Rhinestahl CTS

FutureDrive NG+

USER MANUAL

WIRELESS ELECTRONIC TURNING TOOL

RC3000G01

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1. MANUAL REVISION HISTORY

PAGE	REVISION	DESCRIPTION OF CHANGE	DATE	REVIEWED BY
All	-	Initial issue	8/27/2021	H. Mouti M. Marasch

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2. ABBREVIATIONS

AC Power: Alternating Current Power

PC: Personal Computer

DC: Direct Current

POS: Position

FLAG-RET: Flag Retrieval

INTV: Interval

SQ Drive: Square Drive

FOD: Foreign Object Damage

LCD: Liquid Crystal Display

VAC: Voltage Alternating Current

USB: Universal Serial Bus

XML: Extensible Markup Language

FutureDrive: FutureDriveNG+

RPM: Revolutions Per Minute

3. TOOL DESCRIPTION / INTRODUCTION

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FutureDriveNG™+

Rhinestahl's FutureDriveNG™ is a precision electronic tool used to automate the process of rotating a gas turbine engine for multiple applications. There are three main components, the Power Unit, Drive Motor and Hand Control, with additional cables to connect components, power, and other accessories as needed or required. Refer to Figure 1 for all included items.

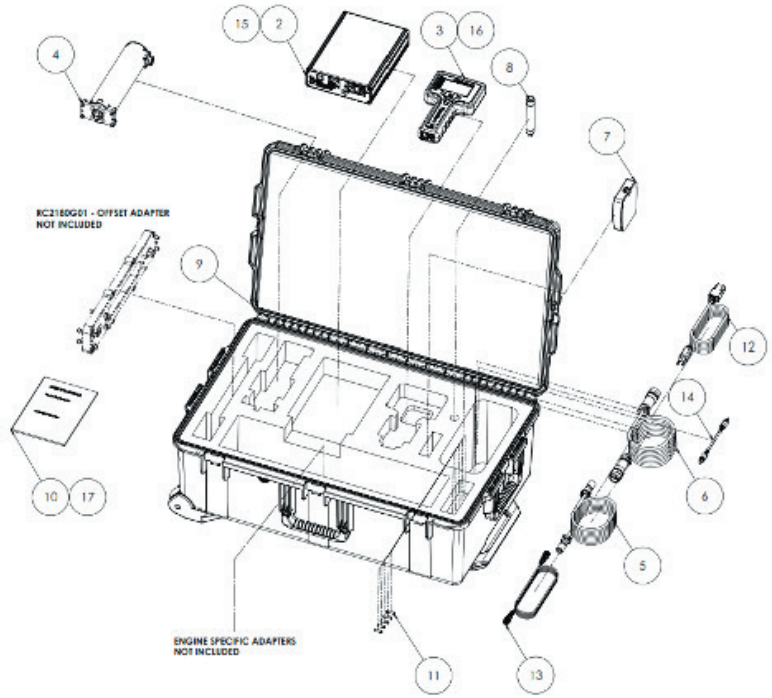

Figure 1: FutureDrive^{NG}+ Kit

QTY	IDENTIFICATION	CAGE CODE	ITEM ZONE	ITEM NO.	DESCRIPTION OR NAME
1	RC3001G01			2	POWER UNIT ASSEMBLY W/ VIDEO OVERLAY & WIRELESS CAPABLE
1	RC3002G01			3	HAND CONTROL ASSEMBLY, WIRELESS CAPABLE
1	RC3003G01			4	MOTOR ASSEMBLY
1	RC2010P104			5	CABLE ASSEMBLY, HAND CONTROL
1	RC2010P105			6	CABLE ASSEMBLY, MOTOR
1	RC3004G01			7	SWITCH, FOOT, REMOTE, WIRED
1	RC3005G01			8	SWITCH, HAND, REMOTE, WIRED
1	RC3006G01			9	CASE, CARRYING, WHEELED, LARGE
1	RC3000G01 - MANUAL			10	MANUAL, OPERATIOR
5	RC2000P53			11	SHEAR PIN
1	RC2140P01			12	POWER CORD, U.S. STD - 90" LG
1	RC2170P01	4U744		13	CABLE ASSY, COAX - AUXILARY SWITCH
1	AK-AV200			14	CABLE RCA MALE-MALE 1.5M
1	AK672/2-3-BLACK			15	CABLE USB 2.0 MALE

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4. FUNCTIONAL USE DESCRIPTION

4.1 POWER UNIT

The power unit (*Figure 2*) is the central hub of the FutureDrive system.

In addition to the AC power connectors for the hand control and drive motor, the power unit also offers the following connectors:

1. Composite video IN/OUT and S-Video IN/OUT: the power unit can overlay information about the engine, stage and blade onto the signal from a video borescope. Plug the video output from the borescope into one of the power unit's composite video or S-video IN jacks and connect a cable from the power unit's composite video or S-video OUT jack to a monitor or video recorder.
2. USB: To install software updates or upgrades to a Future- Drive, Rhinestahl will provide a PC software package that will upgrade the unit via a USB cable. This can be used to add new features or additional engine models. The hand control must be connected to the power unit via its own cable when the update is in progress.
3. Use the USB port to connect the turning tool system with a communication capable borescope. An XML output on the serial port for Engine/Stage/Blade/Flag information shall appear on the device.

    1. For the borescope system:
        - Send command 'e1' to enable the output from the turning tool system to the borescope
        - Send command 'e0' to turn off the output from the turning tool system to the borescope

    2. The live output is as follows:
        - Stage number data
        - Blade number data

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Figure 2: Power Unit Face

Figure 4: Drive Motor

4.2 DRIVE MOTOR

DC brushless servo motor design with a machined, aircraft-aluminum housing and high-resolution encoder feedback for full motion control range with digital accuracy. High torque gearbox ensures reliable operation. Variable acceleration design provides for minimal backlash problems during operation. Equipped with two alignment dowel pins and (x4) ¼-20 captive screws for convenience and ease of installation. The motor (Figure 3) is equipped with a shear pin as a failsafe to protect the motor from overload and ensure delivered torque does not exceed the allowable limits.

• Motor Weight	5.0 lbs (2.27 kg)
• Dimensions	3.25" x 2.5" x 10" (8.26 x 6.35 x 25.4 cm)
• Motor Torque Limit	110 ft. lbs. (149.14 Nm)
• Shear Pin Braking Force	90 ft. lbs. (122.02 Nm)
• Drive	½" sq. Drive

4.3 HAND CONTROL

The hand control is ergonomically designed to fit in the palm of the hand. It incorporates simple, user-friendly control buttons to allow for quick set up and operation.

The barbell-shaped engine rotation indicator will spin whenever the turning tool motor is turning (Figure 4, Item 2).

After a period of inactivity, the hand control may blank its screen and go to sleep to conserve power. Simply press the round button to wake it up again (Figure 4, Item 1).

NOTE

Note: Any time the engine is moving, pressing this button will act as an emergency stop.

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4.3 HAND CONTROL

The battery indicator shows the battery charge. If the cable is plugged in, the icon will animate to show that the battery is charging. The hand control should be plugged to the power unit once the battery indicator shows two bars or less (Figure 4, Item 3).

Current blade — the large number always shows which blade is currently visible in the borescope (Figure 4, Item 4).

Either the hand or foot switch can be connected to this jack if desired for Jog, Blade to Blade, or continuous turn operation (Figure 4, Item 5).

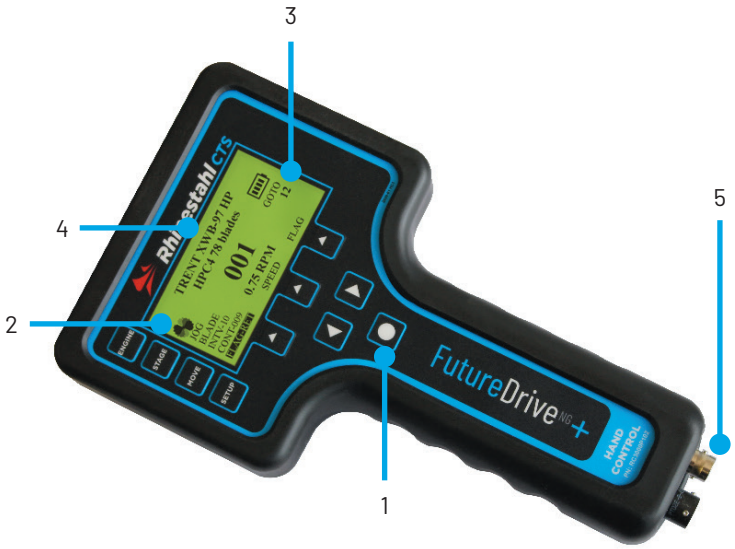

Figure 3: Hand Control

4.4 CONFIGURATIONS

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SET UP MODE

This mode shows the model number and serial number of the unit, plus information about the installed software. This is also where the screen brightness and contrast can be adjusted.

The unit will always remember the brightness and contrast settings from the previous use. If the unit was previously used in very different lighting conditions, the screen may be hard to read until the settings are changed.

Figure 5: Set Up Mode

ENGINE

How to select engine type:

When the FutureDrive is powered on, the hand control will display the startup screen for a few seconds, then will automatically go to the **ENGINE** screen.

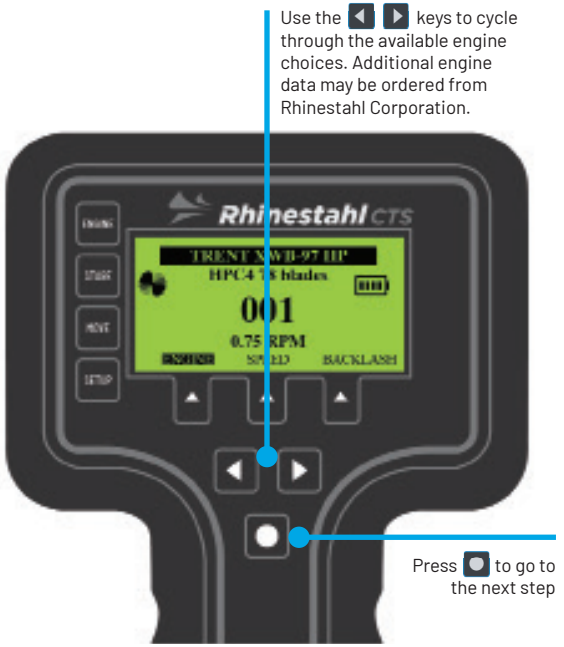

Figure 6: Engine Screen

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BACKLASH

How to compensate for gearbox looseness:

The engine gearbox will have a certain amount of backlash — backlash is looseness between gear teeth in a gear train. Because of backlash, the engine will not move until the slack in the gears is taken up. This step tells the FutureDrive how much backlash is present, so it can compensate and make precise movements.

NOTE

Note: If the selected engine is not bi-directional, the FutureDrive will skip this step.

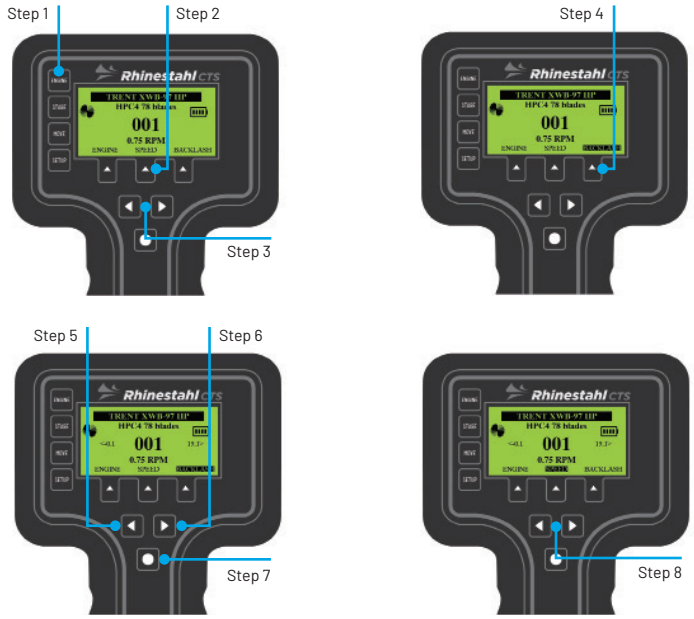

Figure 7: Backlash Screen

BACKLASH

How to setup backlash:

1. Press **ENGINE** button.
2. Press middle ▲ to highlight speed on LCD screen.
3. Use ◀ ▶ buttons to lower speed to 0.10 RPM for precision setting.
4. Press far left ▲ to highlight backlash on LCD screen.
5. Press and hold ◀ until first sign of blade movement on Borescope screen.
   i. During this step press and hold the corresponding directional arrow button continuously or intermittently as needed.
   ii. Backlash compensation and directional arrow is displayed on the hand control screen as a numerical value even if physical movement is not visible on the borescope screen.
6. Press and hold ▶ until first sign of blade movement on Borescope screen.
   i. During this step press and hold the corresponding directional arrow button continuously or intermittently as needed.
   ii. Backlash compensation and directional arrow is displayed on the hand control screen as a numerical value even if physical movement is not visible on the borescope screen.
7. Press ● if satisfied with backlash setting. Otherwise, repeat steps 5 and 6 until backlash amount is captured then press ● button.
8. Use ◀ ▶ buttons to reset inspection RPM to preferred setting.

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STAGE

How to select the engine stage to inspect:

The FutureDrive will come pre-programmed for the applicable engine. The unit knows all the engine's stages, blade counts, the torque required to turn the engine, and other information. When the unit is powered on, it will remember the selected stage from the previous time the unit was used.

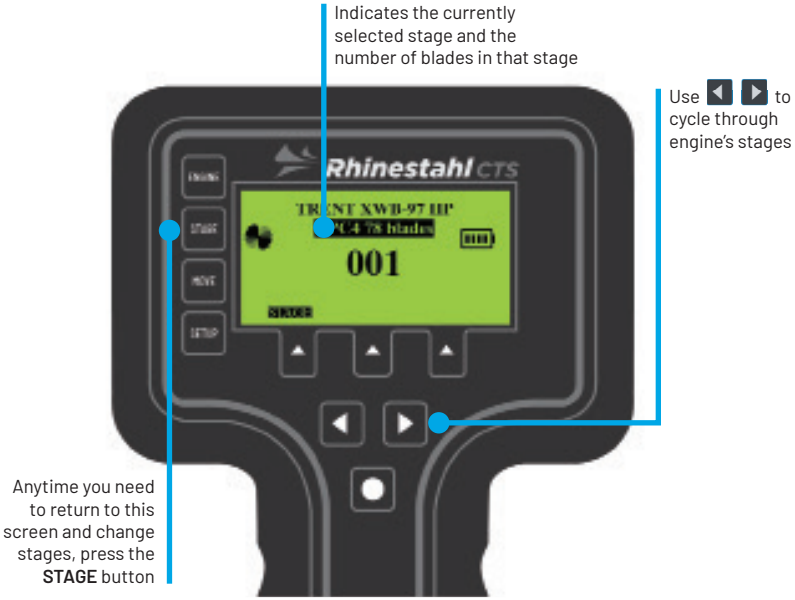

Figure 8: Stage Screen

NOTE

Note: If backlash is set, changing rotational direction during all move modes will trigger a flashing backlash message. The message with appear on the screen while system compensates for looseness in the gearbox and will disappear once this action is complete. During backlash compensation time interval, all hand control buttons will be disabled until this operation is complete, then hand control button functionality is automatically restored.

JOG

How to move the blade in the borescope view:

The jog function allows for positioning of the blades per user preference in how they're viewed via borescope. **SET VIEW POS** will lock this position in, and the FutureDrive will always stop at this same position for each blade viewed in this stage. Use **JOG** and **SET VIEW POS** for each stage.

When using SET VIEW POS, the current blade will become blade 1 for this stage.

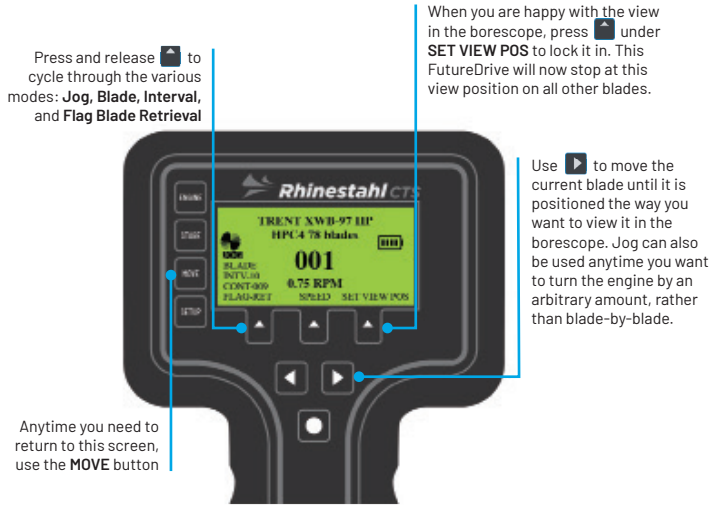

Figure 9: Jog Screen

NOTE

Note: If backlash is set, changing rotational direction during all move modes will trigger a flashing backlash message. The message with appear on the screen while system compensates for looseness in the gearbox and will disappear once this action is complete. During backlash compensation time interval, all hand control buttons will be disabled until this operation is complete, then hand control button functionality is automatically restored.

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BLADE

How to set blade-by-blade movement:

This allows user to move one blade per push of the ◀ ▶ keys. Each blade will always stop at the position selected with **SET VIEW POS**. If the hand or foot switch is connected, it can be used instead of the keys.

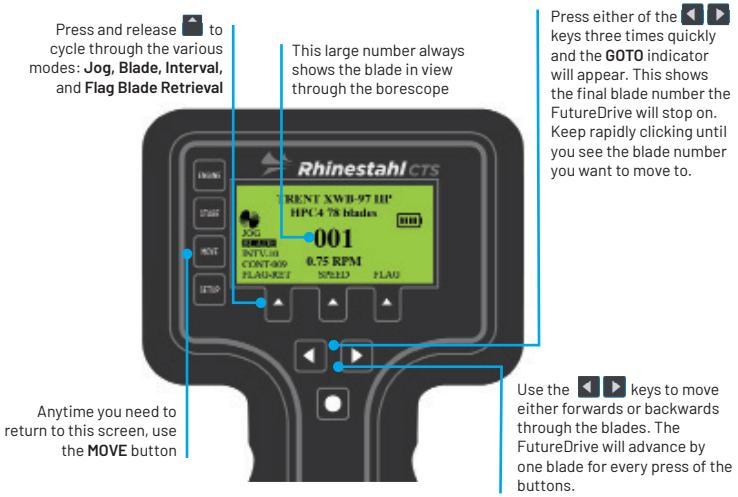

Figure 10: Blade Screen

- An entire engine inspection can be completed with this method. Use the **STAGE** button to change to the next stage, then use **JOG** and **SET VIEW POS** again.
- For more accessibility, connect the auxiliary hand or foot switch for forward rotation only (*Figure 11*)

NOTE

Note: If backlash is set, changing rotational direction during all move modes will trigger a flashing backlash message. The message with appear on the screen while system compensates for looseness in the gearbox and will disappear once this action is complete. During backlash compensation time interval, all hand control buttons will be disabled until this operation is complete, then hand control button functionality is automatically restored.

GO TO BLADE

The FutureDrive tool allows the operator to move to a particular blade at any time. This is done as follows:

1. Use **MOVE** button to select **BLADE**.
2. Press ▶ rapidly to bring up the **GOTO** indicator – keep pressing ▶ until the desired blade number is displayed, and the Drive Motor will go to that blade. Bi-directional engines can be turned in either direction – using ◀ ▶ to move or **GOTO** either way.

Figure 11: Auxiliary Hand Switch to Control Blade Screen

NOTE

Note: If backlash is set, changing rotational direction during all move modes will trigger a flashing backlash message. The message with appear on the screen while system compensates for looseness in the gearbox and will disappear once this action is complete. During backlash compensation time interval, all hand control buttons will be disabled until this operation is complete, then hand control button functionality is automatically restored.

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FLAG

How to flag a blade:

A flag is a bookmark that allows for easy return to a particular blade, such as one that is damaged or questionable. Even if an inspection of other stages of the same engine continues, the FutureDrive remembers all flagged blades for each stage.

NOTE

Note: Flagged blades can only be removed in flag-retrieval mode.

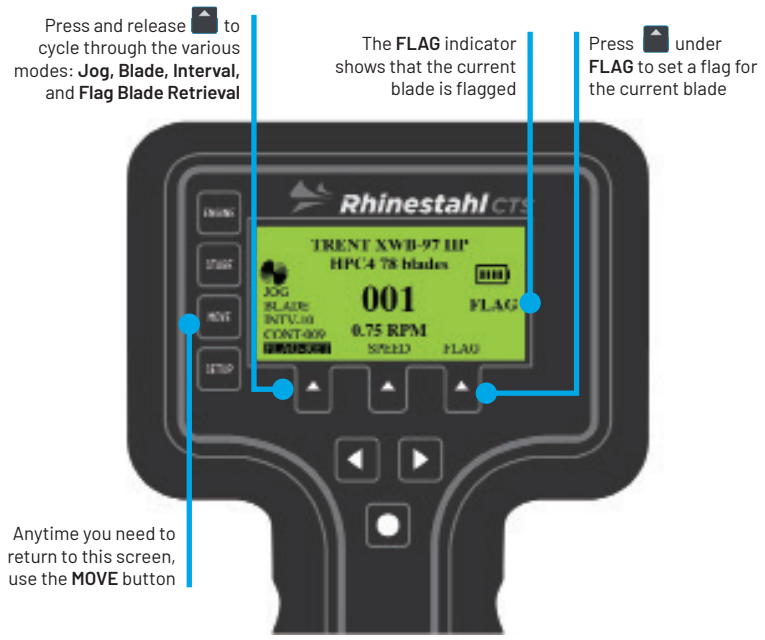

Figure 12: Flag Screen

BLADE FLAG

The motor drive can mark questionable blades for re-inspection. This is done as follows:

1. Press **FLAG**
2. The word **FLAG** will appear on the right side of the screen for flagged blades. It will be blank for un-flagged blades.

At any point during the inspection of a stage, the operator can move any flagged blades by performing the following procedure:

1. Select the stage that the flag blade is on with **STAGE**. Then go to **MOVE** and select **FLAG-RET**.
2. Press to move to the next highest blade that has been flagged (if there are no blades flagged in the current stage, the unit will not turn at all). Quickly pressing steps through the flagged blades and the Drive Motor will stop at the last one selected.
3. Press to move to the previous blade that has been flagged.

NOTE

Note: Blades can be flagged while in interval movement mode by pressing **FLAG**.

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FLAG RETRIEVAL

How to return to a flagged blade:

Find and return to the blades flagged earlier in the inspection process. The FutureDrive will remember every blade flagged in every stage of the engine.

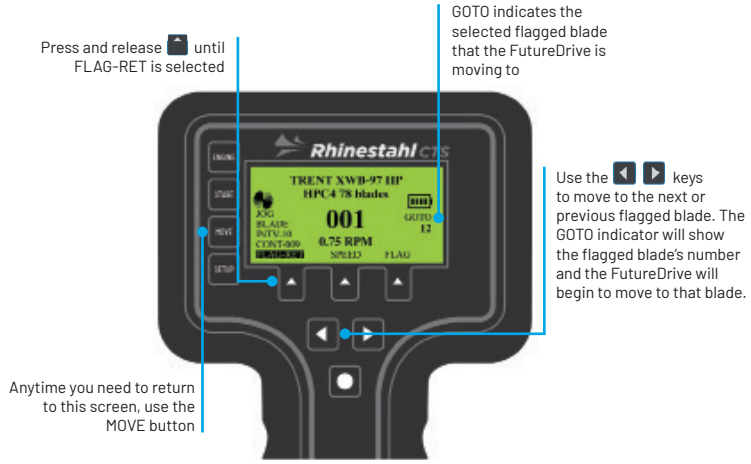

Figure 13: Flag Retrieval Screen

New blades cannot be flagged in **FLAG-RET** mode; the only functionality is finding and returning to flagged blades, and unflagging them (*Figure 14*). Select **BLADE** to flag a new blade.

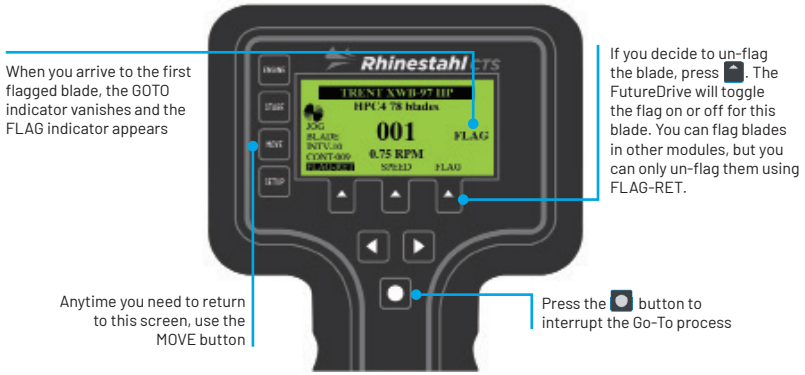

Figure 14: Unflagging Blade Screen

INTERVAL

How to set interval speed:

This mode automatically moves the engine, starting at the current blade through the last blade on the stage. It can be set for continuous travel (INTV:0) or can pause at each blade if **INTV** is set to 1 (for 1 second) or above (up to 99 seconds). This allows the user to work entirely hands-free. If a video recorder is used, the inspection can be recorded unattended.

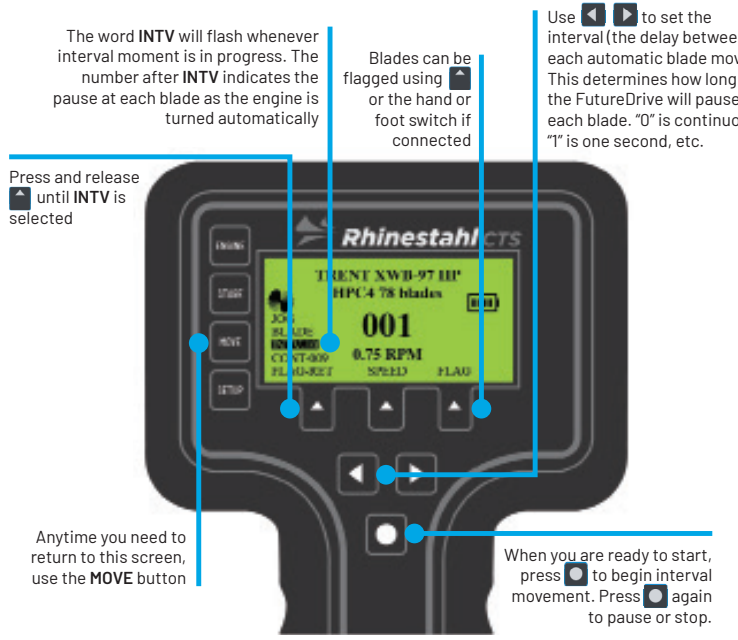

Figure 15: Interval Screen

NOTE

Note: If backlash is set, changing rotational direction during all move modes will trigger a flashing backlash message. The message with appear on the screen while system compensates for looseness in the gearbox and will disappear once this action is complete. During backlash compensation time interval, all hand control buttons will be disabled until this operation is complete, then hand control button functionality is automatically restored.

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CONTINUOUS

How to set continuous mode:

This mode automatically moves the engine core a set number of full rotations starting at the current blade through the last blade.

Set up steps:

1. Press **MOVE** button to cycle through move modes and select continuous.
2. Press ▶ to set the number of engine core full rotations.
3. Press and quickly release ● button for clockwise rotation.
4. Press and hold ● button for two to five seconds for counterclockwise rotation.

NOTE

Note: during continuous operation, press ● button to interrupt continuous rotation progress.

Figure 16: Continuous Screen

NOTE

Note: If backlash is set, changing rotational direction during all move modes will trigger a flashing backlash message. The message with appear on the screen while system compensates for looseness in the gearbox and will disappear once this action is complete. During backlash compensation time interval, all hand control buttons will be disabled until this operation is complete, then hand control button functionality is automatically restored.

SPEED

How to set speed:

The **SPEED** setting determines how quickly the engine rotates when it is moving between blades. The values are in RPM (revolutions per minute). The speed can be changed at any time.

NOTE

Note: Speed can be changed at any time, even during a movement.

The FutureDrive system allows a wide range of engine turning speeds to be used. The speed is selected as follows:

1. Press **MOVE**; select ▲ **SPEED**.
2. Use ◀ ▶ to select the speed desired. The possible range of speeds is in .01 – 2 RPM (the unit compensates for gearbox ratios so the engine core will turn at this speed).
3. Select ▲ **SPEED** again to exit the Speed Setting Mode.

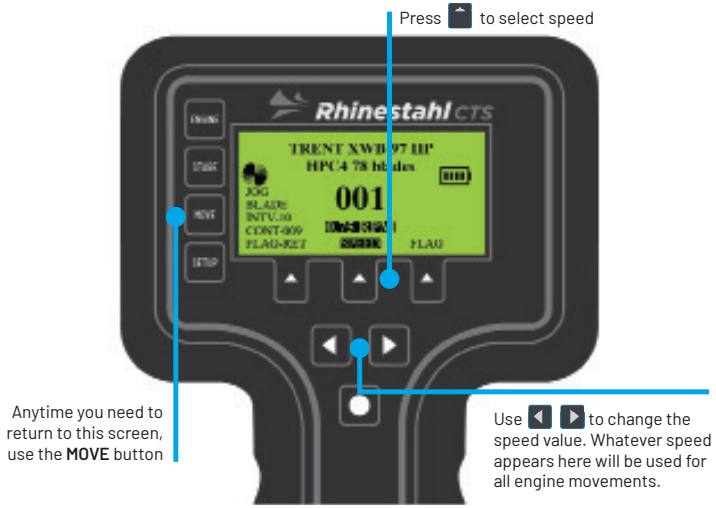

Figure 17: Speed Screen

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SPEED

The auxiliary hand and foot switch (*Figure 18*) are equivalent to the ▶ key. This allows movement of the engine from blade to blade without using the hand control.

In **INTERVAL** Mode, the hand and foot switches can be used to **FLAG** blades. Click and release to set the **FLAG** – do not hold the switch down.

Figure 18: Auxilary Hand and Foot Switch

5. GENERAL SAFETY

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5. GENERAL SAFETY

⚠ WARNING

Warning statements: A warning statement is a description of a situation where a potentially hazardous condition exists that could result in the death or serious injury of workers and/or the general public if not avoided.

CAUTION

Caution statements: A caution statement is a description of situations where a non-immediate or potential hazard presents a lesser threat of injury that could result in minor or moderate injuries to workers and/or the general public.

NOTE

Note statements: A note statement is used to notify people of installation, operation, programming, or maintenance information that is important, but not hazard-related.

- The tool must be visually inspected for damage and all major components must be present before every use.
- Check all moving components and mechanisms to be fully operational.
- This tool is expected to be used by a qualified trained operator(s).
- Shock loading of tools is prohibited.
- Fixtures should be used in a well-lit, clean, non-explosive environment.
- Tools should not be forced into or be used in a purpose contrary to its intended use.
- All personnel are required to use Personal Protective Equipment as approved by the Facility.
- Do not overreach when using the tool.
- Stay Alert: watch what you are doing and use common sense.
- Report any defects to the appropriate supervisor

5. GENERAL SAFETY

⚠ WARNING

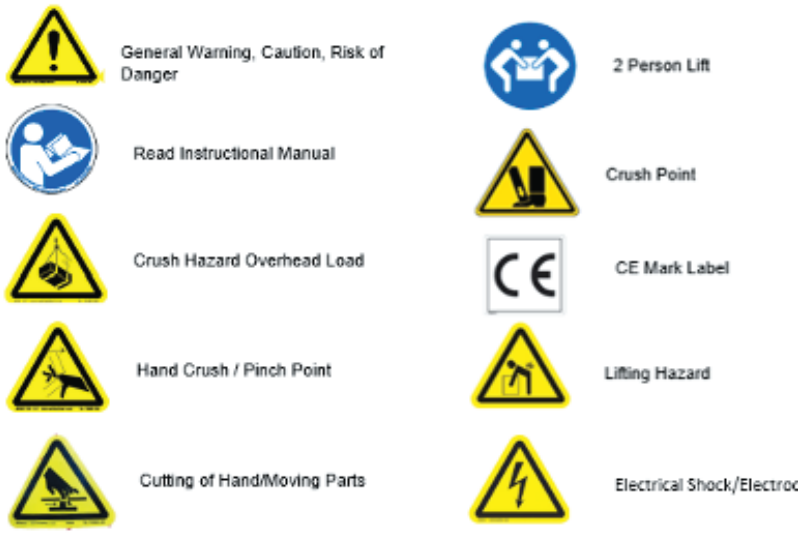
Warning: Use caution with the FutureDrive unit to avoid electric shock. Do not use the unit if cables are damaged or if the unit has been exposed to moisture. High voltages can lead to injury or death.

⚠ WARNING

Warning: The cord set or the ON/OFF switch can be used as a disconnect device

⚠ WARNING

Warning: Do not replace electrical supply cords with inadequately rated cords.



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6. LEADING PARTICULARS

6.1 PHYSICAL SIZE

- Power Unit 6.75" x 2" x 9" (17.15 x 5.08 x 22.86 cm)
- Motor Drive 3.25" x 2.5" x 10" (8.26 x 6.25 x 25.40 cm)
- Hand Controller 2" x 5" x 8.75" (5.08 x 12.70 x 22.23 cm)
- Aux. Hand Switch 0.75" diameter x 5" (1.91 cm diam. x 12.70 cm)
- Aux. Foot Switch 2" x 3.5" x 5.5" (5.08 x 8.89 x 13.97 cm)

6.2 WEIGHT

- Entire Package 39.2 lbs. (17.8 Kg), including case, cables and all accessories.
- Main Power Unit 4 lbs. (1.85 Kg)
- Motor Drive Hand 5 lbs. (2.27 Kg)
- Controller 1 lbs. (.45 Kg)

6.3 ELECTRICAL REQUIREMENTS

- Voltage 110 - 240 VAC, 2A
- Hertz 47 – 63
- Fuse 5mm x 20mm Glass Tube Fast-Acting, 250 VAC, 2A
- Voltage Fluctuations +/- 10%

⚠ WARNING

Ensure that provided power cable is plugged into a proper receptacle EARTH GROUND feed.

6.4 ENVIRONMENTAL

- Operating Temp. -10 C to 40 C (14 F to 104 F)
- Storage Temp. -10 C to 70 C (14 F to 158 F)
- Humidity 0 to 96%
- Altitude 1,500m
- Pollution Degree 2
- Ip Rating IP 30

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6.5 OPERATION

- Speed — Variable from .01 to 2 RPM of the engine core
- Direction — Bi-directional
- Torque — Motor Drive rated at 120 ft.lb (162.70 Nm); shear pin rated to 90 ft.lb (122.02 Nm)
- Interval Timer — 0 to 99 seconds between blades
- Blade Counter — Up to 999
- Blade Flagging — Damaged blade locations can be flagged and automatically repositioned
- Control Type — Simple multiplexing one hand control design with emphasis on simple operation without sacrificing full functional versatility. Backlit LCD display provides for maximum visibility in widest variety of operating.
- Battery Power — NiMH 9.6 V
- Electronics — Microprocessor based system design ensures reliable operation
- Drive Motor — DC brushless servo motor design with a machined, aircraft-aluminum housing, and high-resolution encoder feedback for full motion control range with digital accuracy. High torque gearbox ensures reliable operation. Variable acceleration design provides for minimal backlash problems during operation.

7. INSTALLATION/REMOVAL

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7. INSTALLATION/REMOVAL

Attach the drive motor to the engine (some engine models may require an adapter).

Connect the drive motor to the power unit via the supplied drive cable. Be sure to completely tighten the connectors.

The wireless model can be used with or without the cable. The battery will recharge if the cable is used. See *Figure 19* for the correct method to connect/disconnect the hand control cable. Attach the Hand Control Cable by aligning the connectors and then twisting the collar to lock it in place. Remove the connector by first untwisting the collar.

Figure 19: Connect/Disconnect Hand Control Cable

NOTE

Note: It is recommended to always connect the hand control to the power unit via hand control during set up.

- If the auxiliary hand switch or auxiliary foot switch is to be used, connect it to the hand control with the supplied auxiliary switch cable. This cable is connected by aligning the pin to the slot, pushing the connectors together and then giving the connector a slight clockwise turn.
- Connect the Power Unit to the appropriate power source via the supplied power cord. Only use a grounded outlet.

7. INSTALLATION/REMOVAL

- Turn on the FutureDrive system via the switch on the Power Unit. The Hand Control will wake up and its display will light.

⚠ WARNING

Warning: It is very important for the proper operation to make sure all cables are securely connected before turning on the power. If the unit seems to be behaving improperly, turn the power off, check all connections, and turn the power back on. Do not use power source outside of electrical requirement (see Section 6).

Follow above steps in reverse order for removal.

7.1 NORMAL OPERATIONS

Once set up, the FutureDrive is used to perform the standard borescope inspection procedure as follows (refer to Section 4.4 for detailed set up instructions):

1. Set backlash
2. Select the stage to inspect
3. Jog the engine to zero the blade under the borescope at the desired blade viewing point
4. The unit can now bring each blade in the stage into view
5. At this time, move through each stage of the inspection by performing steps 2-4 in succession for each stage.

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8. GENERAL MAINTENANCE

8. GENERAL MAINTENANCE

Clean the unit thoroughly using only a dry, soft, clean cotton cloth. Never use any solvents or cleaning solutions – these can damage the Hand Control's display.

This unit is designed for indoor and outdoor use. The user must ensure the unit does not get wet or damp due to the nature of electronics and other sensitive components. Refer to the environmental specifications in *Section 6.4* for temperature/humidity range of operation.

Only use original FutureDrive components and adapters with this tool. Use of non-original FutureDrive parts can lead to failure of unit and voiding of warranty.

Periodically check all cables and connectors for wear and damage and clean the contacts if necessary.

Replacement fuse: 5mm x 20mm Glass-Tube Fuse Fast Acting, 250 VAC, 2 Amp

8.1 STORAGE

- Store tool in supplied storage case.
- Apply a light coat of corrosion preventative oil on all non-painted surfaces when stored.

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8.2 DISPOSAL

- If required, the tool shall be disposed of via approved material recycling organization and in accordance with local regulations.

8.3 TROUBLESHOOTING

- Motor will not turn
  - Check if shear pin is broken (*Section 8.4*)
  - Remove motor from engine, set speed to 1 rpm and check for movement of drive motor shaft. If it is still not moving, cycle power (turn power unit off and on again)
  - Check that the engine itself can turn freely and is not locked up. If there is unexpected resistance from the engine, the unit's torque limiter may be preventing the drive motor from turning.
- Hand control screen is blank
  - Check the contrast and brightness settings. If the hand control was previously used in very different lighting conditions, the settings may need to be changed.
  - Turn off the power unit and check the hand control cable connections at both ends.
  - If using the wireless setting on hand control, connect cable and make sure the hand control is charged.
- Problem flagging blades with the auxiliary hand or foot switch
  - Do a quick click-and-release to flag a blade. Don't hold the auxiliary hand switch button down.

8.4 SHEAR PIN REPLACEMENT

If the shear pin is broken, the customer can remove and replace onsite. Spare shear pins are included in the unit (*Figure 20*) and can be removed with a 3/16" punch (*Figure 21*).

Figure 20: Spare Shear Pins

Figure 21: 3/16" Punch

The shear pin will break if drive unit torque of 90 ft/lb (122.02 Nm). is exceeded. If the shear pin breaks, the drive motor may still turn. However, when pressure is applied there will not be sufficient torque to turn the engine. This may also occur if the shear pin is still in the hole or if it has not been removed completely.

To replace:

1. Energize FutureDrive unit
2. Use Jog function and rotate motor until shear pin is aligned with motor flange side bore
3. Power off the FutureDrive unit and remove motor cable
4. Secure motor flange in a vise (use light force and soft jaws to not damage the flange)
5. Use a pin punch and a hammer to drive shear pin out of SQ Drive and shaft combo

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8.4 SHEAR PIN REPLACEMENT

6. Inspect SQ Drive and shaft to be free of FOD
7. Align SQ Drive and shaft through holes (*Figure 22*)
8. Insert shear pin in SQ Drive and shaft (use a punch and a hammer)

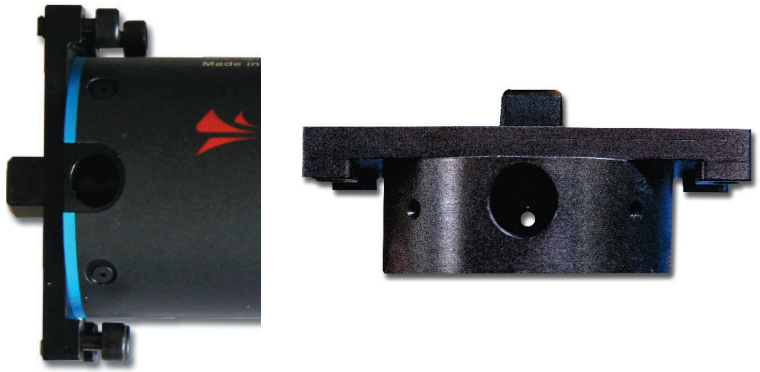

Figure 22: Shear Pin Insertion Point

Inspect components for any damage or disrepair. Contact Rhinestahl for technical support.

9. SCHEDULED MAINTENANCE

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9.1 SOFTWARE UPDATE INSTRUCTIONS

Materials required: USB Type A (Male) to USB Type B (Male) cable and software package file

Figure 23: USB Cables

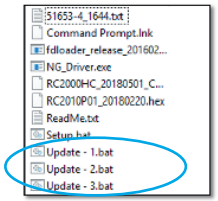

Figure 24: Software Update Files

One of the two following methods can be used to upload software changes:

Method 1 – Accellion KiteWorks

Rhinestahl will email a secure link which will require the end user to login to an account and create a password. After following all login steps, user will download the software update to computer and move forward with steps 1-9.

Method 2 – Thumb drive

Plug in the thumb drive to your computer then follow steps 1-9.

1. Unzip the "Update" file to a directory on computer and run the Setup. bat file to install the driver BEFORE connecting the FutureDrive to the computer. Once the driver setup has been completed connect the FutureDrive to the computer.
2. Connect the FutureDrive motor and hand control to the power unit if operating under normal conditions.

9.1 SOFTWARE UPDATE INSTRUCTIONS

NOTE

Note: for wireless models 1) Go to **SETUP** menu and ensure wireless is **DISABLED**. 2) Ensure hand control is connected to power unit via cable.

3. Plug the unit into a standard 100V to 240V AC power outlet.
4. Connect the above-mentioned USB cable (*Figure 23*) from the PC containing the software update to the FutureDrive power unit.
5. Turn on the power.
6. Once the display on the hand control shows "001", the unit is ready to begin the software update.
7. Locate the "Update" files labeled as **Update-1, Update-2, Update-3,** and **Update-4** (*Figure 24*).

NOTE

Note: the number of update files can varies depending on type update. Also, certain updates only require one update file to complete to task.

8. Double-click the **Update-1** file to download. The Command Prompt Screen will immediately pop up and see that the software is downloading. The hand control screen will display "Connection with power unit lost."
9. The update should only take about 1 minute to load. Once the software update is complete, the command prompt screen will clos
10. When applicable, repeat steps 8 and 9 for the **Update-2** and **Update-3** files.
11. Disconnect the USB cable and confirm that new programs were updated by indexing to new engine program(s).

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9.2 LIMITED WARRANTY

For a period of 12 months from the date of purchase, Rhinestahl Corporation will provide no-cost warranty service at Rhinestahl Corporation's factory, including parts, labor, and UPS ground service back to the customer, for any manufactures defect found on its FutureDriveNG+ products.

Rhinestahl Corporation disclaims all warranties not expressly set forth herein, including any WARRANTY OF MERCHANTABILITY and/or WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. There are no warranties which extend beyond the description on the face hereof. The parties agree that the buyer's sole and exclusive remedy against the seller shall be for the repair or replacement of defective or damaged parts as provided herein. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss) shall be available to the buyer.

The customer must pay for shipping the units to Rhinestahl Corporation. If the customer wishes to have the unit shipped back via a carrier other than UPS ground, the customer must pay for the difference. Freight collect shipments will be refused.

If a problem is encountered with any part of the unit, the customer must contact Rhinestahl Corporation to obtain an RMA number. Please note that some problems can be worked out on the phone or re-reading the manual might be able to solve the problem. To speed return repairs please indicate precisely what the problem is and a person that can be contacted that is observing the problem. Returned units should be packed in the original shipping cartons. Rhinestahl Corporation is not responsible for damage done in transit. Shipments must be sent freight pre-paid to:

Rhinestahl CTS
7687 Innovation Way
Mason, OH USA 45040
m: +1 513 229 5300 f: +1 513 229 3165

10. CALIBRATION AND INSPECTION REQUIREMENTS

N/A

11. CE AND UKCA DOCUMENTATION

CE and UKCA certified

NOTE

Note: CE and UKCA certification will be updated once second encoder/wash rig function is tested and RR approved.

12. HISTORY/REWORK

Reason for change: N/A
Superseded part: N/A
Superseded part disposition: N/A
Scrap: N/A
Procure new: N/A
Rework: N/A
Fabricate: N/A

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Declaration of Conformity

IN ACCORDANCE DIRECTIVE 2014/EC OF THE EUROPEAN PARLIMANET AND OF THE COUNCIL

Certificate No.: 02014-8162021

Manufacture: Rhinestahl Customer Tooling Solutions
7687 Innovation Way, Mason OH 4504

Holder of Certificate: Rhinestahl Customer Tooling Solutions
7687 Innovation Way, Mason OH 4504

This is to certify that the Technical File, Manufacturing, Inspection and Testing for listed equipment described below has been investigated and meets conformity with the applicable provisions as of compliance with the following harmonized standards:

2014/35/EU - Low Voltage Directive (LVD)
- **EN 61010-1:2010**

2011/65/EU - RoHS Directive
- **EN 63000:2018**

2014/30/EU - Electromagnetic Compatibility (EMC) Directive
- **CISPR 35 [EN 55035:2017]**
- **CISPR 32 [EN 55032:2015]**
- **EN 301-489-1 (EN 301-489-19)**

Safety Standard Directive EN 61010-1:2010

This certificate, technical file and testing reports is only valid for the following equipment.

Equipment: Future Drive NG+
Technical File: FD-08152021-2014
Model(s): RC3001: Power Unit Assembly
RC3002: Hand Control Assembly
RC3003: Motor Assembly
RC3004: Foot Switch
RC3005: Hand Switch

Manufacture ISO: AS9100D / 9001:2015
Date: Aug 16, 2021

Authorized Certification Representative:
Advanced Solutions & Controls LLC

Christopher C. Hurst
Chief Executive Officer

Advanced Solutions & Controls LLC.
2050 Byers Rd, Miamisburg OH 45342
USA TEL: +19378652592

UNDERWRITIER LABS FILE No. E513873

Declaration of Conformity

IN ACCORDANCE DIRECTIVE 2014/EC OF THE EUROPEAN PARLIMANET AND OF THE COUNCIL

Certificate No.: 02014-8162021-001

Manufacture: Rhinestahl Customer Tooling Solutions
7687 Innovation Way, Mason OH 4504

Holder of Certificate: Rhinestahl Customer Tooling Solutions
7687 Innovation Way, Mason OH 4504

This is to certify that the Technical File, Manufacturing, Inspection and Testing for listed equipment described below has been investigated and meets conformity with the applicable provisions as of compliance with the following harmonized standards:

2016 No. 1101 - The Electrical Equipment (Safety) Regulations Safety Standard Directive
- **EN 61010-1:2010**

2012 No. 3032 - The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations
- **EN 63000:2018**

2016 No. 1091 - Electromagnetic Compatibility Regulations
- **CISPR 35 [EN 55035:2017]**
- **CISPR 32 [EN 55032:2015]**
- **EN 301-489-1 (EN 301-489-19)**

This certificate, technical file and testing reports is only valid for the following equipment.

Equipment: Future Drive NG+
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RC3005: Hand Switch

Manufacture ISO: AS9100D / 9001:2015
Date: Aug 16, 2021

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Chief Executive Officer

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USA TEL: +19378652592

UNDERWRITIER LABS FILE No. E513873

USER MANUAL

WIRELESS ELECTRONIC TURNING TOOL

RC3000G01

CAUTION:
RISK OF ELECTRIC SHOCK

CAUTION:
RISK OF DANGER

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FutureDrive NG+

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