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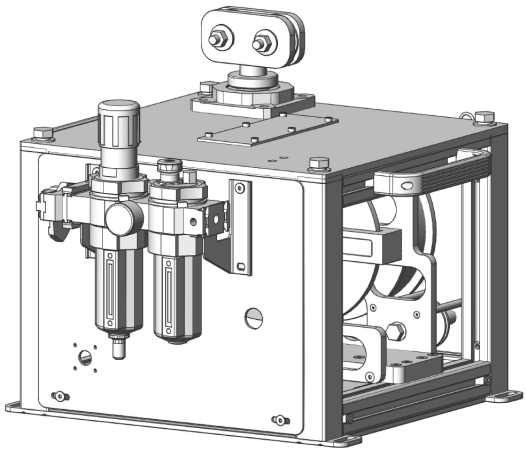
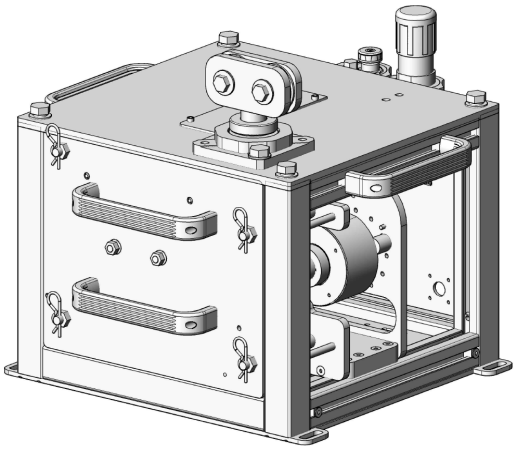
Hohner Automation Ltd. (UK)
Hohner Corporation (Canada)

CHM-xxx Series Geolograph / Air Line Retriever (Chameleon) Operation and Maintenance Manual





WARNING

Please read this manual completely before installing and using this device. Keep the manual in a safe location for future reference. The Geolograph is a passive device used for feedback. Not for positional safety.

This device conforms to the Machinery Directive (2006/42/EC) and the ATEX directive (EN13463-1:2009 and EN13463-5:2011)

Zone 1, Ex II 2 G c, Ex IIB T3/T4 Gb (Tamb = +1C to +40C)

In order to maximize the life cycle of our Geolograph, please follow the recommended instructions for maintenance, operation and safety. Thank you for purchasing the Geolograph / Air Line Retriever

General Product Use Criteria:

- Ensure the unit is either bolted or welded to a flat surface and that the product is fully earthed.
- Ensure orientation of telescoping head is in line with the direction of desired steel cable output
- Functionally rated at temperatures from -20C to + 60C
- Certified for use from +1C to +40C
- Use ONLY compressed air to drive device
- Ensure exposure to drilling fluids is minimized
- Cable is rated to 522 kilos breaking load
- If the cable does snap or break, an internal limiter is set to minimise the speed.
- Ensure compliance with the ATEX directive and Zoning requirements if used in a hazardous area
- Encoder certification varies upon model purchased, please check the encoder certification separately.
- Lifetime of motor is about 20,000 hours (continuous use) at 200rpm.

Complete the following checklist prior to starting installation in a hazardous area. All actions must be completed in accordance with ATEX 100a.

- Read device label to ensure device is appropriately labelled for intended zone use area
- Check site environment for potentially explosive substances
- Check ambient temperature of the site to make sure it's within the limits of the device operation
- Ensure the cable path outside the unit minimizes tangling
- Check that the cable paid out from device does not rub on any surfaces outside the unit (minimize sparks)
- Check that internal parts are moving freely
- Check that the encoder certification and connections are appropriate for the intended zone of use
- Keep electric equipment away from device as it uses strong Nb magnets for the brake mechanism

Improper environment, installation and operation can result in injury and/or damage to property.

Qualified personnel must perform all work to assemble, install, operate, maintain and repair Geolograph

Qualified personnel must follow:

- These instructions and the warning and information labels on the Geolograph
- All other start up instructions, circuit diagrams
- The system and wiring specific legal regulations and requirements (typically EN 60079-14 and EN 60079-25)
- The current applicable national and regional specifications regarding explosion protection, safety and accident prevention
- Any work carried out should be done with appropriate safety wear at all times (gloves, hardhat, safety glasses, safety shoes)

CAUTION	**The device uses a magnetic brake system. Please be careful when approaching the unit with electronic devices.**

Your safety and the safety of others is extremely important.

We have provided many important safety messages in this manual and on your product. Always read and obey all safety messages.

This is the safety alert symbol. This symbol alerts you to hazards that can kill or hurt you and others. The safety alert symbol and the words "DANGER" and "WARNING" will precede all safety messages. These words mean:

DANGER

You will be killed or seriously injured if you don't follow instructions.

WARNING

You can be killed or seriously injured if you don't follow instructions.

All safety messages will identify the hazard, tell you how to reduce the chance of injury, and tell you what can happen if the safety instructions are not followed.

CODE SYMBOLS

	Hazard. Possible consequences: death or severe injuries.
	Hazardous situation. Possible consequences: slight or mild injuries.
STOP	**Dangerous situation.** Possible consequences: damage to the drive or the environment.
Ex	**Important instructions on protection against explosion.**
	Application tips and useful information.

Installation: (parts 1 through 12)

1) First ensure that the Geolograph is either bolted or welded securely to the machine floor and securely earthed in an area without vibration, avoiding corrosive environments and its position is optimally located to minimise any potential hazards (falling objects / moving objects / personnel). For versions without FRL covers, please ensure that the FRL is protected from potential falling objects (via a suitable cover or similar).

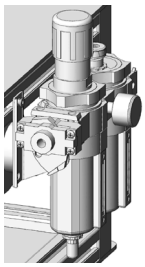
DANGER **Ensure proper care is taken when lifting and moving the device. Two large handles at the sides are provided. Two people are required.**

2) Ensure the red shut off valve is closed.

3) Then ensure the regulator valve is closed by turning the top in the minus direction till it stops. Also ensure oil level is appropriate, see maintenance section 35 onwards.

4) Then attach your air inlet connector to the female inlet port (1/2" is standard).

WARNING **Ensure the main air supply is off before attaching the air inlet connector.**



5) The Encoder type and termination can change - refer to encoder handbook provided in this manual packet for detailed safety critical information. An appropriately certified safety barrier will be required as the encoder will be certified Intrinsically Safe (Ex ia).

   For Junction Box Versions open the top cover (4x M12 hex bolts close the cover) and connect your cable to the junction box of the unit by threading the cable in from the side panel, and securely fasten to the Ex e terminals available (refer to J.B. user manual included for details).

   For Connector Versions, connect the mating connector to the panel mount connector located on the side of the geolograph and route cable as per the applicable Ex wiring regulations (Typically BS EN 60079-14)

   For Direct Cable Versions, route cable as per the applicable Ex wiring regulations (Typically BS EN 60079-14)

Ex **Encoder has to be installed following the encoder installation document in accordance with hazardous area regulations.**

6) Open the top cover and remove the tape from the drum to release the cable and thread through approx. 1m out from the top of the telescope section. Close and secure the cover with the 4 x M12 hex bolts.

7) Telescope height is fixed, though it can be rotated to ensure cable exit is inline with travelling block.

8) Turn on the main air supply.

DANGER **Ensure the main air supply does not exceed 7Bar. It must be clean dry compressed air (-20C to +80C)* *Air supply must be dry enough to avoid ice formation below +2C**

9) Open the shut off valve, and then gently and carefully turn the regulator towards the + sign to allow minimal pressure to the air motor. This is to ensure there is a little tension in the cable before pulling the cable out to attach to the target.

WARNING **Hold on to the end of the cable or secure it so it does not get drawn into the device.**

10) Draw the cable out and securely attach to the travelling block or desired point of fixation via pulley(s) to ensure a straight as possible cable movement tracking the block. It is imperative you keep the number of bends, and obstacles to a minimum from the Geolograph to the target.

11) Once you have ensured that the cable has cleared all obstacles and does not get in the way of any walk paths and personnel working areas, and is safely and securely attached to the desired point of fixation you can adjust the regulator to the desired BAR rating as per the graph and table below. A rating of 4 BAR is recommended. Three versions are available (Option B is standard)

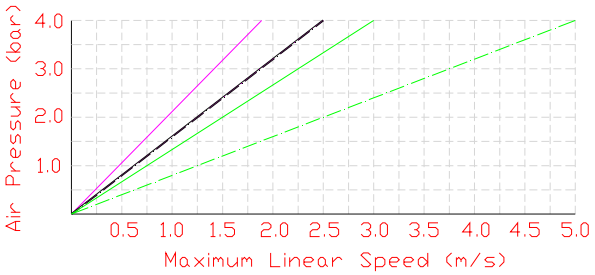


Table 1	Option A	Option B	Option C
T Class	T4	T3	T3
Functional Speed	1.8m/s	2.5m/s	3m/s
Brake Speed	2.5m/s	2.5m/s	upto 5m/s

12) Device is now ready for use

CAUTION	**Cable moving at speed can cause serious injury and / or death. Ensure sufficient clearance between it and other machinery and personnel during normal operations.** **Ensure cable paying out from device is well clear of any obstacles and that bends, sharp objects or turns via pulleys or other methods are minimized.**

DANGER	**Ensure the rig is not doing any operations and that the travelling block is STATIONARY and others are aware you are working**
STOP	**Do not continue until you are certain the rig is no longer operating, and that the rig manager is aware of what you are doing.**

Normal Usage: (parts 13 through 21)

13) The unit requires minimal to no supervision to operate normally if installation is done correctly. Particularly ensuring careful clearance of the cable outside the unit.

14) During operation the pneumatic motor will keep tension on the cable and you will be able to monitor the distance the travelling block moves up/down.

15) The drum has many cable layers, so each revolution will have a slightly different linear length. Calibration is required and is set up per end user systems.

16) The equivalent of this revolution distance to your travelling block movement depends on the installation and alignment of cable with the drilling mast.

i	**Calibration should be done to ensure correct readings.**
DANGER	**Improper calibration can cause incorrect readings relative to the position of the travelling block, resulting in possible injury.**

17) The pressure gauge can be seen directly on the FRL. It is good practice to check that the air pressure is at about 4 bar (52 psi) periodically

18) If you would like to use a different maximum speed on your unit, please adjust the air pressure accordingly as per the graphs and table shown on the previous page.

19) Also regularly check for any accumulation of dirt and grime on the unit, if excessive, it is a good idea to keep it relatively clean and to keep the telescope area clean of any debris.

DANGER	**Ensure wear and tear to the cable is minimized as any fraying or kinks might cause the cable to snap and possibly cause damage to the unit itself and injuries to others. It is important to monitor the condition of the cable regularly and replace it if necessary.**

20) The unit is designed to operate with minimal to no maintenance, but we are aware that a drilling rig environment differs between locations, as does the environment around it. Therefore keeping it clean and the cable clean helps with the life time. The unit is designed to minimize tangling and damage inside the unit, any damage to the cable outside will result in the cable reeling in at a safe speed and causing no damage to the internal mechanism.

21) Cleaning the cable as it comes in and out is not required, though a good wipe with a thick cloth while using gloves is good practice once a week. Do this by gently applying a 'damp' cloth to the cable (right by the telescope) while the cable is paying in or out. Be sure to wear safety gloves and glasses during this operation. It is advised that restricted access is in place in normal operation (especially to the top telescope section, where the cable enters the geolograph via two pulleys).

CAUTION	**Take extra precautions when applying the damp cloth to the cable during operation as the cable can have sharp or worn edges and to avoid any potential static charges.**

Failure Mode: (parts 22 through 31)

22) If during operation the cable snaps or brakes, the cable will automatically reel into the device at a maximum controlled speed as per table 1 (when set at 4Bar). This is a safe speed which will minimize the damage and injury to machines and personnel while it reels in.

23) Most of the failures will be a result of the cable snapping or getting damaged outside of the unit. Therefore it is important to have a clear path for the cable to track the target.

24) If the cable does snap, the drum will continue to turn until the air shutoff valve is turned off.

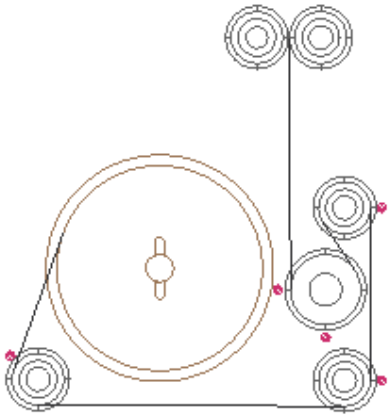
CAUTION	**It is recommended to wait for the cable to fully reel back in before approaching the Geolograph in such a case, and only then shutting the air off at the main supply or the manual shut off valve.**

25) Once the drum comes to a complete stop, ensure the manual valve is truly set to OFF. Turn the regulator in the direction of the minus sign to fully shut off the air to the unit. Now the air is 'twice' shut off from the device, and it's now safe to open the device.

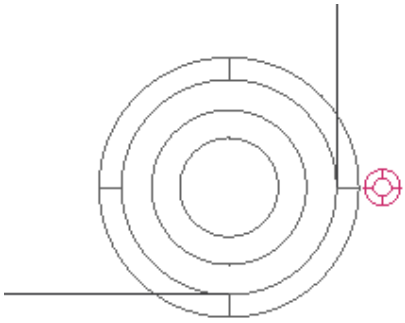
26) Open the device by removing the 4x M12 hex bolts on corners of the device. Keep them in a safe place.

27) Once opened, turn the drum by hand until you find the loose end of cable. *****if the cable is tangled go to troubleshoot section*****

28) Thread this cable through the pulley bars as per the following diagrams. Ensure the correct sequence is used. The drum reels in clock wise in this diagram.



i	**The diagram above shows the orientation of the cable relative to the drum and telescope. Regardless of the type, ensure the cable is threaded between the pulleys and pulley bars.**
DANGER	**The sequence to lay the cable has to be followed exactly as shown. As the anti-tangle mechanism is dependent on it. Also ensure the cable is threaded through between the pulleys and pulley bars. This is imperative for the safe functionality of the unit.** **The Geolograph comes with 100/75m of cable. Ensure enough cable is left after breakage to continue safe usage of device.**
i	**The below diagrams shows the threading of the cable between the pulley and the pulley bars**



29) Once the cable has been re-threaded, pull it through the telescope and reattach the cover using the 4x M12 screws.

30) Go to step (2) in the installation manual and follow instructions.

Encoder Issues: (parts 31 through 36)

31) If the encoder is giving faulty signals or no signals at all, the quickest solution is to attach a new encoder to the unit.

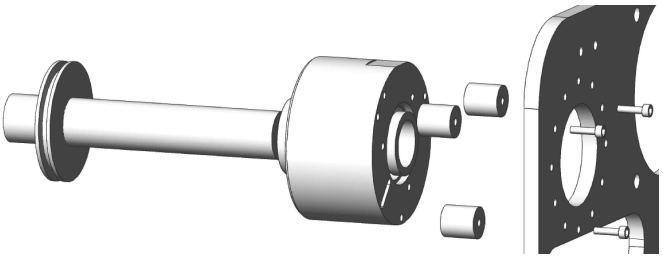
32) First ensure that the air supply or shut off valve is switched off before commencing any work, and that the encoder is fully disconnected from the barrier (de-energised).

33) Open the top cover, then junction box (if fitted) and undo the encoder wires coming from the encoder cable. Then remove the junction box to get access to the encoder mounting screws.

34) Refer to the 'spare encoder' part number engraved by the top plate of the Geolograph and contact us with the information provided for a replacement.

35) Then remove the encoder, which also removes the shaft holding the pulley. Undo the three encoder pins on the motor side of the frame. The encoder should now slide out. To replace a new encoder, follow the steps in reverse ensuring the pulley is tightly fastened to the encoder shaft and that the pulley is located centrally and directly underneath the periscope.

36) Rewire the encoder to the junction box and close the junction box and then close the top cover.



DANGER	**Ensure that both the main air supply and/or shut off valve are switched off and that the encoder is de-energised before commencing any work.**

Maintenance: (parts 37 through 48)

37) **OIL LEVEL:** Check to see if the oil level in the lubricator is sufficient before use. The reservoir should be at least half full. Do not adjust the feed drop rate for the oil that is pre-set at the factory for ideal conditions.

38) If oil needs refilling, shut down the device (refer to section 57-59). Then use any mineral oil available suitable for pneumatic filters to refill the right side canister and empty out the left side.

39) **CLEANING:** To clean the cable and inside the unit, first shut down the device (refer to section 57-59). Then open the unit (refer to instruction 25-26).

40) You may spray clean water all over the insides of the unit to remove any excess grime, keeping caution to not get excessive water into the air exhaust of the air motor. Externally you can use a 'damp' cloth to remove any dirt or deposits on the FRL and side panels.

i	**All items are IP rated inside the device, be careful to not get water in to the muffler of the air motor. The sliding shafts do NOT need oil, cleaning with water is ideal.**

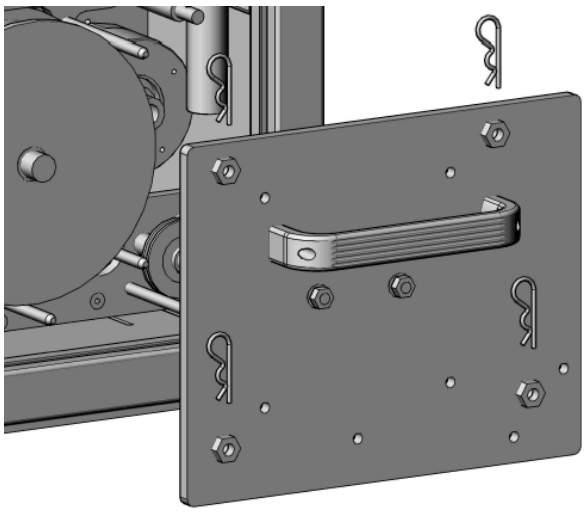
41) **NEW CABLE:** to add a new reel of cable, first shut down the device (refer to section 57-59). Then open the unit (refer to instruction 25-26 and 45).

42) Thread the end of the new cable through the telescope and through the pulleys (refer to section 27-28).

43) Once it's all the way through, thread the end through the hole in the diameter of the drum for it to come out again. At this point tie or make a loop wide and strong enough so that it does not come back out.

44) Close the device, and refer to section (6-12 and 45).

45) **NEW DRUM:** Open the 'DRUM ACCESS' panel be undoing the 4x M10 bolts and removing the 'R' clips, Keep these in a safe place. Take the old drum out and add a new drum and re-thread the cable as per instruction (27). Replace the 'DRUM ACCESS' panel.



46) **COUPLING:** The coupling is designed to be maintenance free, though it is recommended to check it periodically for wear and tear, replace or contact Hohner if any significant wear/play is present.

47) **BUSHINGS and BEARINGS:** The Geolograph uses two different types of bushings (composite material) and one bearing (Stainless steel). Please contact Hohner if for replacements. The bushings and flange bearings are maintenance free and self-lubricating. The telescope bearing is maintenance free and is not self-lubricating, though due to the nature of the application no extra lubrication is required. The lifetime of the parts are detailed in the table below:

Parameter	Pulley Bush JSM-1622-20
10N 20C 220 rpm 24hr/75%	Min 3.4 years
10N 40C 350 rpm 24hr/100%	Min 1.8 years

Parameter	Flange Bearing EFOM-20
19N 20C 220 rpm 24hr/75%	Min 3.0 years
19N 40C 350 rpm 24hr/100%	Min 1.0 years

Parameter	Telesc. Bearing CRFSPN19T
100N 20C 1 rpm 24hr/75%	Min 12 years
100N 40C 2 rpm 24hr/100%	Min 8 years

48) **PNEUMATICS AND MOTOR**: The geolograph uses an ATEX rated Motor and FRL. It is recommended that the muffler and motor is checked regularly as follows:
1. Remove the sound absorber. 2. Clean the felt filter.
3. Check the air compressor. 4. Listen for changes in the sound of the motor. If motor sounds smooth, you are finished. If motor does not sound like it running smoothly, contact Hohner for further instructions or replacement parts.

49) **PERISCOPE:** Alternate the cable tension between the periscope pulleys evenly. After each day rotate the periscope 180 degrees to ensure an even wear and tear of the periscope.

Shutdown: (parts 50 through 56)

50) Reel in as much cable as possible while the end is still attached to the travelling block

DANGER	**Ensure the rig is not doing any operations and that the travelling block is STATIONARY and others are aware you are working.**
STOP	**Do not continue until you are certain the rig is no longer operating, and that the rig manager is aware of what you are doing.**

51) Reduce the air pressure going to the motor to zero, turning the regulator towards the minus sign till it stops. Also close the manual valve.

52) Unhook the cable from the travelling block and bring it down to the rig floor and lay it neatly away from personnel and machinery. Make a large loop at the end of the cable and hook the loop onto the telescope.

53) Open the manual valve on the device and gradually increase air pressure until the cable starts slowly reeling in. Stay by the unit while it is slowly reeling in.

DANGER	**Ensure the pressure to pneumatic motor is low enough to keep a steady slow reeling in speed from the Geolograph.**
CAUTION	**Moving cable during this process, please be careful and wear safety gloves and glasses. Keep hands near the shut off valve in case of emergency.**

54) Let it reel all the way in until the cable tightens around the telescope, thus stopping the movement.

55) Put some tape across the drum and cable to secure it.

56) Turn the air fully off at the regulator and shut-off valve and then disconnect air hose.

DANGER	**Do not disconnect the air inlet connector as the line might still be pressurized. Ensure it is no longer pressurized before doing so.**

Emergency Shut Down

57) Turn off the manual air valve on the unit

58) Turn off the main air supply to the unit.

59) Not necessarily in this sequence, but ensure the air supply is shut off as quickly and safely as possible.

General Technical Data

1) Weight: <50kg
2) Max linear cable speed: See Table 1
3) Material of structure and all side panels: Aluminum
4) Material of main shaft: Stainless Steel
5) Material of main drum: Aluminum
6) Material of sliding shafts: Stainless Steel 316
7) Material of pulleys and related parts: Stainless Steel 316
8) Dimensions L x W x H: 400 x 465 x 315 mm
9) Dimensions Imperial: 15.7” x 18.4” x 12.5”
10) Recommended Air Supply: Between 4 and 7 bar max
11) Lubrication: Gulf Harmony 53, Shell Tellus 33 or equiv
12) Cable is 7x19 core 3.0mm cable with 552 kg break load

Troubleshooting

1) Drum is not turning:
   a. Ensure air is on to the device
   b. Ensure manual valve is open
   c. Ensure regulator set to 4 bar

2) Encoder is not giving signals:
   d. Ensure encoder is connected
   e. Ensure voltage to encoder is at the correct level

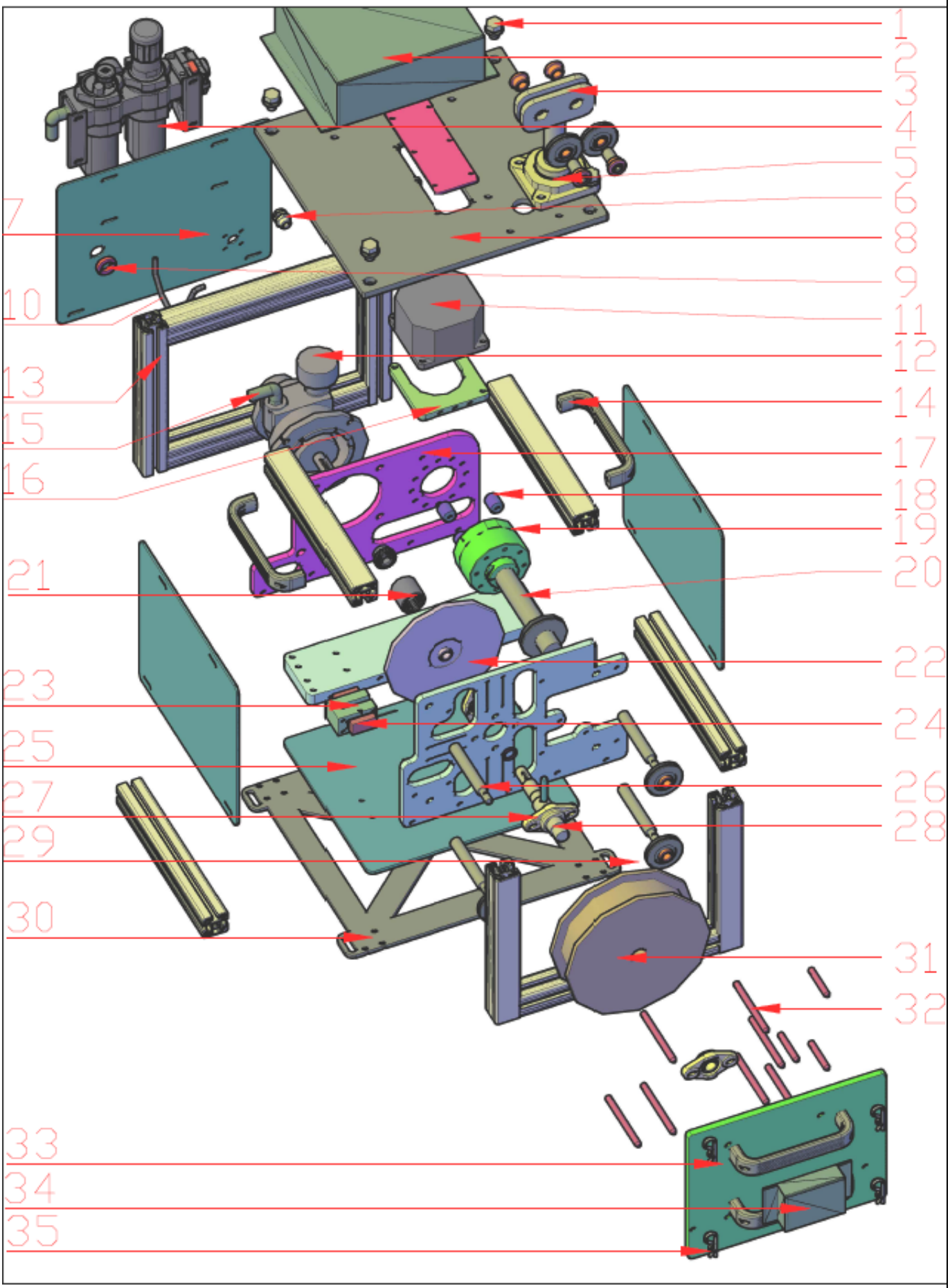
3) Cable is not reeling in
   f. Ensure air to motor is on
   g. Ensure no obstructions to cable
   h. Ensure unit is clean

4) Cable is tangled
   i. Shut the unit off (steps 57 to 59)
   j. Open the unit (step 26), but keep in mind the cable is still coming out through the telescope, so be careful.
   k. By hand try to dislodge the cable from wherever it tangled, it might take some manual work in turning the drum by hand back and forth to dislodge the cable. No clear cut method, it’s time consuming and you have to be patient. Additionally see section 45 to allow easier access.
   l. Once the cable has been untangled and the cable has been fully pulled out, gently reel it back in by following steps 8-9).
   m. The device is now ready.

CAUTION	**If the unit is well worn, the cable might have frayed edges, please use safety gloves to dislodge cable and replace if necessary.**

DANGER	**Ensure the rig is not doing any operations and that the travelling block is STATIONARY and others are aware you are working.**
STOP	**Do not continue until you are certain the rig is no longer operating, and that the rig manager is aware of what you are doing.**

Exploded Full Product View and General Bill of Materials



Use the number and description here for re-ordering parts and for spare parts (only use genuine Hohner parts for replacements) (depending on what needs replacing, we will send detailed instructions upon request)	
1: M12 closing screws	4x To close cover
2: Optional cover for FRL	1x from drawing # Covers – sheet 1 of 2
3: Telescope assembly	1x from drawing # Telescope Parts
4: Filter/Lubricator/Regulator/Switch 1/2” kit	1x Norgren BL64-401
5: Telescope Support	1x SealMaster CRFS-PN19T
6: Customer Connection	1x Either Cable Gland or Connector specified by Customer
7: Front Cover	1x from drawing # Aluminium Side Plates - sheet 6 of 6
8: Top cover	1x from drawing # Aluminium Side Plates - sheet 3 of 6
9: Grommet	1x Grommet to protect Air Line Tube (variable sizes)
10: Air Line Tube	1x section of part number PPU128BLK
11: Junction Box	1x IP20 rated box (example PL612 Box with M20 cable gland exits)
12: Air Motor	1x Air motor GAST 6AMNRV22A
13: Frame	1x set of profiles, see drawing # Profile drawings for KJN
14: Handles	2x Handles for lifting device and 1x (or 2x) handles on drum cover
15: Air Line Swivels	2x 90 degree swivels for connecting tubing to motor and FLR P/N 101471248
16: Junction Box Mount	1x from drawing # Aluminium Side Plates - sheet 5 of 6
17: Inside Mechanism Plates	1x from drawing # Aluminium Side Plates - sheets 1 of 6 and 5 of 6
18: Encoder Spacers	3x from drawing # Main Drum Parts - sheet 2 of 5
19: Encoder	1x Encoder as per customer specification from drawing # System Installation
20: Large Pulley and shaft	1x Main shaft and 1x Large Pulley
21: Coupling	1x Coupling to join motor to main shaft
22 Aluminium disc brake	1x from drawing # Main Drum Parts - sheet 4 of 5
23: Magnet Holder	2x from drawing # Main Drum Parts - sheet 5 of 5
24: Magnets for disc brake	2/3 sets of two EP383 Nd magnets for brake mechanism
25: Inside Base Plate	1x from drawing # Aluminium Side Plates - sheet 2 of 6
26: Sliding shafts	4x from drawing # Sliding Shaft Mechanism - sheet 2 of 3
27: Flange Bearing Bushes	3x (or 4x) from Igus EFOM-20
28: Drum Shaft for Geolograph	1x from drawing # Main Drum Parts - sheet 3 of 5
29: Pulleys	4x from drawing # Sliding Shaft Mechanism - sheet 3 of 3
30: Bottom Base Plate	1x from drawing # Aluminium Side Plates - sheet 4 of 6
31: Drum Parts	1x from drawing # Main Drum Parts - sheet 1 of 5
32: Pulley guides	10x from drawing # Sliding Shaft Mechanism - sheet 1 of 3
33: External closing plate	1x from drawing # Aluminium Side Plates - sheet 5 of 6
34: Cover for optional external bearing	1x from drawing # Covers - sheet 2 of 2
35: ‘R’ pin clip	4x ‘R’ pin clips to keep bolts from coming off once unit is closed

Certification Requirements, Instructions and 'X' Conditions

1) As the encoder type and termination can change, please refer to the installation drawing shipped with the product (part number specific) for all safety parameters and wiring requirements / specifications. A suitably certified safety barrier / isolator will also be required as the encoder is intrinsically safe (Ex ia).

2) The fitted encoder is fully isolated, and does not require any special earthing requirements, however it is recommended to earth the cable screen for EMC purposes at one point only (generally in the safe zone), and a facility will be available for junction box and connector versions.

3) The equipment may include some areas of non-conducting materials and may generate an ignition-capable level of electrostatic charges under certain extreme conditions. The user should ensure that the equipment may not come in contact with fast moving laden air/gas or non-conductive fluids (such as high-pressure steam) which might cause a build-up of electrostatic charges on non-conducting surfaces. Steps must also be taken to ensure the equipotential bonding is maintained. Additionally, cleaning of these areas on the equipment should be done only with a damp cloth.

4) Ensure the Air Regulator Filter (FRL) is protected from any potential impact in final installation if not already fitted with the Hohner optional guard (part number specific).

5) To avoid electrostatic charging, steps must be taken to ensure that equipotential bonding is maintained (the chassis is appropriately earthed).

6) Only use clean compressed air with a maximum pressure of 7 Bar.

7) For junction box versions ensure that the lid is fully tightened down after the cable has been fitted.

8) The material composition of the geolograph is predominantly aluminium (anodised and/or powder coated as standard). The end user should assess its suitability for the area that it is installed.

9) For spares and repairs only use approved parts stated in either this manual or included Motor / FRL manual. Contact Hohner for further information.