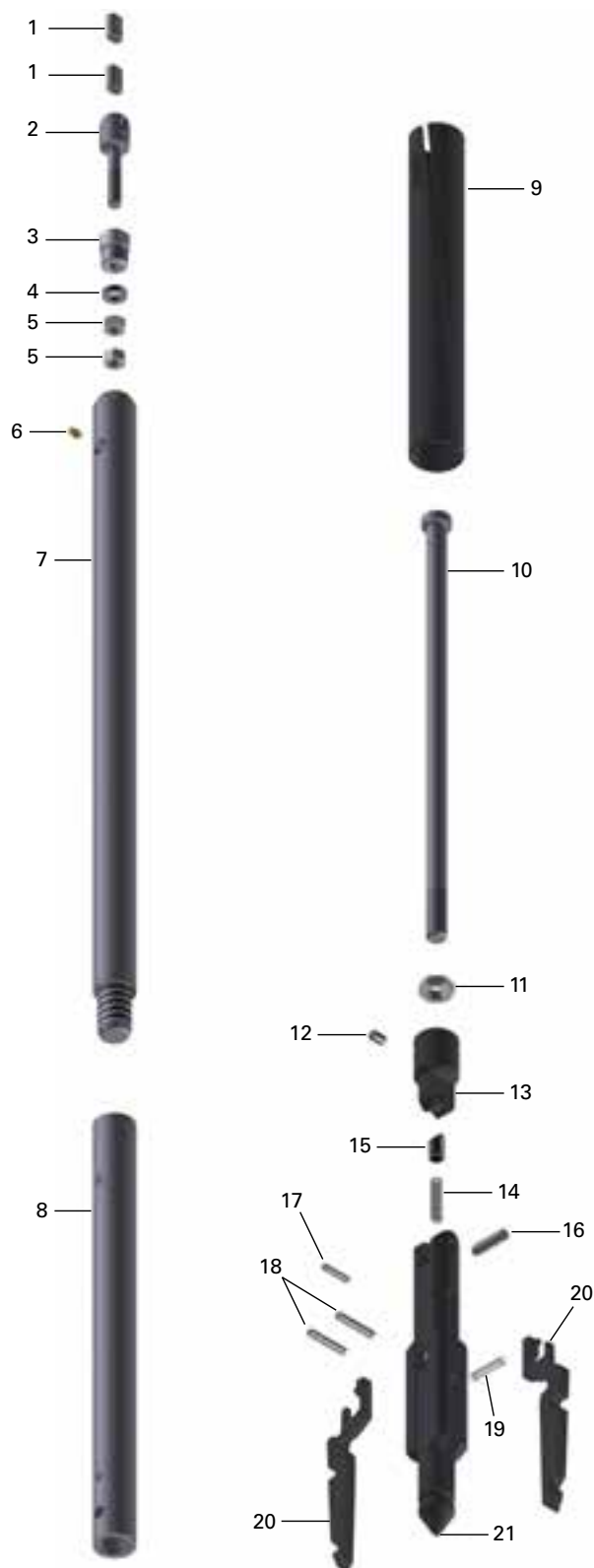


| Item | Description  | Part Number    |                |            |            |
|------|--|----------------|----------------|------------|------------|
|      | Core barrel type   | H3 core barrel | H core barrel  |            |            |
|      | Rod connection   | HO rod         | HO rod         | HT rod     | HMO rod    |
|      | 1.5 m / 5 ft Core barrel assy complete   | 3760017399     | 3760017309     | 3760017305 | 3760017307 |
|      | 3.0 m / 10 ft Core barrel assy complete  | 3760017398     | 3760017308     | 3760017304 | 3760017306 |
| A    | 1.5 m / 5 ft inner tube assy complete  | 3760017397     | 3760017303     |            |            |
| A    | 3.0 m / 10 ft inner tube assy complete   | 3760017396     | 3760017302     |            |            |
| B    | Head assembly complete   | 3760017300     |                |            |            |
| C    | Overshot assembly complete   | 3760017250     |                |            |            |
| D    | Dry hole kit (optional)  | 3760017249     |                |            |            |
| 1    | Locking coupling   | 3760006043     |                | 3760006044 | 3760011909 |
| 2    | Adapter coupling   | 3760006045     |                |            |            |
| 3    | Landing ring   | 3760006258     |                |            |            |
| 4    | 1.5 m / 5 ft outer tube  | 3760006046     |                |            |            |
| 4    | 3.0 m / 5 ft outer tube  | 3760006047     |                |            |            |
| 5    | 1.5 m / 5 m inner tube   | 3760006048     |                |            |            |
| 5    | 3.0 m / 10 ft inner tube   | 3760006049     |                |            |            |
| 6    | 1.5 m / 5 m Split inner tube   | 3760005641     | Not Applicable |            |            |
| 6    | 3.0 m / 10 ft Split inner tube   | 3760005640     | Not Applicable |            |            |
| 7    | Adapter  | 3760006295     | Not Applicable |            |            |
| 8    | Piston plug  | 3760006283     | Not Applicable |            |            |
| 9    | Piston   | 3760006296     | Not Applicable |            |            |
| 10   | O-ring   | 0663210093     | Not Applicable |            |            |
| 11   | Inner tube stabilizer  | 3760006259     |                |            |            |
| 12   | Stop ring  | 3760006288     | 3760006255     |            |            |
| 13   | Core lifter  | 3760006289     | 3760006256     |            |            |
| 14   | Core lifter case   | 3760006290     | 3760006257     |            |            |
|      | Spare Part Kits (2000 m / 6600 ft drilling)  |                |                |            |            |
|      | Spare parts kit head assembly  | 3760017347     |                |            |            |
|      | Spare parts kit overshot   | 3760017265     |                |            |            |
|      | Consumables kit core barrel  | 3760016578     | 3760016577     |            |            |
|      |  |                |                |            |            |
|      | Universal components common for most DCDMA core barrel specific size (Excore, O-Series, Link Latch design etc. |                |                |            |            |

| H core barrel consumables kit 2000 m / 6600 ft<br>3760016577 |             |     |
|--|-------------|-----|
| Description  | Part Number | Qty |
| Core lifter  | 3760006256  | 40  |
| Core lifter case   | 3760006257  | 8   |
| Landing ring   | 3760006258  | 4   |
| Inner tube stabilizer  | 3760006259  | 4   |
| Stop ring  | 3760006255  | 8   |

| H3 core barrel consumables kit 2000 m / 6600 ft<br>3760016578 |             |     |
|---|-------------|-----|
| Description   | Part Number | Qty |
| Core lifter   | 3760006289  | 40  |
| Core lifter case  | 3760006290  | 8   |
| Landing ring  | 3760006258  | 4   |
| Inner tube stabilizer   | 3760006259  | 4   |
| Stop ring   | 3760006288  | 8   |

# Arrow 3S Overshot Assembly – NH Surface



NH Arrow 3S Overshot Surface total length – 1980 mm / 78"

| Item  | Description                     | Part Number | Qty |
|-------|---------------------------------|-------------|-----|
|       | NH Arrow 3S Overshot – Surface  | 3760017250  |     |
| 1–5   | Cable swivel assembly           | 3760016262  | 1   |
| 12–21 | Arrow 3S Overshot head assembly | 3760017252  | 1   |
| 1     | Nicopress sleeve                | 3760008244  | 2   |
| 2     | Eye bolt                        | 3760016265  | 1   |
| 3     | Cable swivel collar             | 3760007216  | 1   |
| 4     | Bearing                         | 3760006467  | 1   |
| 5     | Nut                             | 3760012331  | 2   |
| 6     | Grease fitting                  | 0544110023  | 1   |
| 7     | Sinking bar body                | 3760006384  | 1   |
| 8     | JarTube                         | 3760015660  | 1   |
| 9     | Release sleeve                  | 3760006381  | 1   |
| 10    | Jar staff                       | 3760015663  | 1   |
| 11    | Jam nut                         | 5530616400  | 1   |
| 12    | Set screw                       | 3760015495  | 1   |
| 13    | Pivot body                      | 3760017258  | 1   |
| 14    | Spring – Detent                 | 3760017279  | 1   |
| 15    | Detent                          | 3760017280  | 1   |
| 16    | 7/16" Coiled pin                | 3760017260  | 1   |
| 17    | 1/4" x 1 1/4" Spring pin        | 0108169134  | 1   |
| 18    | 5/16 x 1 1/2" Coiled pin        | 3760017259  | 2   |
| 19    | Spring                          | 3760006373  | 1   |
| 20    | Lifting dog – Surface           | 3760017254  | 2   |
| 21    | Overshot body – Surface         | 3760017255  | 1   |
| 22    | Release tool                    | 3760016230  | 1   |
| 23    | Safety pin                      | 3760017291  | 1   |

| H NH-A3S spare parts kit (2000 m / 6600 ft) | 3760017265 | Qty |
|---|------------|-----|
| NH-A3S Lifting dog                          | 3760017254 | 2   |
| BO NO HO Lifting dog spring                 | 3760006373 | 2   |
| Pin coiled spring 5/16 x 1 1/2              | 3760017259 | 2   |
| Pin coiled spring 7/16 x 1 1/2              | 3760017260 | 1   |
| Round detent plunger                        | 3760017280 | 1   |
| NH-A3S Detent spring                        | 3760017279 | 1   |
| Spring pin 1/4" X 1 3/4" LG                 | 108169187  | 1   |
| 3/16" Nicopress sleeve oval                 | 3760008244 | 2   |





# Operation

For safety, it is recommended to use the wireline and overshot to handle the inner tube assembly outside of the drill string. It is not recommended to drop an inner tube assembly into the drill string. Doing so may damage the head assembly, latches and drill string threads.

## Lowering



1. Attach the DiscovOre Locking Overshot to the DiscovOre Head Assembly by inserting the overshot head into the top of the retracting case.
2. Once attached, the overshot is locked onto the back end of the inner tube assembly. The inner tube assembly can be safely maneuvered above the drill string.

### CAUTION

The head will drop into the drill string, keep hands clear to avoid injury.

## Retrieval

1. Insert the overshot into the drill string and lower it until it hits the back end of the inner tube. Once connected, the head and overshot are automatically locked together.
2. Reverse the wireline and pull the overshot to disengage the latches of the head assembly from the core barrel.
3. At the surface, maneuver the inner tube assembly into position
6. To release the overshot, insert the overshot into the retracting case of the head assembly to slightly compress the lifting dogs. Maintain some slack in the wireline.
7. Squeeze the lifting dogs while maintaining the overshot inserted in the retracting case, then pull the overshot out of the retracting case while squeezing the lifting dogs.

### DANGER

Personnel should avoid being directly under a hanging inner tube assembly.



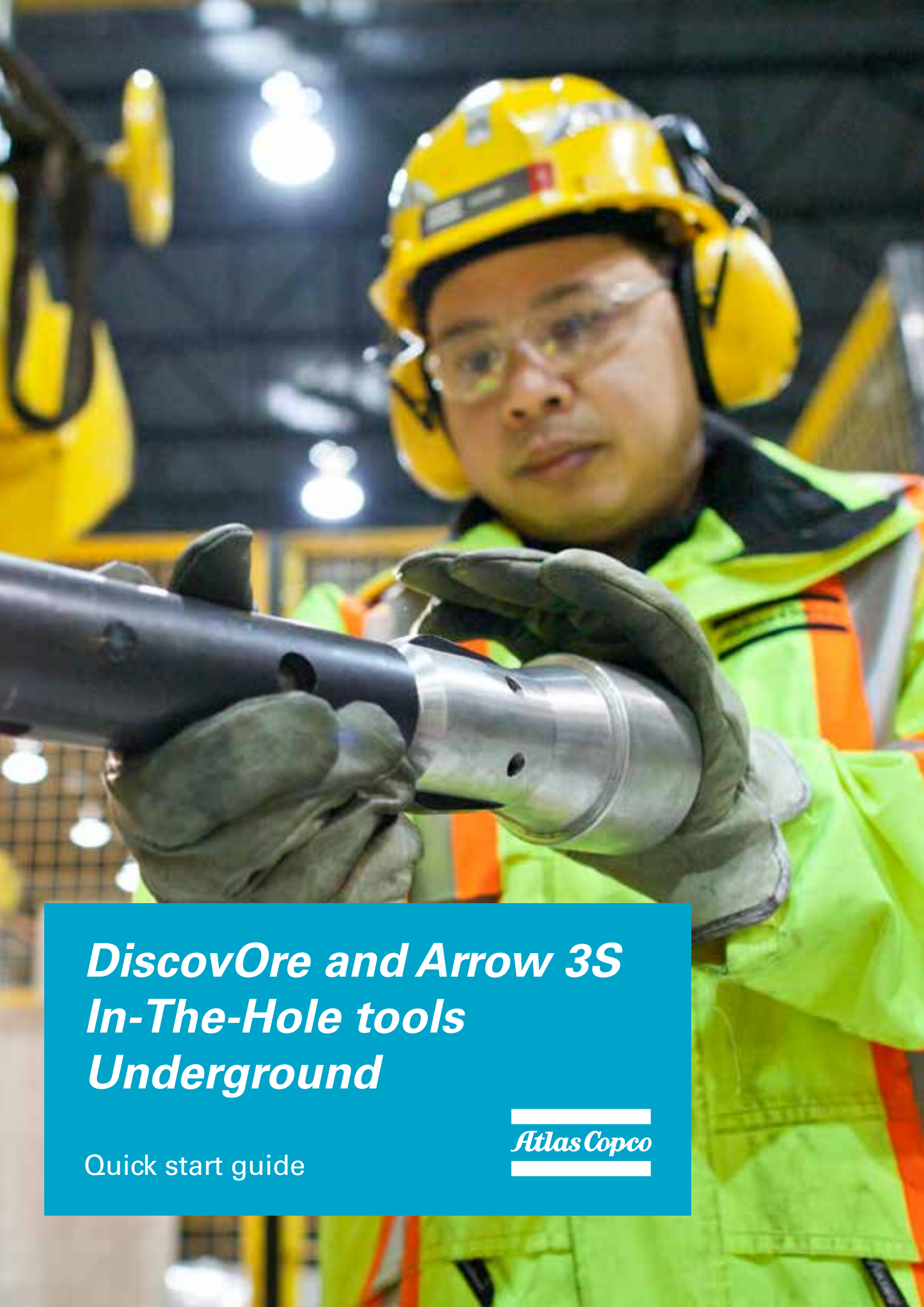
3. Lower the inner tube assembly into the drill string until the latches are past the threads.
4. Insert the release tool horizontally, into the opening in the middle of the overshot body
5. Push down on the release tool to pry open the lifting dogs to disconnect the head assembly from the overshot.

### CAUTION

The head will drop if it is not supported.





A close-up photograph of a male worker wearing a yellow hard hat with a headlamp, safety glasses, and a high-visibility yellow and orange safety vest. He is holding a large, dark-colored industrial tool, likely a rock drill, with both hands wearing heavy-duty grey work gloves. The background is a dimly lit underground mine with some yellow equipment visible.

# ***DiscovOre and Arrow 3S In-The-Hole tools Underground***

Quick start guide

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***Atlas Copco***

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# DiscovOre Head Assembly – NU & N2U Underground



| Item | Description              | Part Number |            | Qty |
|------|--------------------------|-------------|------------|-----|
|      |                          | NU size     | N2U size   |     |
| –    | NU DiscovOre Head Assy   | 3760017201  | 3760017245 | 1   |
| 1    | Retracting case          | 3760017233  |            | 1   |
| 2    | Assembly bolt            | 3760017239  |            | 1   |
| 3    | Wedge lock washer        | 3760017235  |            | 1   |
| 4    | Spring – Retracting case | 3760017236  |            | 1   |

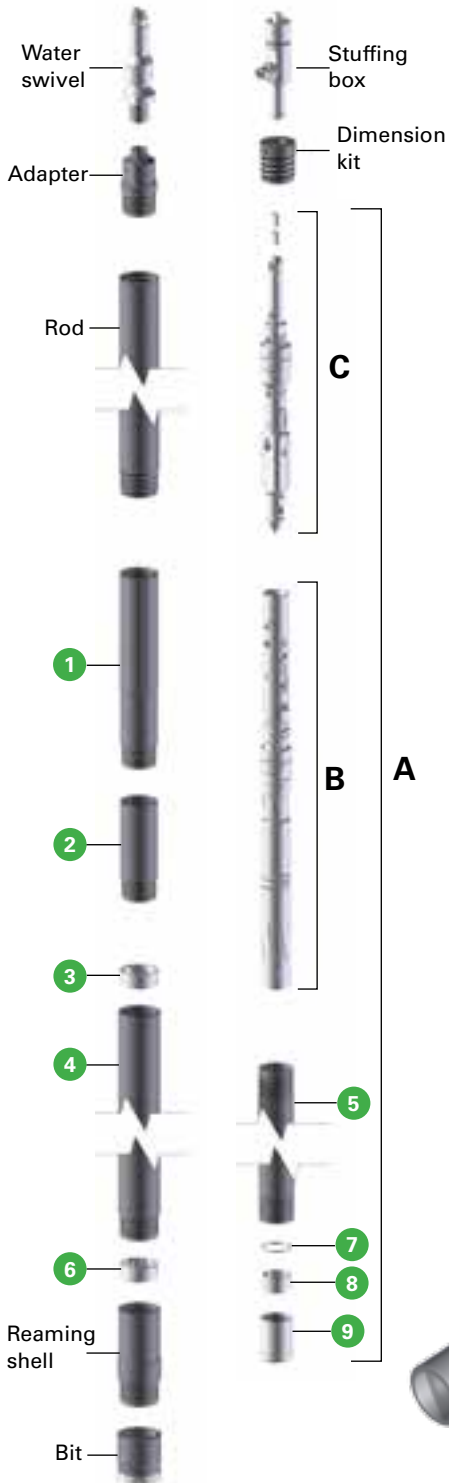
| Item | Description               | Part Number |            | Qty |
|------|---------------------------|-------------|------------|-----|
|      |                           | NU size     | N2U size   |     |
| 5    | Assembly rod              | 3760017228  |            | 1   |
| 6    | Spring – Drive key        | 3760017238  |            | 1   |
| 7    | Drive key                 | 3760017229  |            | 1   |
| 8    | Spring – Latch            | 3760017237  |            | 1   |
| 9    | Latch                     | 3760017222  |            | 2   |
| 10   | Latch body                | 3760017220  |            | 1   |
| 11   | Propulsion seal           | 3760017225  |            | 2   |
| 12   | Seal spacer               | 3760017226  |            | 1   |
| 13   | Mid Body – UG             | 3760017224  |            | 1   |
| 14   | Landing shoulder UG       | 3760017264  | 3760017241 | 1   |
| 15   | 22 mm ball                | 3760012099  |            | 1   |
| 16   | Landing indicator bushing | 3760012100  |            | 1   |
| 17   | Lower body                | 3760017211  |            | 1   |
| 18   | Locknut – Spindle         | 3760017212  |            | 1   |
| 19   | Spindle                   | 3760017217  |            | 1   |
| 20   | Shut Off Valve – Yellow   | 3760008328  |            | 2   |
| 21   | Valve adjusting washer    | 3760006237  |            | 2   |
| 22   | Thrust bearing            | 3760006461  |            | 1   |
| 23   | Spindle bearing           | 3760017219  |            | 1   |
| 24   | Hanger bearing            | 3760006462  |            | 1   |
| 25   | Compression spring        | 3760006463  |            | 1   |
| 26   | Washer – Bearing          | 3760017230  |            | 1   |
| 27   | Ball bearing              | 3760017234  |            | 1   |
| 28   | Nyloc nut                 | 3760017240  |            | 1   |
| 29   | Inner tube cap assembly   | 3760017232  | 3760017243 | 1   |

NOTE: Loading tool is required to insert head into the drill string.

| NU Head spare parts kit (2000 m / 6600 ft) | 3760017248 | Qty |
|--|------------|-----|
| N-D Latch                                  | 3760017222 | 2   |
| N-D Drive key                              | 3760017229 | 2   |
| N-D Assembly rod                           | 3760017228 | 2   |
| Assy bolt 1/4" x 20" flanged               | 3760017239 | 4   |
| Wedge lock washer 1/4"                     | 3760017235 | 4   |
| Spring 0.360" X 0.051" X 3"                | 3760017236 | 3   |
| Spring 0.360" X 0.041" X 0.5"              | 3760017238 | 3   |
| Spring 0.300" X 0.030" X 1.50"             | 3760017237 | 3   |
| NO Hard shut off valve yellow              | 3760008328 | 2   |
| 22 mm Stainless steel ball                 | 3760012099 | 1   |
| Landing indicator bushing                  | 3760012100 | 6   |
| NU-D Landing shoulder                      | 3760017264 | 1   |
| NU-D Propulsion seal                       | 3760017225 | 2   |

| N2U Head spare parts kit (2000 m / 6600 ft) | 3760017257 | Qty |
|---|------------|-----|
| N-D Latch                                   | 3760017222 | 2   |
| N-D Drive key                               | 3760017229 | 2   |
| N-D Assembly rod                            | 3760017228 | 2   |
| Assy bolt 1/4" x 20" flanged                | 3760017239 | 4   |
| Wedge lock washer 1/4"                      | 3760017235 | 4   |
| Spring 0.360" x 0.051" x 3"                 | 3760017236 | 3   |
| Spring 0.360" x 0.041" x 0.5"               | 3760017238 | 3   |
| Spring 0.300" x 0.030" x 1.50"              | 3760017237 | 3   |
| NO Hard shut off valve – Yellow             | 3760008328 | 3   |
| 22 mm Stainless steel ball                  | 3760012099 | 1   |
| Landing indicator bushing                   | 3760012100 | 6   |
| N2U-D Landing shoulder                      | 3760017241 | 1   |
| NU-D Propulsion seal                        | 3760017225 | 2   |

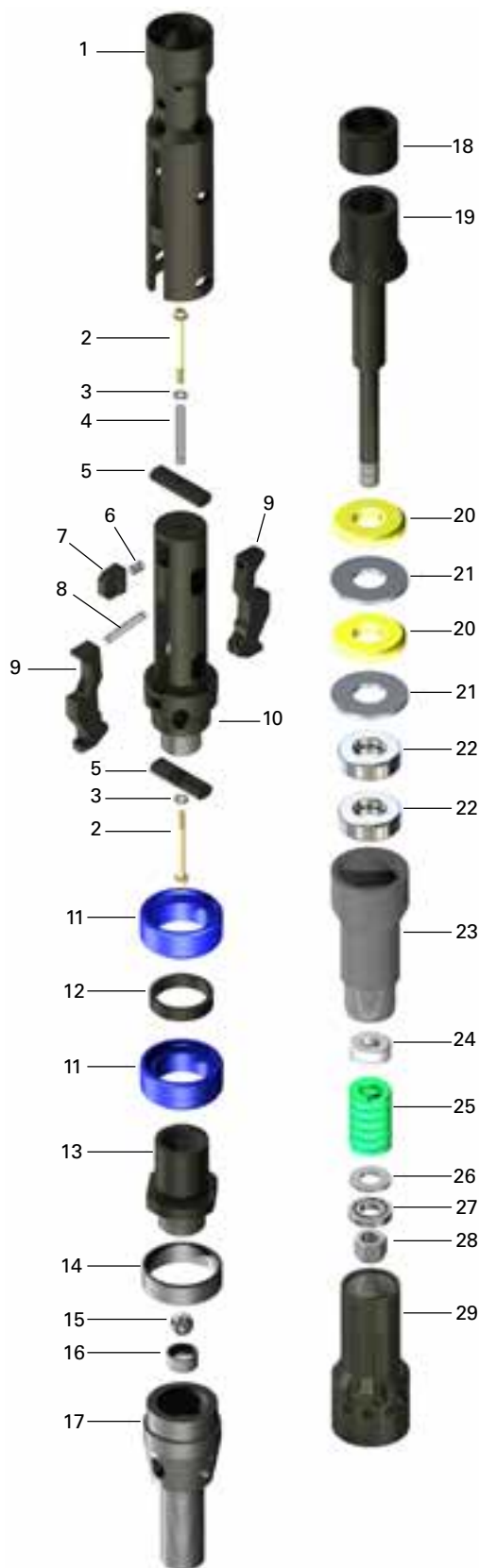
## ***DiscovOre Core Barrel Assemblies – NU & N2U Underground***

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| N/NU core barrel consumables kit 2000 m / 6600 ft<br>3760016574 |             |     |
|---|-------------|-----|
| Description   | Part Number | Qty |
| Core lifter   | 3760006241  | 40  |
| Core lifter case  | 3760006242  | 8   |
| Landing ring  | 3760006243  | 4   |
| Inner tube stabilizer   | 3760006244  | 4   |
| Stop ring   | 3760006240  | 8   |

| N2/NU2 core barrel consumables kit 2000 m / 6600 ft<br>3760016575 |             |     |
|---|-------------|-----|
| Description   | Part Number | Qty |
| Core lifter   | 3760006327  | 40  |
| Core lifter case  | 3760006328  | 8   |
| Landing ring  | 3760006329  | 4   |
| Inner tube stabilizer   | 3760008317  | 4   |
| Stop ring   | 3760006326  | 8   |

# DiscovOre Head Assembly – HU Underground



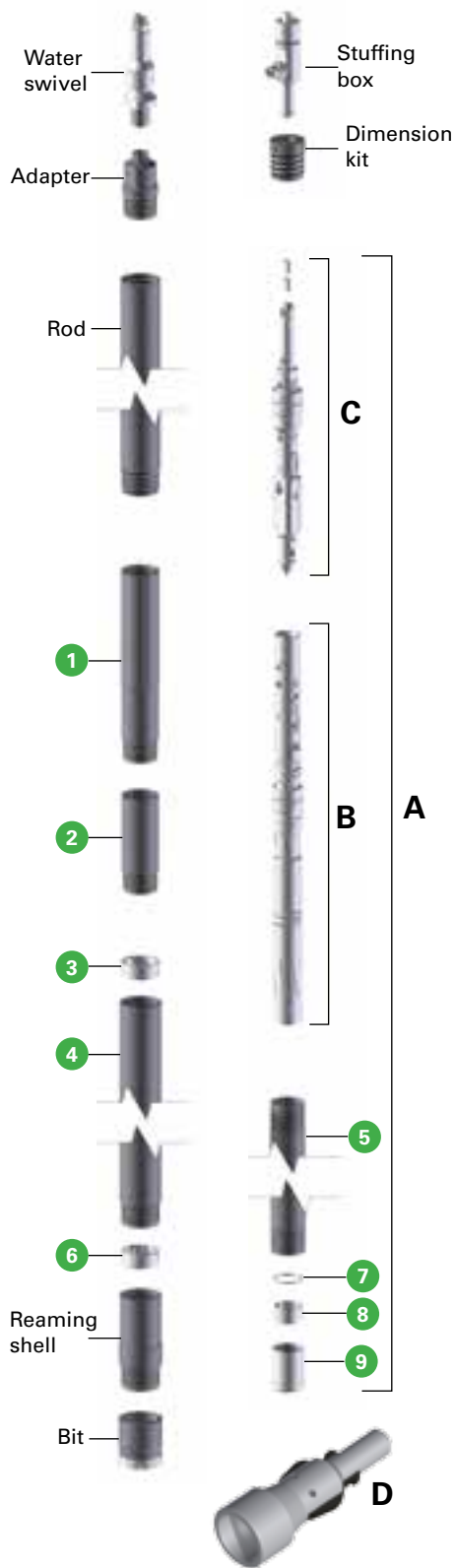
| Item | Description                | Part Number | Qty |
|------|----------------------------|-------------|-----|
| –    | HU DiscovOre Head assembly | 3760017301  | 1   |
| 1    | Retracting case            | 3760017318  | 1   |
| 2    | Assembly bolt              | 3760017239  | 1   |
| 3    | Wedge lock washer          | 3760017235  | 1   |
| 4    | Spring – Retracting case   | 3760017236  | 1   |
| 5    | Assembly rod               | 3760017324  | 1   |
| 6    | Spring – Drive key         | 3760017238  | 1   |
| 7    | Drive key                  | 3760017314  | 1   |
| 8    | Spring – latch             | 3760017334  | 1   |
| 9    | Latch                      | 3760017317  | 2   |
| 10   | Latch body                 | 3760017333  | 1   |
| 11   | Propulsion seal            | 3760017320  | 2   |
| 12   | Seal spacer                | 3760017321  | 1   |
| 13   | Mid body – Underground     | 3760017319  | 1   |
| 14   | Landing shoulder           | 3760006150  | 1   |
| 15   | 22 mm ball                 | 3760012099  | 1   |
| 16   | Landing indicator bushing  | 3760012100  | 1   |
| 17   | Lower body                 | 3760017311  | 1   |
| 18   | Locknut – Spindle          | 3760017212  | 1   |
| 19   | Spindle                    | 3760017322  | 1   |
| 20   | Shut off valve – Yellow    | 3760008379  | 2   |
| 21   | Valve adjusting washer     | 3760006252  | 2   |
| 22   | Thrust bearing             | 3760006471  | 2   |
| 23   | Spindle bearing            | 3760017323  | 1   |
| 24   | Hanger bearing             | 3760006462  | 1   |
| 25   | Compression spring         | 3760006463  | 1   |
| 26   | Washer - Bearing           | 3760017230  | 1   |
| 27   | Ball bearing               | 3760017234  | 1   |
| 28   | Nyloc nut                  | 3760017240  | 1   |
| 29   | Inner tube cap assembly    | 3760017315  | 1   |

NOTE: Loading tool is required to insert the head into the drill string.

| HU Head spare parts kit (2000 m / 6600 ft) | 3760017348 | Qty |
|--|------------|-----|
| H-D Latch                                  | 3760017317 | 2   |
| H-D Drive key                              | 3760017314 | 2   |
| H-D Assembly rod                           | 3760017324 | 2   |
| Assy bolt 1/4" x 20" flanged               | 3760017239 | 4   |
| Wedge lock washer 1/4"                     | 3760017235 | 4   |
| Spring 0.360" x 0.051" x 3"                | 3760017236 | 3   |
| Spring 0.360"x 0.041"x 0.5"                | 3760017238 | 3   |
| Spring 0.360 x 0.042 x 1.750               | 3760017334 | 3   |
| HO Hard shut off valve yellow              | 3760008379 | 2   |
| 22 mm Stainless steel ball                 | 3760012099 | 1   |
| Landing indicator bushing                  | 3760012100 | 6   |
| HO Landing shoulder 3PLB                   | 3760005150 | 1   |
| HU-D Propulsion seal                       | 3760017320 | 2   |



# DiscovOre Core Barrel Assemblies – HU Underground



| Item | Description  |               |            |            |
|------|--|---------------|------------|------------|
|      | Core barrel type   | H core barrel |            |            |
|      | Rod connection   | HO rod        | HT rod     | HMO rod    |
|      | 1.5 m / 5 ft Core barrel assy complete   | 3760017389    | 3760017385 | 3760017387 |
|      | 3.0 m / 10 ft Core barrel assy complete  | 3760017388    | 3760017384 | 3760017386 |
| A    | 1.5 m / 5 ft inner tube assy complete  | 3760017383    |            |            |
| A    | 3.0 m / 10 ft inner tube assy complete   | 3760017382    |            |            |
| B    | Head assembly complete   | 3760017301    |            |            |
| C    | Overshot assembly complete   | 3760017351    |            |            |
| D    | Loading tool   | 3760017270    |            |            |
| 1    | Locking coupling   | 3760017327    | 3760017329 | 3760017328 |
| 2    | Adapter coupling   | 3760006045    |            |            |
| 3    | Landing ring   | 3760006258    |            |            |
| 4    | 1.5 m / 5 ft outer tube  | 3760006046    |            |            |
| 4    | 3.0 m / 5 ft outer tube  | 3760006047    |            |            |
| 5    | 1.5 m / 5 m inner tube   | 3760006048    |            |            |
| 5    | 3.0 m / 10 ft inner tube   | 3760006049    |            |            |
| 6    | Inner tube stabilizer  | 3760006259    |            |            |
| 7    | Stop ring  | 3670006255    |            |            |
| 8    | Core lifter  | 3760006256    |            |            |
| 9    | Core lifter case   | 3760006257    |            |            |
|      | Spare Part Kits (2000 m / 6600 ft drilling)  |               |            |            |
|      | Spare parts kit head assembly  | 3760017348    |            |            |
|      | Spare parts kit overshot   | 3760017367    |            |            |
|      | Consumables kit core barrel  | 3760016577    |            |            |
|      |  |               |            |            |
|      | Universal components common for most DCDMA core barrel specific size (Excore, O-Series, Link Latch design etc. |               |            |            |

| H/HU core barrel consumables kit 2000 m / 6600 ft<br>3760016577 |             |     |
|---|-------------|-----|
| Description   | Part Number | Qty |
| Core lifter   | 3760006256  | 40  |
| Core lifter case  | 3760006257  | 8   |
| Landing ring  | 3760006258  | 4   |
| Inner tube stabilizer   | 3760006259  | 4   |
| Stop ring   | 3760006255  | 8   |

# DiscovOre Accessories – Underground

## NH Loading tool

| Item | Description              | Part Number | Qty |
|------|--------------------------|-------------|-----|
| –    | NH Loading tool assembly | 3760017270  | 1   |
| 30   | NH Loading tool body     | 3760017267  | 1   |
| 31   | Latch – Loading tool     | 3760017268  | 2   |
| 32   | Spring                   | 3760017237  | 1   |
| 33   | 5/16" Coiled pin         | 3760017259  | 2   |



## NU to N2U Head assy conversion

| Description                | Part Number | Qty |
|----------------------------|-------------|-----|
| N2U Landing shoulder       | 3760017241  | 1   |
| N2 Inner tube cap assembly | 3760017242  | 1   |

## Survey instrument spearhead replacement kit

| N-A3S Spearhead replacement kit | 3760017277 | Qty |
|---------------------------------|------------|-----|
| N-AS3 Spearhead replacement     | 3760017276 | 1   |
| Spiral pin 7/16 x 1             | 3760004348 | 1   |

To use Arrow 3S overshoot with existing borehole survey instruments replace spearhead on them with Arrow 3S adapter above.

## NU/N2U/HU to N/N2/H Down hole conversion

| Description          | Part Number | Qty |
|----------------------|-------------|-----|
| N Landing shoulder   | 3760005100  | 1   |
| N2 Landing shoulder  | 3760005241  | 1   |
| N Mid body – Surface | 3760017223  | 1   |
| H Mid body – Surface | 3760017325  | 1   |

To convert underground head assembly (NU, N2U or HU) to down hole version, replace the mid body on the head assembly (and landing shoulder on N and N2) to eliminate the drag from the propulsion seals for faster round trips.

## DiscovOre locking couplings

| Description            | Part Number | Qty |
|------------------------|-------------|-----|
| NO – Locking coupling  | 3760017213  | 1   |
| NMO – Locking coupling | 3760017214  | 1   |
| NT – Locking coupling  | 3760017215  | 1   |
| HO Locking coupling    | 3760017327  | 1   |
| HMO Locking coupling   | 3760017328  | 1   |
| HT Locking coupling    | 3760017329  | 1   |

## Core Barrel adapter couplings

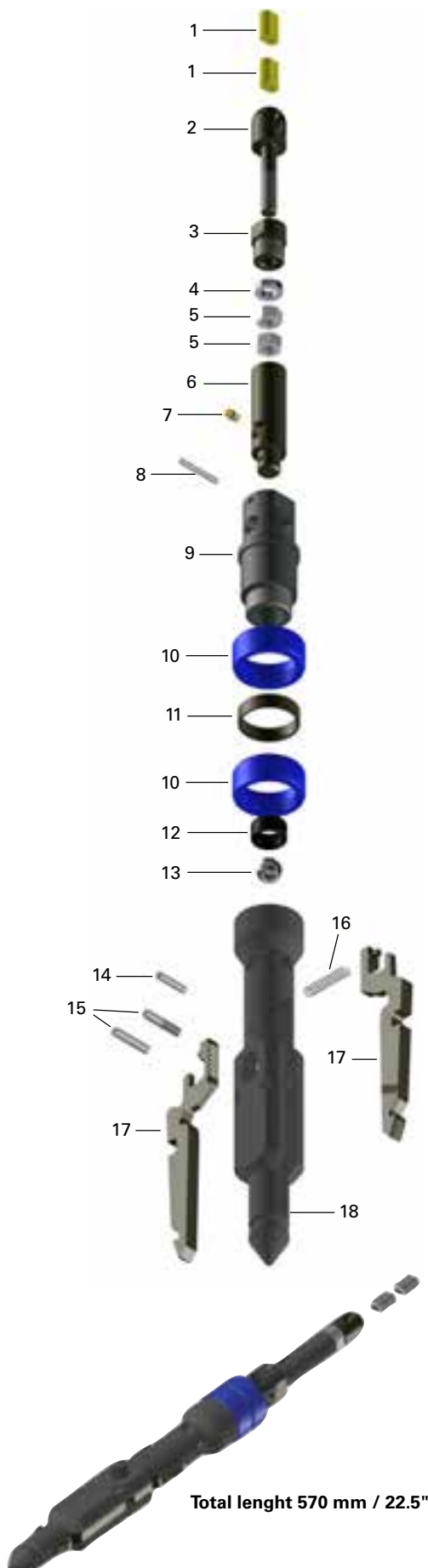
| Description        | Part Number | Qty |
|--------------------|-------------|-----|
| N Adapter coupling | 3760006028  | 1   |
| H Adapter coupling | 3760006045  | 1   |



NO DiscovOre locking couplig – 3760017213

The DiscovOre Underground core barrel outer tube uses the same adapter coupling as the surface core barrel and can be used in all hole orientations with the DiscovOre underground head assembly. The DiscovOre locking coupling must be used for safe latch engagement with the core barrel on up holes.

# Arrow 3S Overshot – NH Underground



| Item | Description                 | Part Number | Qty |
|------|-----------------------------|-------------|-----|
| –    | NU Overshot Assembly        | 3760017251  | 1   |
| –    | HU Overshot Assembly        | 3760017351  | 1   |
| 1–5  | Cable Swivel Assembly       | 3760016262  | 1   |
| 1    | Nicopress                   | 3760008244  | 2   |
| 2    | Eye bolt                    | 3760016265  | 1   |
| 3    | Cable swivel collar         | 3760007216  | 1   |
| 4    | Thrust bearing              | 3760006467  | 1   |
| 5    | Nut 1/2–20                  | 3760012331  | 2   |
| 6    | Cable swivel body           | 3760007767  | 1   |
| 7    | Grease fitting              | 0544110023  | 1   |
| 8    | Shear pin                   | 3760006416  | 1   |
| 12   | Landing indicator bushing   | 3760012100  | 1   |
| 13   | 22 mm ball                  | 3760012099  | 1   |
| 14   | 1/4" Spring pin             | 0108169187  | 1   |
| 15   | 5/16" Coiled pin            | 3760017259  | 2   |
| 16   | Spring – Lifting dog        | 3760006373  | 1   |
| 17   | Lifting dog – Underground   | 3760017262  | 2   |
| 18   | Overshot body – Underground | 3760017261  | 1   |

## HU to NU Overshot conversion

| Item | Description        | Part Number | Qty |
|------|--------------------|-------------|-----|
| 9    | NU Valve body      | 3760017263  | 1   |
| 10   | NU Propulsion seal | 3760017225  | 2   |
| 11   | NU Seal spacer     | 3760017226  | 1   |

## NU to HU Overshot conversion

| Item | Description        | Part Number | Qty |
|------|--------------------|-------------|-----|
| 9    | HU Valve body      | 3760017362  | 1   |
| 10   | HU Propulsion seal | 3760017320  | 2   |
| 11   | HU Seal spacer     | 3760017321  | 1   |

| NU-A3S O/S Spare parts kit (2000 m / 6600 ft) | 3760017266 | Qty |
|---|------------|-----|
| NH-A3S Lifting dog                            | 3760017254 | 2   |
| BO NO HO Lifting dog spring                   | 3760006373 | 2   |
| 22 mm Stainless steel ball                    | 3760012099 | 1   |
| Landing indicator bushing                     | 3760012100 | 6   |
| Botwu shear pin 3/16 x 1 11/16                | 3760006416 | 4   |
| NU-D Propulsion seal                          | 3760017225 | 2   |
| 3/16" Nicopress sleeve oval                   | 3760008244 | 2   |
| Pin coiled spring 5/16 x 1 1/2                | 3760017259 | 2   |

| HU-A3S O/S Spare parts kit (2000 m / 6600 ft) | 3760017367 | Qty |
|---|------------|-----|
| NH-A3S Lifting dog                            | 3760017254 | 2   |
| BO NO HO Lifting dog spring                   | 3760006373 | 2   |
| 22 mm Stainless steel ball                    | 3760012099 | 1   |
| Landing indicator bushing                     | 3760012100 | 6   |
| Botwu shear pin 3/16 x 1 11/16                | 3760006416 | 4   |
| HU-D Propulsion seal                          | 3760017320 | 2   |
| 3/16" Nicopress sleeve oval                   | 3760008244 | 2   |
| Pin coiled spring 5/16 x 1 1/2                | 3760017259 | 2   |



# Arrow 3S Overshot – NH Downhole Short



| Item  | Description                        | Part Number | Qty |
|-------|------------------------------------|-------------|-----|
| –     | NH Overshot short assembly         | 3760017290  | 1   |
| 10–19 | NH Arrow 3S Overshot Head assembly | 3760017252  | 1   |

| Item | Description             | Part Number | Qty |
|------|-------------------------|-------------|-----|
| 1-5  | Cable swivel assembly   | 3760016262  | 1   |
| 1    | Nicopress               | 3760008244  | 1   |
| 2    | Eye bolt                | 3760016265  | 1   |
| 3    | Cable swivel collar     | 3760007216  | 1   |
| 4    | Thrust bearing          | 3760006467  | 1   |
| 5    | Nut 1/2-20              | 3760012331  | 2   |
| 6    | Grease fitting          | 0544110023  | 1   |
| 7    | Sinking bar body        | 3760006384  | 1   |
| 8    | Sinking bar adapter     | 3760015935  | 1   |
| 9    | Release sleeve          | 3760006381  | 1   |
| 10   | Pivot body              | 3760017258  | 1   |
| 11   | Set screw               | 3760015495  | 1   |
| 12   | Spring – Detent         | 3760017279  | 1   |
| 13   | Detent                  | 3760017280  | 1   |
| 14   | 7/16\" Coiled pin       | 3760017260  | 1   |
| 15   | 1/4\" Spring pin        | 108169187   | 1   |
| 16   | 5/16\" Coiled pin       | 3760017259  | 2   |
| 17   | Spring – Lifting dog    | 3760006373  | 1   |
| 18   | Lifting dog             | 3760017254  | 2   |
| 19   | Overshot body – Surface | 3760017255  | 1   |

Use this overshot for down holes with limited space. (Underground or Surface). The extra weight of the sinking bar and no drag from the propulsion seals will result in faster round trips. The release sleeve will give you the ability to release the overshot in the event of a jammed inner tube.

| NH-A3S Spare parts kit (2000 m / 6600 ft) | 3760017265 | Qty |
|---|------------|-----|
| NH-A3S Lifting dog                        | 3760017254 | 2   |
| BO NO HO Lifting dog spring               | 3760006373 | 2   |
| Pln coiled spring 5/16 x 1 1/2            | 3760017259 | 2   |
| Pin coiled spring 7/16 x 1 1/2            | 3760017260 | 1   |
| Round detent plunger                      | 3760017280 | 1   |
| NH-A3S Detent spring                      | 3760017279 | 1   |
| Spring pin 1/4\" X 1 3/4\" LG             | 108169187  | 1   |
| 3/16\" Nicopress sleeve oval              | 3760008244 | 2   |



# Operation

## Loading Tool

The DiscovOre underground head assembly comes with the latch lock already installed. If you have converted your surface head to underground configuration, please ensure that the latch lock is properly installed. With the latch lock installed, the loading tool is required to disengage the latches so it can be inserted into the drill string.



1. Verify that the landing indicator valve has been reset. If the ball can be seen in the lower latch body, it needs to be reset before inserting the inner tube assembly. Using the Atlas Copco reset tool, place the blade

under the ball and lift it against the bushing. Apply enough pressure on the handle to push the ball past the bushing.

2. Insert the loading tool into the top of the retracting case of the head assembly.
3. Hold the loading tool stationary while pulling on the retracting case until it engages the loading tool latches. The loading tool will now stay connected to the head assembly.
4. Insert the inner tube assembly into the drill string. Push the end of the loading tool to fully insert the inner tube assembly.
5. Hold onto the loading tool once fully inserted. It will automatically disconnect from the head assembly.
  - To manually release the head from the loading tool, ensure the latches are inserted past the drill rod threads. Squeeze the loading tool latches to disconnect it from the retracting case.
6. Remove the loading tool from the drill string.
7. Install the water swivel and start pumping in the inner tube assembly.

## Underground Overshot

The DiscovOre underground overshoot has an automatic locking mechanism.

1. To release the overshoot, push the overshoot into the retracting case of the head assembly to slightly compress the lifting dogs. Maintain some slack in the wireline.
2. Squeeze the lifting dogs while maintaining the overshoot inserted in the retracting case, then pull the overshoot out of the retracting case while squeezing the lifting dogs.

Verify that the landing indicator valve has been reset before inserting the overshoot into the drill string. If the ball can be seen in the overshoot body, it needs to be reset. Using the Atlas Copco reset tool, place the blade under the ball and lift it against the bushing. Apply enough pressure on the handle to push the ball past the bushing.

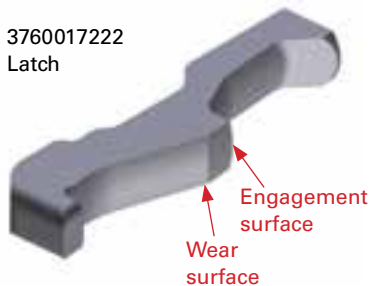


HU Arrow 3S Overshot – 3760017351

# Maintenance

## Replacing latches and drive key

Periodically inspect the latches for wear and damage during use. Replace them if cracked or excessively worn. The latches should be replaced when the bottom side start to wear into the top engagement surface.



## Remove Latches and Drive Key



1. Use 7/16" or 11 mm socket to remove the assembly bolt on top of the head assembly.
2. Remove the assembly bolt, lock washer and spring as one.
3. Remove the assembly rod.
4. Squeeze the latches together with one hand and press in the drive key with the thumb of the other hand.
5. Partially slide out the retracting case while maintaining the latches and drive key until they line up with the cut-outs on the retracting case.
6. Slowly release the latches and drive key so that they do not pop out.
7. Remove the latches by un-hooking them from the latch body and remove the latch spring.
8. Remove the drive key and spring.
9. Remove the retracting case completely.

## Installing Latches and Drive Key



1. Slide the retracting case over the latch body so that the cut-out for the drive key lines up with the pocket in the latch body.
2. Install the drive key and spring.
3. Press in the drive key and slide in the retracting case until the latch cut-out lines up with the latch body slot.
4. Install the latch spring in one latch and hook it into the latch body.
5. Hook the second latch into the latch body.
6. Ensure the spring is inserted into the spring pocket of both latches.
7. Squeeze the latches together with one hand and press in the drive key (not needed for downhole drilling if used with standard tang type locking coupling), with the thumb of the other hand.
8. Slide in the retracting case while maintaining the latches and drive key until the retracting case is fully inserted on the latch body.
9. Install the assembly rod.
10. Install the lock washer on the assembly bolt.
11. Install the retracting case spring on the assembly bolt.
12. Install the bolt, washer and spring as one, through the top of the latch body. The bolt must pass through the hole in the assembly rod. Use the line on the end of the assembly rod to adjust alignment.
13. Use a 7/16" or 11 mm socket to tighten the assembly bolt. Pressure must be applied to compress the retracting case spring before the bolt will start to thread into the latch body. A spacer may need to be installed in the socket to ensure the bolt threads reach the latch body.



### CAUTION

Do not overtighten the assembly bolt.



[illegible]



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