

ERGO-S

PROGRAMMING & SERVICE MANUAL

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www.hetronic.com

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1. Safety

1.1 Intended Use

Your radio remote control is designed for remote operation of machines and systems using safe wireless communications technology. Any modification, reconstruction or extension of the systems without a written agreement of Hetronic may lead to the loss of your warranty and guarantee claims.

Hetronic assumes no liability for damages resulting out of the non-observance of this operating manual. All persons, working with this radio remote control must




- Be suitably trained and qualified as required by the safety regulations.
- Strictly comply with the contents of this operating manual.

Before starting the radio remote control you must have read and fully understood this operating manual. The Safety Checklist in Appendix B is intended to be followed before each time the transmitter is powered up for operation.

1.2 Symbol Notation

The following symbols are used in this operating manual. The safety alert symbol is used in decals on the unit and with proper operation procedures in this manual.

Understand the safety message. It contains important information about personal safety on or near the unit.

	STOP! This symbol gives you warning of imminent danger of life, risk of accident and risk of injury, as well as damage to property in case of non-observance of the working instructions.
	ATTENTION! This symbol advises against a possible damage to the system in case of non-observance of the working instructions.
	TIP! This symbol points to features and information which allow for an easier handling or operation.

1.3 Practices and Laws

Practice safe working precautions for the benefit of yourself and others.

Be alert to unsafe conditions and the possibility of minor, moderate, or serious injury or death. Learn applicable rules and laws in your area.

1.4 Required Operator Training

The original purchaser of this unit was instructed by the seller on safe and proper operation. If unit is to be used by someone other than original purchaser; loaned, rented or sold, ALWAYS provide this manual and any needed safety training before operation. ALWAYS read and understand the documentation for any machine to be controlled by radio remote control.

1.5 Possible Sources of Danger

This device is part of a system that makes remote control via wireless radio signals possible. The transmission of control commands can take place around obstacles and out of the operator's direct line of sight. Take the following precautions to prevent accidental start-up and possible injury or damage:



Switch "OFF" the transmitter when it is not in use. Unless the transmitter has user access control password configured, remove the battery if unit is placed away from the operator.



Disconnect the power supply from the receiver before any assembly, maintenance or repair work is done.



AVOID SYSTEM DAMAGE - ALWAYS disconnect receiver power supply and control wiring before welding on any part of the machine.



Never remove or alter any of the safety features.



ALWAYS confirm that the machine and radio remote control Stop functions work properly **BEFORE** beginning any machine operation.

1.6 Protective Features

This transmitter is equipped with electronic and mechanical safety features. Control signals from other transmitters cannot be processed because transmission coding is unique to each system.

1.7 STOP in case of EMERGENCY

Push the emergency stop on the machine.

1.8 Caring for your ERGO-S

The enclosure materials employed on the ERGO-S transmitter have been carefully selected to minimise maintenance requirements.



Buy a Hetronic ERGO-S holster and screen protector. These will take care of your transmitter by preventing it from being subject to knocks and scratches. This helps to keep the unit's appearance longer and may also protect it from some internal damage should you accidentally knock or drop it.



Always use genuine chargers and accessories. Cheaper ones that are not compatible or made for going with your ERGO-S can harm the unit or lessen its lifespan.

Do not keep your ERGO-S stored in a closed container for extended periods of time unless it is powered off and the battery is removed from the unit. Charging the ERGO-S in a closed container is a potential fire hazard and may shorten its lifespan. Lithium-Ion batteries give off heat when charging and when discharging. Keep your battery percentage between 40%-80% for longer battery life.



Clean your ERGO-S regularly. Use damp cloth or alcohol wipes to clean the unit's exterior surfaces. Do not use aggressive cleaning agents that may inadvertently damage the unit.

2. Introduction and Functional Description

We congratulate you on the purchase of your new Hetronic ERGO-S push button transmitter. You have chosen a high quality product. Familiarise yourself with the unit before using it for the first time. In addition please carefully refer to the operating instructions and the safety advise given in this manual. Only use the product as instructed and only for the intended field of application. Keep these instructions in a safe place. If you pass the product on to anyone else, please ensure that you also pass on all the documentation with it.

2.1 Production and System Numbers

Before contacting your dealer or Hetronic about service, repair or replacement parts, note the equipment Production and System numbers. These numbers are located on the silver label affixed to the unit.

2.2 Before Operating Your Wireless Control Unit

Confirm that installation of all your system components has been properly completed. Before start up, **ALWAYS** confirm that the machine and radio remote control Stop functions work properly.

Understand all Safety Precautions provided in the manuals and review control functions and operation of the machine and this radio remote control system. When not in use, turn the transmitter off and store in a safe place to prevent unauthorized use. Ensure that the USB Dongle (which acts as a security key to program the transmitter) is kept in a separate but safe and secure place. If the machine does not respond properly, immediately stop operation. Turn off the transmitter and report the condition to your supervisor.

Turn off the transmitter before any maintenance work is done. Always have fresh batteries on hand or an optional rechargeable battery pack in the battery charger to ensure the availability of a fully charged battery. Installation, setup and service must be performed by authorized and qualified personnel only.

2.3 Unit Labels

2.3.1 Blank Rating Plate

1. Specific approvals, such as CE, FCC, IC, etc.
2. Type of ERGO-S transmitter
3. Eleven-digit Production Number
4. Eleven-digit System Number
5. Frequency information
6. Current rating
7. Supply voltage

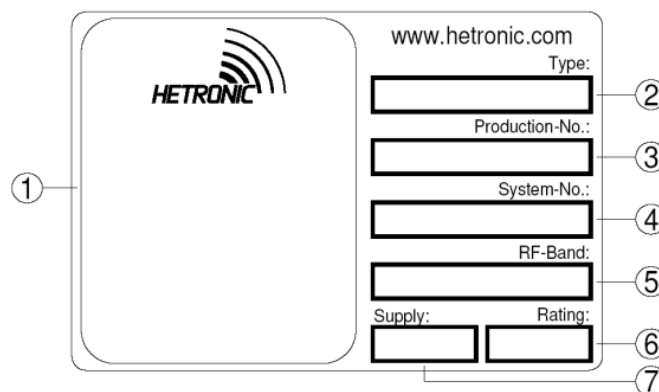


Figure 1. Blank Rating Plate

2.3.2 Read User Manual



The "Read User Manual" symbol on the transmitter acts as a reminder for the user to thoroughly read through the manual before attempting to operate the system. The User Manual must always be placed in a safe and easily accessible place when not being used for when there is the need to refer to it.

3. Your ERGO-S Transmitter

3.1 General Description

The ERGO-S is an ergonomically designed, programmable wireless industrial transmitter for remote machine control.

Your transmitter is encased in a rugged IP65 rated housing, is battery-powered, and comes equipped with built-in low battery detection. Standard equipment includes two 3.45Ah Lithium-Ion batteries and battery charger.

3.2 ERGO-S Basic Features

- Fully programmable via Hetronic PC-Link
- 8 push buttons with up to two detents
- 4 push buttons with single detent, one of which is the power button
- 1 proportional Joystick or Digital Selector switch
- Minimum 100 m (300 ft.) range using CS4XX and CS8xx modules
- Minimum 60 m (196 ft.) range using CS2400 RF module
- Typically 100 m (300 ft.) range using on board MFS 2G4 radio
- Internal Antenna
- Auto power off feature (configurable)
- Infrared (configurable)
- USB Interface
- Low Battery detection
- Status bi-colour LED Red/Green
- Feedback LEDs bi-colour Red/Green
- Cable Control
- Magnetic Belt Clip
- Data Logging (configurable)
- Rechargeable battery pack

3.3 Standard ERGO-S 2.4GHz Configuration

Your ERGO-S 2.4GHz transmitter is factory programmed to one of the following switch configurations:

A. ERGO-S 2.4GHz-V1

- 11 Single detent pushbutton
- 1 Single detent POWER pushbutton
- 1 Joystick or Selector Switch

B. ERGO-S 2.4 GHz-V2

- 3 Single detent pushbuttons
- 8 Double detent pushbuttons
- 1 Single detent POWER pushbutton
- 1 Joystick or Selector Switch



Figure 2. ERGO-S Transmitter (Right, Front, Left)

An optional 2.4" 240x320 TFT screen provides real-time visual information during operation of the ERGO-S transmitter. It is used to change configuration settings, provide two-way feedback and display transmitter diagnostic information such as battery life, signal strength and button status. The status and feedback LEDs have the same positioning when the TFT is also present on the transmitter.

Feature #	Description
1-8	Up to 2 Detent Momentary Pushbutton (S2-S9)
9-11	Single Detent Momentary Pushbutton (S10-S12)
12	Single Detent Power/Start Pushbutton (S1)
13	Joystick or Selector Switch (S13)
14	Infra Red
15	STOP Pushbutton (S0)
16	USB Port
17	TFT Display
18	Status bi-colour Red/Green LED
19	LED Feedback bi-colour Red/Green (L1-L3)
20	Customised Logo Area
21	Battery Compartment
22	Magnetic Belt Clip

Table 1. ERGO-S Transmitter features



Figure 3. Status and Feedback LEDs

3.4 Transmitter Operation Modes

Your ERGO-S transmitter has following modes.

3.4.1. Transmission Mode

In which operator control unit can send the switch and joystick status to the machine control unit and display the information sent from machine control unit on operator control unit LCD.

3.4.2. Service Mode

Your ERGO-S transmitter's parameters (Frequency, Baud rate, display brightness, access code, time, date and much more) can be updated without connecting to Hetronic PC-Link. When the transmitter is in this mode the user can also check proper functioning of the buttons.

3.4.3. Boot loader Mode

In which operator control unit's firmware can be updated. PC flash programming software should be used for uploading the firmware from any computer with USB cable connected.

3.4.4. Charging Mode

In which operator control unit shuts down if the unit is placed on the docking station.

NOTE: When inserting the USB power cable in the transmitter, this does not charge the battery.

4. Operating Your Transmitter

4.1 Holding Your Transmitter

Hold the transmitter upright with the front facing you. Confirm that you are able to easily read and understand any operation text or symbols. Complete the following procedures once a day, before the start of an operation and at all shift changes.

4.2 Visually Checking Your Transmitter

Always check the transmitter for any physical damage before any operation. Check equipment for wear or damage and confirm that you can read and understand all of the safety labels. Never operate a transmitter with worn out or damaged parts.

4.3 Powering Up and Starting Your Transmitter

NOTE: When the transmitter is not being used by the operator, it must be stored in a safe place.

1. Confirm that all safety measures required by the equipment manufacturer have been followed.
2. Insert a fully charged battery into the battery compartment of the transmitter.
3. Insert the USB key supplied with the transmitter in the ERGO-S port (#16) and press Power (#12) button to power ON the transmitter unit.
4. Enter Access code (if enabled in Hetronic PC-Link configuration).
5. Power ON the receiver and press **START** (#12) on the transmitter unit to start and enable communication. The transmitter will perform a routine initialization upon start up.

4.4 Transmitter Initialization with Standard Status LED Indicator

Upon turning the transmitter ON, all four front LEDs light up as solid colours and then switch off before the unit performs the routine initialization.

During initialization, if the coder finds an error in the radio module, address, configuration or feedback, the transmitter will boot up and the failure will be displayed as a blinking ORANGE (RED and GREEN simultaneously) status LED (#18) at the baud rate. The transmitter may then be connected to Hetronic PC-Link (refer to Sections 5.1 Using Hetronic PC-Link and 6.5.7. Device Status and Button Diagnostic Checks for instructions) for the Error to be corrected.

After a successful initialization, the ERGO-S transmitter will enter Normal Operation Mode. The Green LED (#18) will blink at the baud rate i.e. the LED toggles on with every transmitted telegram frame. All other LEDs switch off. Test all machine functions. Refer to your machine, transmitter and receiver documentation as needed.

4.5 Transmitter Initialization with Graphic User Interface (TFT) and Standard Status LED Indicator

Upon turning the transmitter ON, the TFT screen turns ON and all the front LEDs light up as solid colours and then switch off before the unit performs the routine initialization.

During initialization, if the coder finds an error in the radio module, address, configuration or feedback, the transmitter will boot up and the failure will be displayed as a blinking ORANGE (RED and GREEN simultaneously) status LED (#18) at the baud rate. The error will also be displayed on the screen. The transmitter may then be connected to Hetronic PC-Link (refer to Sections 5.1 Using Hetronic PC-Link and 6.5.7. Device Status and Button Diagnostic Checks for instructions) for the Error to be corrected.

After a successful initialization, the ERGO-S transmitter will enter Normal Operation Mode and display the Splash screen. The correct Operation Access Code must be inputted for the ERGO-S to start operating, if this is enabled through Hetronic PC-Link configuration.

NOTE: This can be changed/enabled/disabled when the transmitter is in Service mode during operation or through Hetronic PC-Link. (Refer to Section 6.7 for instructions).

The basic home screen will then be displayed and the Green LED (#18) will also blink at the baud rate i.e. the LED toggles on with every transmitted telegram frame. All other LEDs switch off. Test all machine functions. Refer to your machine, transmitter and receiver documentation as needed.

4.6 Turning OFF the Transmitter and Stopping the Radio Remote Control

Below are the steps to follow to turn off the transmitter:

1. Press the **STOP** button (#15).

The **STOP** screen appears, the RED status LED blinks at a fast rate and the transmitter sends a Stop telegram to the receiver. Upon receiving the Stop telegram, the receiver goes into Safe Mode and turns OFF all receiver outputs.



Figure 4. Stop Screen

2. Press the **Start** button (#12) and the Shut Down Delay timer starts. The transmitter shuts off once the delay timer is over. This is normally set to 2 seconds by default but can be programmed differently (refer to Section 6.3.4. STOP Button (#15)). The OFF state of the LED indicates that the transmitter has switched off. If the Start/Power button is not pressed the Transmitter does not switch OFF.

Note: If the user wishes to resume operation, this is possible by deactivating the STOP switch.



WARNING: Holding the transmitter improperly while operating your machine could result in unexpected machine response.



WARNING: Test the stop function as described in the machine manufacturer's operator manual before beginning any operation.



WARNING: To avoid accidental start-up, always press STOP when not in use.

Turn OFF your machine if there is a fault or problem with the safety check.

NEVER operate the machine if the STOP function does not work properly.



WARNING: Improper operation, maintenance or adjustment may cause serious injury or damage to equipment and may void the warranty.

4.7 LED Behaviour and Meanings

The following table gives the meanings for the different behaviours of the Status LED (#18).

Result	Meaning
Red & Green LED turns ON always.	Service Mode.
Green LED Blinks.	Data is being transmitted.
Red LED Blinks.	Battery low.
Red LED Blinks at fast rate.	Stop switch active. Stop Data is being transmitted.
Red & Green LED Blinks.	H-link data transmitted to PC application.
Red & Green LED Blinks at fast rate.	Boot loader mode to update the firmware.
Red & Green LED Blinks.	FB / RF / Address / Configuration Error on Startup.

Table 2. Status LED Behaviour and Meanings

The other three bi-colour LEDs (#19) are configurable through H-Link and are typically used as feedback signals.

4.8 Magnetic Belt Clip (if equipped)

The practical magnetic belt clip allows the user to hang the ERGO-S transmitter to any steel surface and continue operation hands free or store the transmitter hung vertically when not in use and have easy access to it.

4.9 Start-Up Sequences

A number of sequences are available which will allow the user to enter different modes during Start-up. Below is a table which outlines these sequences. In each case, the user needs to hold the respective sequence buttons to activate that particular mode.

Mode	Sequence
Normal Operation	Start Switch (#12)
Service Mode	Stop Switch (#15) + Start Switch (#12)+ Top Left Switch (#9)
Copy USB H-Link Settings	Stop Switch (#15) + Start Switch (#12) + Lower Right Switch (#10)
Copy USB Graphics	Stop Switch (#15) + Start Switch (#12) + Lower Left Switch (#11)
Wireless Hetriconic PC-Link	Stop Switch (#15): Active only for the initial 5s after Power Up
Shutdown	Stop Switch (#15) + Start Switch (#12)

Table 3. Start-Up Sequences

5. Configuring Your ERGO-S

5.1 Using Hetronic PC-Link

ERGO-S units can be configured wirelessly using Hetronic's PC-Link programming tool without being opened!

Hetronic PC-Link can access and set functions such as system address, transmission frequency channel, auto shut-off features, switch DK assignments, device status and much more. Certain features can also be updated directly from the same transmitter when Service Mode is selected (see Section 5.2 Using the Transmitter in Service Mode).

5.1.1 Connecting transmitter to Hetronic PC-Link

1. Insert the Hetronic Dongle in the PC where Hetronic PC-Link is installed and USB key in transmitter.
2. Make sure transmitter STOP button #15 is pressed and press 'Connect' on Hetronic PC-Link whilst pressing and holding 'Start' switch #12 on your ERGO-S.
3. Input Hetronic PC-Link password from 'Password > Login' menu and configure ERGO-S settings file as required.
4. Save settings to transmitter by selecting 'Transfer settings to device' from 'File' menu.
5. Release STOP switch, switch ERGO-S on and settings are automatically saved to USB key.

5.1.2 Using Hetronic PC-Link to Save Settings File on USB key

Note: This method is an alternative to saving the configuration file from Hetronic PC-Link directly on the transmitter (as in 5.1.1).

1. Insert USB Key (provided with Transmitter) in the PC where Hetronic PC-Link is installed.
2. Make sure transmitter is switched off.
3. Select 'ERGO-S' from list of devices on Hetronic PC-Link and click on 'Offline'.
4. Load settings file from USB Key by clicking on 'Read' from 'User: Control' tab.
5. Input 'Service Access' Code (which is the same code as that used to enter Service Mode on transmitter).
6. Update as necessary, click on 'Write' in 'User: Control' tab and choose location on USB Key.
7. Remove USB key and insert in transmitter.
8. Switch on transmitter and select option 1 ('Copy to Coder') to save settings to coder.

5.2 Using the Transmitter in Service Mode

NOTE: Service Mode is only accessible on transmitters equipped with the optional graphic user interface. The units equipped with the standard status LEDs can only have their settings updated via Hetronic PC-Link tool (Section 5.1 Using Hetronic PC-Link).

Service Mode can be used to edit configuration settings such as: Access code, RF module and Channel Selection, Screen Brightness, Date and Time, TX Baud Rate, and others.

5.2.1 Entering Service Mode

1. Make sure STOP switch (#15) on transmitter is activated.
2. Switch on ERGO-S by pressing the Start button (#12) and then keeping the side top switches (#9 and #12) pressed until the splash screen disappears and the 'Device Settings' screen appears.
3. Input the 'Service Access' code if this is enabled in the Hetronic PC-Link configuration and perform the appropriate selections.



Figure 5. Pages 1 and 2 of the Device Settings menu

5.2.2 Adjusting Settings in Service Mode

The four topmost buttons on the front panel are used to navigate through Service Mode and also to change setting parameters within the menus. The menu selection changes with every screen and the description of what each of the four buttons will do is explained next to the button number.

Note: Once the user exits 'Service Mode' the changes are automatically saved to the USB Key, only if it already contains a settings file. Whenever a USB Key with different configuration settings is inserted in the transmitter, the user is prompted to choose whether the settings on the USB Key are to be saved to the coder ("Copy to Coder") or whether the settings on the coder are to replace the existing ones ("Copy to USB Key").

Note: When the USB Key is not detected, a warning message is displayed stating that the key is missing and unit is shutting down.

6. Setting up Your ERGO-S for Operation

6.1 Coder

6.1.1 Address

The coder address with which the ERGO-S transmitter has been programmed from the factory can be found listed on the datasheet. This can be updated via Hetronic PC-Link in the 'RF' tab and any number between 1 and 999999 can be used. The user is also able to read the coder address from the transmitter when the option 'About' is selected when the transmitter is in Service Mode (refer to Section 6.5.5. About the Transmitter).

6.1.2 Telegram Type

Three types of telegrams are available for selection. These are

- a) 32DK
- b) 32DK + 8AK
- c) 80DK + 2AK

When the transmitter is set to MFS mode, the 32DK telegram can only be used.

6.1.3 Battery Level Indication

Unless the transmitter is equipped with a TFT screen, in which case the Battery Level is also displayed on the status bar, the transmitter uses two different warning signs to show the user that the battery needs replacement.

When the Low Battery level warning has been triggered, the RED status LED (#18) will blink at the baud rate. The Low Battery detection threshold can be set through the 'Low Batt Warning' field in the 'RF' tab on Hetronic PC-Link. This can be set to either 'Short', 'Medium' or 'Long' and is related to the battery voltage.

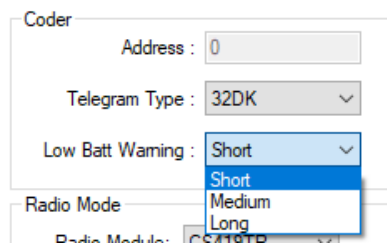


Figure 6. Low Battery Warning Configuration

Approximate battery duration for each of the above options, assuming a brand new and fully charged battery, are as follows:

	Full Duplex	Half Duplex	MFS
Short	7hr 15mins	8hr 30mins	10hr 15mins
Medium	6hr 15mins	7hr 10mins	9hr 30mins
Long	5hr 15mins	6hr	7hr 45mins

Table 4. Battery duration

In addition to low battery warning, a fixed critical battery level is also monitored. When critical battery level is reached, the RED Status LED will blink faster. The coder will automatically trigger the Stop telegram for about 5 seconds until it shuts off.

6.2 Communication

Following are the standard communication parameters which can be set using H-Link for your ERGO-S transmitter from the 'RF' tab.

Parameter	Description
Address	<ul style="list-style-type: none"> 0-999999
Telegram Type	<ul style="list-style-type: none"> 32DK 32DK + 8AK 80DK + 2AK
Radio Module	<ul style="list-style-type: none"> CS419TR CS429TR CS434TR CS458TR CS868TR CS434TXN CS458TXN CS480TR CS9xxTR CS1216TR CS2400TR MFS2G4
Frequency	Standard frequencies for each RF module
Low Battery Warning	Short, Medium, Long
TX Baud	4800, 9600bps for standard 4xxx-8xx MHz radio modules 115200bps for standard 2400MHz radio modules
Auto off	1min – 1hour
Feedback	Disabled, Half duplex, Full duplex
DK sync1	DK2 – DK30
DK sync2	DK2 – DK30
Interval	0-30
FB Delay	1 – 100ms
FD Baud	TxBaud, 2400-115200
Radio Module	Standard Hetronic RF module range
Frequencies	Standard frequencies for RF module
Primary MFS channel	MFS channel Standard channels for MFS 2.4Ghz (1-16)
Secondary MFS channel	MFS channel Standard channels for MFS 2.4Ghz (1-16)
Duty cycle	EU/USA

Table 5. Radio parameters

N.B. For setting specific RF channels/groups refer to respective frequency table in RF module appendix.

N.B. When in MFS mode, only 32DK telegram format is used.

Certain communication settings can be also be updated from the 'Radio Settings' page when the transmitter is in Service Mode (refer to respective sections for instructions).

6.2.1 Radio Settings

The ERGO-S coder is designed with the possibility to connect two on board RF modules either operating in the sub 1GHz range as well as MFS2G4 and CS2400. When the RF module is plugged directly on to the coder (onboard), the user may select the frequency channel or group to use for communication. If the RF module is connected to the coder externally (through a cable set inside the transmitter) the channel will depend on the SIP switch settings as outlined in the RF module and Frequency Bands charts. The RF module is used for either transmitting only the control telegram or else operating in half duplex mode. For the coder to operate in full duplex mode then a second RF module has to be connected and configured using Hetronic PC-Link.

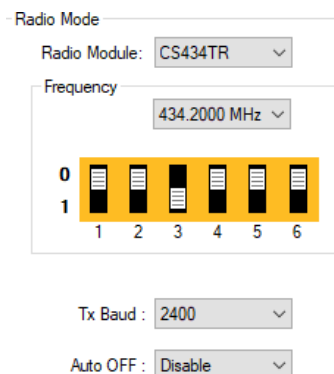


Figure 7. Radio Mode menu selections on Hetronic PC-Link

The user also has the possibility of checking or changing the Radio Settings directly from the transmitter from the below menus in Service Mode.

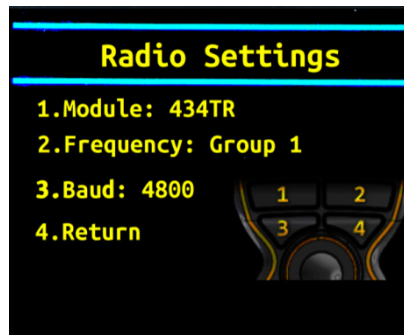


Figure 8. Radio Settings menu

- RF Module

1. Press button #1 to enter Radio Settings menu.
2. Press button #1 to go through the list of RF module options until the desired one is visible.
3. Press button #4 to save selection and return to main 'Device Settings' page.

- Frequency Channel or Group

1. Press button #1 to enter Radio Settings menu.
2. Press button #2 to scroll through the list of channels or groups until the desired one is visible.
3. Press button #4 to save selection and return to main 'Device Settings' page.

- Transmitter Baud Rate

The allowable baud rates of the control telegram that may be configured are 4800 or 9600bits/second for the Hetronic standard 4xx-8xx MHz radio modules. The standard baud rate of 115200 bits/second is used for Hetronic standard 2.4GHz radio modules. To change the TX Baud Rate when the transmitter is in Service Mode one has to:

1. Press button #1 to enter Radio Settings menu.
2. Press button #3 to scroll through the available baud rates and stop when the desired one is visible.
3. Press button #4 to save selection and return to main 'Device Settings' page.



The baud rate for the transmitter must be identical to that of the receiver. Whenever the baud rate of a unit is changed, the baud rate of the paired unit must be changed accordingly.

Note: The coder still supports all other baud rates for cases when non-standard radio modules are used.

6.2.2 Auto-OFF

A transmitter Auto-OFF timer can also be set which powers down the coder if it remains idle for a configured period of time. The Auto-OFF timer can also be disabled so that the coder remains always ON until either switched OFF manually or else when the critical battery voltage is reached and thus the transmitter switches off automatically.

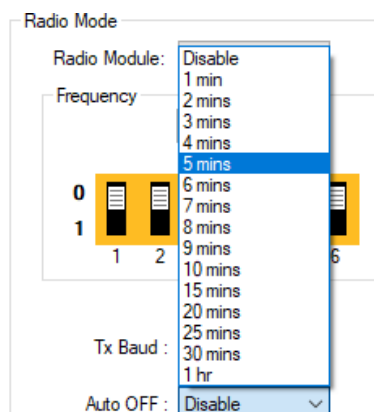


Figure 9. Setting the Auto-OFF timer

6.2.4 Half Duplex Communication

For half duplex feedback configurations the below parameters have to be set:

- **DK Sync 1** – Can be any DK between DK2 and DK30 from the control telegram. The coder triggers the sync DK after an assigned interval and then switches to receive mode. Once a valid feedback frame is received, the coder switches back to transmit mode.
- **DK Sync 2** – The second sync DK can be used to prompt a sensor or other device to send a feedback telegram. This operates in the same way as DK Sync 1.
- **Interval** – The value of the interval defines after how many sent control messages should a feedback telegram be received. If the interval is set to 0, then for every control message, 1 feedback telegram is received. If set to 1, then for every 2 control messages sent, 1 feedback telegram is received.
- **HD Baud** – A different feedback baud rate to the transmit baud rate can be used when operating in half duplex. This also can be configured to a value from 2400 to 115200bits/second.
- **FB Delay** – The feedback delay configures how much time to wait for a feedback telegram after the sync DK has been sent. If after the FB delay period is over, a valid feedback telegram has not yet been received, then the coder switches back to transmitting.

Figure 10. Half Duplex Configuration

6.2.4 Full Duplex Communication

The RF module, baud rate and frequency channel have to be configured when full duplex is selected.

NOTE: These settings have to match those on the receiver.

Figure 11. Full Duplex Configuration

6.2.5 MFS 2.4GHz Radio Mode

The presence of internal 2G4 radio allows the ERGO-S coder to operate in MFS 2G4 mode.

- **MFS Channels** – There are 16 channels available for selection of the primary and secondary channels of operation. The primary and secondary channels are used alternately in transmitting and receiving MFS data frames.
- **MFS Duty Cycle** – The user can choose between EU and USA duty cycles depending on the country regulations in place.

Figure 12. ERGO-S MFS Configuration

- **MFS 2G4 Feedback** – ERGO-S supports the reception of MFS 2G4 default feedback with digital and analogue data. The feedback data can control either the LCD or the LEDs. Standard Hetronic Feedback telegrams can all be processed in MFS 2G4.

6.3 DK Configuration

6.3.1 DK Assignment

Your ERGO-S transmitter can have 8 front and 4 side switches (for V1 and V2 type). These switches can be configured from the H-Link DK tab and each switch can be assigned with 3 different DK's. The front switches can be 1 step or 2 step switches, depending on the coder, and the side switches can only be 1 step. In order to assign DKs to a particular switch, it must be selected from the image of the transmitter shown on the left side of the window.

Figure 13. Assigning DKs to switch number 3

6.3.2. Switch Interlocks

The front and side switch pairs can be configured with switch interlocks. If this feature is enabled, then whenever both switches of the interlocking pair are pressed, only the DK/s assigned to the first one which has been pressed is/are set to ON. Thus, the first switch which has been pressed takes priority and whenever this switch is released will the DK/s of the second switch being pressed be set as ON. The switch interlock pairs are switch 1&2, 3&4, 5&6, 7&8, A&B and C&D.

Figure 14. Enabling Switch Interlocks

6.3.3. Telegram DK Assignment

All 80 telegram DKs are configurable via H-Link using logic gates having a maximum of four inputs each. DK31 and DK32 are exclusively assigned to the Stop switch but can have additional logic signals controlling their states.

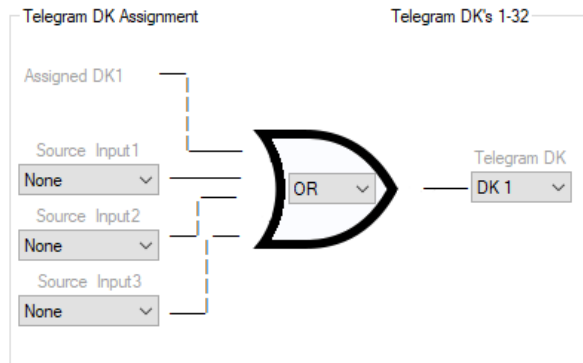


Figure 15. Assigning Telegram DK logic gates

6.3.4. STOP Button (#15)

When the STOP button is pressed, the Stop screen (Figure 3) is displayed (if equipped with the optional TFT) and the stop telegram is continuously transmitted. The Shut Down Delay timer starts once the **Start** button (#12) is pressed and as soon as the timer is over, the device switches off. This is normally 2 seconds after #15 is pressed, however the shut down delay can be configured to last up to 7.5 seconds. This can be set on Hetricon PC-Link from the 'Shut Down Delay' Timer on the DK tab.

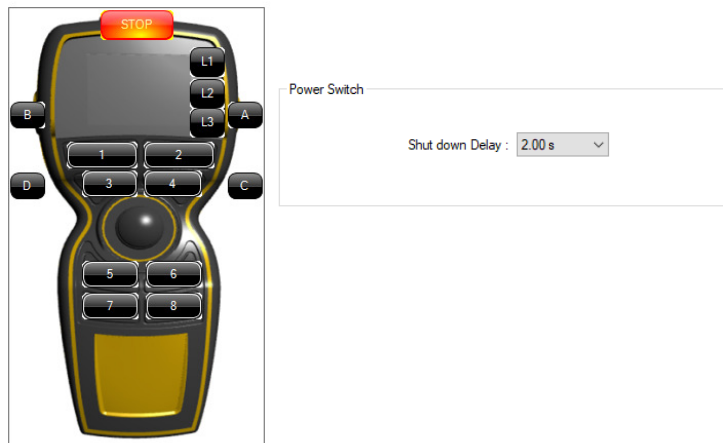


Figure 16. Setting the Shut Down Delay timer

6.3.5. LED Feedback assignment

The three feedback bi-colour LEDs (L1-L3) can be configured to switch ON when either of two 'Sources' is ON. The Green LED switches on with Colour 1 and the Red LED switches on with Colour 2. The 'Source' can be a DK, logic gate result, feedback bit (16bit, 4bit LCD, 4 bit short), etc.



Figure 17. Setting the Sources for Feedback LED 2

6.4 AK-DAC

All 8 configurable AK channels (AK1-AK8) can be assigned to an independent 'Signal'. When no 'Signal' is assigned, the corresponding AK channel will remain in neutral position, which can be either 0x7F or 0x00 hex value depending on the 'Type' selected (Vref/2 or 0-Vref respectively).

6.4.1. Joystick up/down and left/right (Optional)

Whenever a joystick is to be used on an ERGO-S transmitter, it must be connected to 4 analogue inputs. As a safety precaution, AK1 and AK2 must have the same values of AK3 and AK4, respectively. Thus, the joystick must have a redundant circuit as a safety measure in case the joystick fails. When configuring the AKs to the telegram AK1/AK3 are mapped to joystick up/down movements while AK2/AK4 are mapped to joystick left/right movements.

The safety DKs for the AKs are also configurable via Hetronic PC-Link, however, these are only set if the settings for AK1 are identical to those of AK3 and those of AK2 are identical to those of AK4. This ensures that the joystick is operating correctly.

When setting the 'Type' to Vref/2 the user can select direction DKs. When the direction DK is ON then the joystick value will be available in the telegram, thus ensuring that the joystick function is permitted only when a button is pressed or a specific condition is met.

By adjusting the joystick analogue input sensitivity level from the bar in Hetronic PC-Link, the speed by which the analogue input updates is configured. Higher sensitivity means that the AK updates very fast whilst very low sensitivity means that the joystick updates slowly.

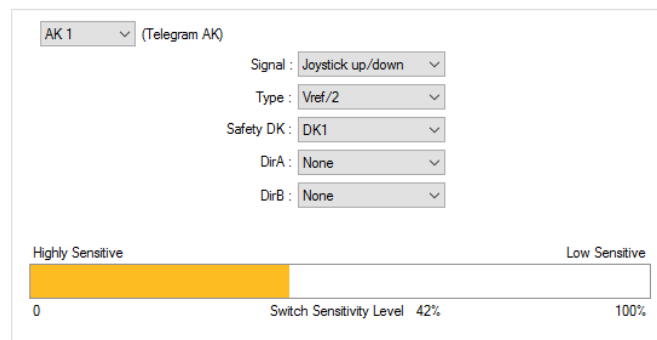


Figure 18. Joystick AK configuration

6.5 Graphical User Interface (Optional)

Your ERGO-S transmitter's TFT has following display features:

6.5.1. Splash Screen (Logo)

Splash screen is the Logo that will be displayed during transmitter start up. The ERGO-S default screen is the Hetronic Logo. This can be enabled or disabled using 'LCD Splash screen' in the Feedback tab of Hetronic PC-Link and can also be changed using the Hetronic Graphics Programming tool (as outlined in Section 6.6 Feedback Messages). Its duration can also be set from the 'On time' field.

6.5.2. Time & Date

Time displayed on the status bar of your ERGO-S transmitter can only be in 24hrs format. The time and date are automatically downloaded on to the transmitter with the configuration and can be updated either from the User Control tab on Hetronic PC-Link, or through the second page of the 'General Settings' menu when the transmitter is in Service Mode.

6.5.3. Language

The language of the menus in Service Mode can be changed to English, Spanish, French, Italian or German from the second page of the 'General Settings' menu. The choice of languages available is displayed in a cyclic manner every time button 3 is pressed. The user selects the preferred language by then pressing button #4 to confirm the selection and return to previous page.



Figure 19. Time, Date and Language menu

6.5.4. Received Signal Strength Indicator (RSSI)

Received signal strength is displayed on status bar of your ERGO-S transmitter indicates the transmitter signal strength. If feedback is enabled then it shows the strength of the receiver signal.

6.5.5. About the Transmitter

Basic transmitter and software information, including address, can be viewed from the 'About' option found in the second page of the 'Device Settings' menu. The number of hours of operation is also shown here. To return back to previous page, button #4 must be pressed.

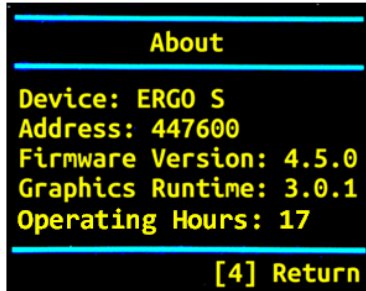


Figure 20. Information provided in the 'About' screen

The user can also check when the configuration file was last updated from the User Control tab.

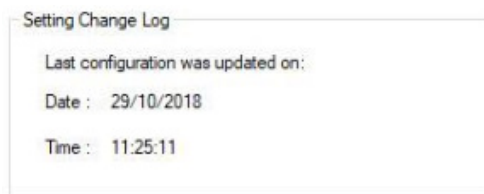


Figure 21. Logging of changes done to configuration file

6.5.6. Brightness

TFT brightness can be adjusted from page 1 of the General Settings menu when the transmitter is in Service Mode.



Figure 22. Adjusting TFT Brightness

The user can choose the optimal screen brightness by pressing buttons #1 or #2. Brightness can be adjusted between setting 1 and setting 8, with 8 being the brightest. Pressing button number #3 will save the new setting and return to the General Settings menu.

6.5.7. Device Status and Button Diagnostic Checks

Your ERGO-S transmitter's switch DKs, AK settings and communication parameters can be monitored from the Hetronic PC-Link 'Device Status' tab. All the configured parameters must be cross checked before using the transmitter with any receiver. After connecting the transmitter to Hetronic PC-Link, the user has to click on "Connect" on the 'Device Status' tab and the status bar changes to green which denotes communication. The 'Device Status' tab acts as a receiver thus all the logic gate results, interlocking features, delays, etc can be seen when activated.

The button diagnostic checks can also be carried out directly from the transmitter to ensure that all 1-Step and 2-Step switches are working properly. The user needs to access 'Device Settings' page when in Service Mode and button #2 for the 'Button Diagnostic' page.



Figure 23. Button Diagnostic page on Transmitter

When pressing the first step of a 2-Step button, the respective diagnostic identifier for that button switches on blue. When the second step is pressed, the identifier will change to green. 1-Step switches will only use the blue identifier. If a button is not functioning well, the diagnostic identifier remains on.

Once all checks are made, the user can return to the main screen by making sure the STOP button is pressed whilst holding buttons #1 and #2 pressed simultaneously.

6.6 Feedback Messages

Customized LCD feedback is used for ERGO-S and this is handled through the LCD and LEDs next to the LCD. This mode allows the display of images in any location on the LCD and decoding of the feedback data as required by user without the need to follow any particular graphics mode.

6.6.1. LCD Customizable Graphics

The TFT's background colour, splash screen, graphics, feedback images and positions, text and status bar can all be configurable using a custom graphics programming tool which can be provided upon request.

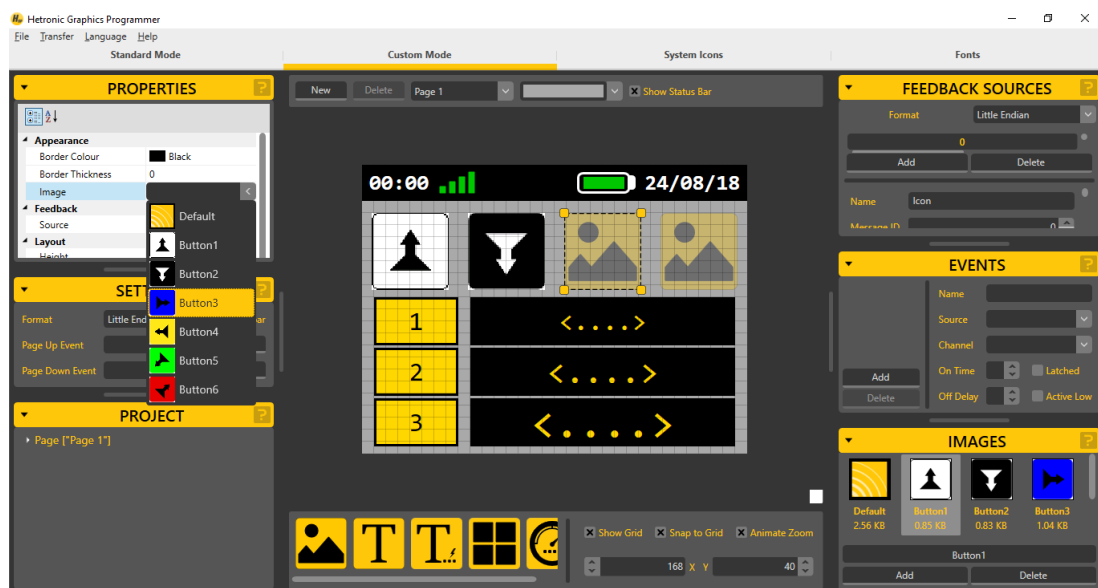


Figure 24. Changing TFT layout using Hetronic Graphics Programmer

Steps to upload new graphics on to the transmitter:

1. Insert USB Key in PC where Hetronic Graphics Programmer software is installed. Edit the screen layouts to be used and save onto the USB Key.
2. Remove USB Key and insert in ERGO-S. Release Stop switch and switch on transmitter.
3. The graphics file will automatically be downloaded on the coder and the progress will be shown on the display.

NOTE: The user can also choose to copy the graphics file manually by selecting the option 'Copy to Coder' following the Start-Up sequence outlined in section 4.9.



Figure 25. Downloading Graphics File to coder from USB Key

6.6.2. Feedback Timeout

The LCD screen can show LCD timeout if no feedback has been received for a pre-set amount of time. If no feedback is received during this time then the LCD can either be set to keep on showing the last feedback message received by selecting 'Keep Data' or else the last feedback message can be cleared by selecting 'Clear Data'. When 'Clear Data' is selected, the feedback timeout can be configured from 500ms to 5 seconds and the image displayed can be configured through the Hetronic Graphics Programmer. Should the user not wish to have a timeout image being displayed then a blank white screen can be set in the GUI timeout screen settings.

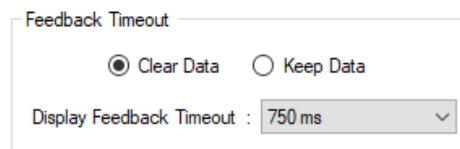


Figure 26. Configuring Feedback Timeout



Figure 27. Optional image displayed when "Clear Data" is selected

6.7 Access Codes

If the Operational Access is enabled, the user is asked to input the Access Code every time the transmitter is switched on. This is done as a safety measure to prevent unauthorized use of the transmitter. Thus, the operator must keep this code confidential and must not leave it easily accessible to unauthorized personnel. Setting the access code as '0' will disable the function. The Service Access code can be identical to the Operational Access code, however, the Service Access code can only be changed through Hetronic PC-link configuration.

Updating of the Operational Access code can be done through the 'User: Control' tab.

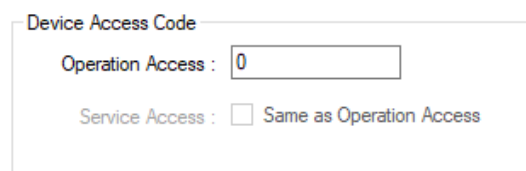


Figure 28. Updating the Operation Access Code

The user can also change the Operational Access Code from the transmitter when in Service Mode using the following steps:

1. Press button #3 to enter General Settings menu.
2. Press button #2 to go to Access Code page.
3. Press button #3 to increment (or button #4 to decrement) the highlighted digit and button #2 to confirm and move on to the next digit.
4. When all the required changes have been made, press button #2 to confirm the new access code.



Figure 29. Making Changes to the Access Code

6.8 USB Interface

Your ERGO-S transmitter's USB port is used for following features:

1. Updating firmware: Memory key must be replaced with USB cable for your ERGO-S transmitter to update the firmware in Boot loader mode.
2. USB key: USB stick acts as a hardware key to operate the transmitter. Without the USB Key the transmitter will not operate.
3. Power bank: Can be plugged with power bank to operate the transmitter without battery (In current design power switch is bypassed for this feature).
4. Basic Configuration: The transmitter configuration settings can also be saved on the USB key and this is then inserted in the Transmitter before switching it on.

Note: Always make sure to keep the USB key in a safe place when it is not being used.

6.9 Data Logging

The user can choose to log all commands which are transmitted during operation. The 80DKs can be selected for monitoring and each time their state changes this will be logged together with the date, time and battery voltage. The user can choose to save the data by selecting 'Read' in the User Control tab, then exporting the data to a document.

6.10 Cable Control

Cable control is also possible on ERGO-S Transmitters and this allows for the operation of the transmitter with no wireless radio transmission. This feature requires an additional cable to be ordered and this is plugged in the battery compartment in the ERGO-S in place of the battery. The special battery enclosure consists of a module which has to be configured via Hetronic PC-Link (from 'RF' tab) for CAN or RS232 communication. The CAN communication supports both CANopen and J1939 while RS232 communication is by default set to full duplex communication.



Figure 30. Enabling RS232 communication

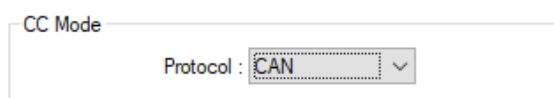


Figure 31. Enabling CAN Communication

When CAN is selected, the 'CAN' tab becomes available to configure the required CAN settings.

The following three standard cable options are available to choose from depending on the application. However, customized variants can also be ordered.

- a) 10m CAN cable without termination jumper (#1051512510)
- b) 10m CAN cable with termination jumper (#1051512610)
- c) 10m RS232 cable (#1051513510)

The cable side to be connected to the receiver unit has a plug connector attached to it. Pin outs are as follows:

RS232 Cable

Pin number	Function
1	Vcc
2	RS232 TX
3	RS232 RX
4	GND

CAN Cable

Pin number	Function
1	Vcc
2	CAN H
3	CAN L
4	GND

6.10.1 Installation of Cable Control Cable

1. Switch off ERGO-S and remove the battery.
2. Plug in the cable in the ERGO-S, making sure the clips are securely fastened.

6.10.2 Operation of ERGO-S in Cable Control Mode

With cable control cable attached, switch on transmitter following the start up sequence as outlined in Section 4. During start up, the transmitter will automatically recognize that the cable is attached and communicating and thus will switch into cable control mode. This will turn off all wireless transmission and send/receive all command and feedback signals through the cable.



All controls on the transmitter will function the same regardless of whether the transmitter is in cable control mode or wireless mode.

6.10.3 Returning Transmitter to Wireless Mode

To return to wireless mode, the transmitter must be powered off and the cable disconnected. Following the start up sequence from Section 4, restart the transmitter. This will automatically detect that it is no longer in cable control mode and will start the unit in its normal wireless mode.

7. Theory of Operation

Your ERGO-S transmitter works with a receiving device to transfer machine control commands via radio frequency to your machine. The transmitter electronically generates a carrier frequency that allows it to communicate with the receiver without the use of cables or wires. The receiver then converts the carrier frequency information into discrete machine control outputs that interface with your machine's controls. Each transmitter and receiver that comprises a system is programmed with a unique address code. This code ensures that machine operations are safe, and that other remote control equipment cannot unintentionally control your machine. The receiver only accepts commands from the transmitter with the same address code. The receiver and transmitter have the address code set at the factory.

7.1 Stop Function

The most important feature of the radio remote control system is the STOP function. When the transmitter is turned on, it performs a self-test to confirm that communications are within designated parameters. If an error is detected, the transmitter will not transmit any signals. The transmitter sends the STOP pushbutton status along with the specified machine functions. This method confirms that ongoing operations are safe. If the STOP pushbutton (#15) is pressed, the data telegram changes so that only the stop command is transmitted. No other motion command data is sent.

This special data telegram places the receiver in Safe Mode, and the stop relays in the receiver open. All other machine functions are completely disabled in the receiver.

The STOP button (#15) on the transmitter is only a remote stop and will operate only when the transmitter is powered up.



Pressing the STOP pushbutton (#15) does not ensure the machine will stop. STOP button functionality is subject to the wiring of receiver STOP relays to machine emergency stop circuit and controlled machine logic where applicable.

ALWAYS test the STOP function at the beginning of every operation session or when there is change of operator.

8. Flash Programming

8.1 Programming the Stop Processor Firmware

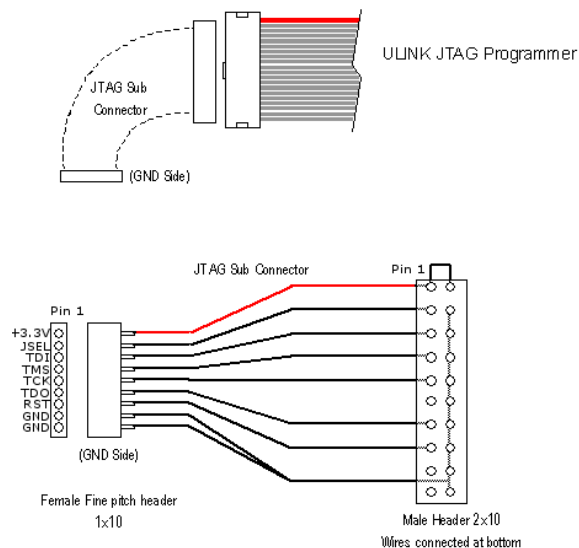
Tools required: AVRISP mkII programmer and AVRStudio v4.18 or later

1. Connect the AVRISP programmer to the board's ISP2 connector. Square pad is pin 1.
2. Turn on power to the board.
3. Start AVRStudio.
4. From the "tools" menu, select "Program AVR/Connect" or click the AVR Programmer icon.
5. Under "Main" tab, set Device to ATmega168 and ISP Frequency to 125.0 kHz.
6. Under "Program" tab, select the firmware file under "ELF Production File Format."
7. Under "Program" tab, click "Program."

8.2 Programming the Main Processor Firmware

Tools required: Keil ULink 2 and uVision 4

1. Connect the “ULINK USB-JTAG Adapter” to the ERGO-S board’s JTAG (JTAG designator) connector. Square pad is pin 1.



2. Press the Power on button of the transmitter and keep it held until programming is completed.
3. Start the "Keil uVision4" program.
4. From the "Project" menu select "Open Project"", locate the folder which contains the "Bootloader /Application" file and open the "Bootloader /Application" file.

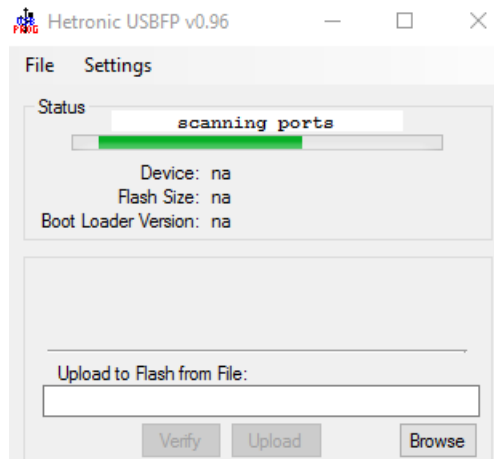


5. Select "LOAD" button to flash code into hardware.

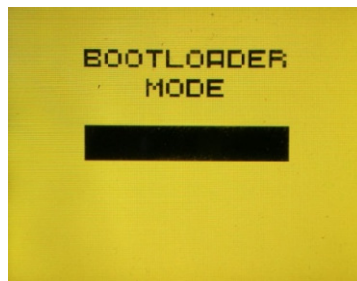
8.3 Programming the Application

Tools required: USB flash programmer v0.96 and USB cable

1. Remove the battery. Press the power switch with stop button activated and connect the USB cable.
2. Run the USB flash programmer.



3. ERGO-S LED's (Green and Red) will blink at a fast rate and LCD displays "Bootloader mode".



4. The application will display as 'scanning port' and indicate the details of the board connected.

Note: - Application should display device name as "ERGO-S" with Boot loader memory from '0' to '4000h' and Application memory from '4000h' to '0x3C000h'.

5. Change the 'Memory space' drop down to 'Application'.

6. Click on 'Browse' and select the latest .hex file.

7. Click on 'Upload'. If the flashing was successful then the application will display 'Verification successful'.

8. Disconnect the USB and deactivate the stop switch to run the application.

9. Troubleshooting

If your ERGO-S does not operate after normal start-up, follow the recommended troubleshooting sequence to help isolate the cause and determine corrective action. If you need more information, contact your dealer or Hetronic.

PROBLEM	PROBABLE CAUSE	CORRECTION
Transmitter won't start	Incorrect Access code (if enabled)	Enter correct access code
	Battery fully discharged	Replace with fully charged battery if needed
The transmitter is turned on, but does not transmit (Power LED not flashing)	Battery is discharged	Replace battery with a fully charged battery
	Component failure	Contact your supervisor or nearest Hetronic Service Centre
Transmitter is transmitting (Power LED flashing), but machine will not respond	No power to the receiver	Check the diagnostic LEDs in the receiver to be sure power is applied. Ensure that the system is properly grounded
	Transmitter/receiver frequency channels do not match	Follow instructions under "Setting Frequency and channels" or contact your supervisor
	Transmitter out of range	Take the transmitter back into the range of the receiver, press START
	Receiver power off	Turn on power to receiver
	Blown fuse in receiver	Check all fuses and replace if needed
	STOP failure in receiver. Red STOP LED on PC board is illuminated	Contact your supervisor
All machine motions operate intermittently	Receiver antenna connection is loose or missing	Tighten or replace antenna
	External antenna (if used) has loose connection, poor grounding or interference	Tighten antenna and ground connection. Contact Hetronic or your Dealer for more information
	Connector inside receiver is loose	Check all connectors, reseal if needed
	Another frequency may be interfering with the system	Contact your supervisor

Table 6. Troubleshooting tips

10. Specifications

Transmitter	
Housing	Ergonomically designed Impact Resistant Polymer Composite
Environmental Protection	IP 65 (Exceeds Nema 12/13)
Weight	~450g (1.21lbs) including battery And full duplex configuration
Dimensions	Height: 240 mm (9.4 in.)
	Width: 110 mm (4.2 in.)
	Depth: 80 mm (3.1 in.)
Antenna	Internal
Power Supply	Battery +B: 3.0 to 5.0Vdc Optional Cable Control +B: 6.5 to 32Vdc Battery Charge: 3.0 to 4.2Vdc
Diagnostics	Status LED for operation and standard/advanced low battery detection
Operation Time	Up to 11 hrs continuous transmission*
Control Configuration	V1 – 11 single detent push buttons, start + stop
	V2 – 8 two detent push buttons, 3 single detent push buttons, start + stop
Frequency Range	4xxMHz or 8xxMHz or 9xxMHz or 2.4GHz (subject to purchased configuration) **
Power (RF Output)	Typically ≤ 10 mW E.I.R.P; depends on country legislation
Typical Operating Range	Typically 120 m. (400 ft.) for ≤ 1GHz, 100m (300ft) for MFS2G4, 50-60m (170 ft) for ≥ 1GHz
Safety	20-bit programmable address concept with up to 1,000,000 combinations
	Hamming Distance 4
Operating Temperature Range	-20°C . . . 70°C (-4°F . . . 158°F)
Storage Temperature Range	-40°C . . . 85°C (-40°F . . . 185°F)
Humidity Range	95% IEC 60068-2-78
Response Time	Less than 100 msec.
Standard Features	Fully programmable via Hetronic PC-Link
	USB (Type A) Interface with 4Gb Memory key for configuration settings
	Status LED for std/adv. low battery detection and Feedback LEDs
	STOP Button EN 60204-1, ISO 13850, IEC60947 Compliant
	User programmable RTC
	Start and Function Interlock
Central control options	User programmable Infrared ACK Start-Up
	Prop Joystick 2-axis
	Selector switch 3 position
TFT	Blank
	240(RGB)*320 2.4" TFT with Backlight
	Colour 65K/262K Sunlight Readable User-replaceable protection cover

Table 7. Transmitter Technical Specification

*assuming brand new, fully charged battery at 20°C temperature

** for full Channel Lists refer to Frequency Bands Radio Modules Charts

Battery Pack	
Rated Capacity	3.7V, 3400mAh, 0.2C discharging
Storage Environment Conditions	-20°C . . . 45°C, 90%RH max (for short periods less than 1month) -10°C . . . 45°C, 90%RH max (for long periods more than 3 months) 15°C . . . 35°C, 85%RH max (recommended storage)*
Charging Temperature Range	0°C . . . 45°C (32°F . . . 113°F), max 90%RH
Discharging Temperature Range	-20°C . . . 70°C (-4°F . . . 158°F) , max 90%RH
Charging Time (hrs)	3-4

Table 8. Battery Pack Technical Specification

* for long time storage, the cell's storage voltage should be 3.6-3.9V and it is recommended to charge the cell every six months.

11. Warranty, Service, Repairs and Maintenance

Before any service or maintenance intervention on remote controlled equipment always:

- Remove all electrical power from the equipment
- Follow lock out procedures

Hetronic products are covered by a guarantee/warranty against material, construction and manufacturing faults. During the guarantee/warranty period, Hetronic may replace the product or faulty parts. Work under guarantee/warranty must be carried out by Hetronic, or by an authorized service centre specified by Hetronic. Any modification, reconstruction or extension of the systems without a written agreement of Hetronic may lead to the loss of your warranty and guarantee claims.

The following are **not** covered by the guarantee/warranty:

- Faults resulting from normal wear and tear
- Consumables e.g. batteries
- Products that have been subject to unauthorized modifications
- Faults resulting from incorrect installation and use

Maintenance and Preventive Care

- Repairs and maintenance must be carried out by qualified personnel
- Only use original Hetronic spare parts
- Contact your representative for service or any other assistance
- Keep the product in a clean, dry place
- Keep battery contacts clean
- Wipe off dust using a slightly damp, clean cloth
- Keep rubber over-mould clean
- Remove dust from inside gaps, docking recesses and battery contacts using a vacuum. Special care must be taken when cleaning the battery compartment of the transmitter as detachment of the pressure balance element may lead to ingress protection problems

NEVER USE:

- Abrasive cleaning solutions or high-pressure water jets.
- Sharp, pointed objects or any hard items as these may tear the over-mould or rubber parts.
- Compressed air as this may lead to ingress protection issues.
- Petroleum based solvents including Diesel and Gasoline to clean the unit as these may react with the silicone rubber of the joystick gaiter.

Note: Refer to Appendix C for Spare Parts List and Instructions on how to replace Button Cell on coder and USB Key.

12. Regulatory Information

12.1 Europe

CE Marking

Hetronic hereby declares that the radio equipment types listed in this manual are in compliance with Directive 2014/53/EU.

The latest version of the complete EU Declaration of Conformity is available on the Hetronic website www.hetronic.com.

WEEE Directive



This symbol means that inoperative electrical and electronic products must not be mixed with household waste. The European Union has implemented collection and recycling system for which producers are responsible. For proper treatment, recovery and recycling, please dispose of the product in a designated collection point.

REACH Compliance

Hetronic confirms that, to the best of its knowledge and continual communication with its respective suppliers, chemical Substances of Very High Concern (SVHC) are not included in our products. Based on the response statements of our suppliers no materials from the ECHA are included on Hetronic products. For the latest version of the complete Declaration of Conformity please visit the Hetronic website www.hetronic.com.

RoHS Compliance

As a designer and manufacturer of electrical and electronic products covered by RoHS and RoHS2, Hetronic confirms that to the best of its knowledge at the date of this statement, none of the products supplied by it contain any of the hazardous substances in excess of permitted levels referred to in the Directive 2002/95/EC. The latest version of the complete Declaration of Conformity is available on the Hetronic website www.hetronic.com

12.2 North America

FCC ID: LW9-ERGOS2G4

FCC Recommendations:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

To comply with FCC RF exposure compliance requirements, this device and its antenna must not be co-located with, or operating in conjunction with, any other antenna or transmitter.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

12.3 Industry Canada (IC/ISED) Statement

IC ID: 2119B-ERGOS2G4

IC RF Exposure Statement

This device meets the IC requirements for RF exposure in public or uncontrolled environments.

IC Warning

This product complies with Industry Canada's licence-exempt RSSs. Operation is subject to the following two conditions:

1. This device may not cause interference, and
2. This device must accept any interference, including interference that may cause undesired operation of device.

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Appendix A

Definition of terms

The following terms are used throughout the ERGO-S Programming and Service Manual.

Term	Definition
baud rate	The transmitting speed measured in bits per second.
hamming distance	A measurement of data transmission safety. The amount of failures in the data stream which has to occur during the transmission in order to create a wrong signal. A low hamming distance means that the test is not very sensitive to data transmission errors and could potentially be unsafe. A high hamming distance means that the system is very sensitive and could potentially be unreliable due to potential noise interference.
interlock	Prevents a component from functioning when another component is functioning or operating in a particular way.

Appendix B

B.1 Operator Safety Basics

Before starting your shift, you should make sure that the equipment has a current inspection certificate and that the necessary inspections and risk assessment checks have been carried out and are up to date. Also, the equipment must be operated in accordance with the manufacturer's instructions.

Furthermore, it is of utmost importance that you know that **YOU are primarily responsible for YOUR OWN health and safety**. Wear appropriate Personal Protective Equipment and make sure that you have had all the necessary training to operate the equipment. The following basic safety precautions must be adhered to at all times:

1. Transmitter switches must never be mechanically blocked ON or OFF for any motion. When not in use the transmitter must be turned off. A safe and secure storage space should be provided for the transmitter unit and the unit should always be placed there when not in use. This precaution will prevent unauthorized people from operating the crane. Receivers must be removed from the equipment when it is unlikely that it will be used for a period of time, and properly stored.
2. All defective or missing safety equipment, mechanical or electrical defects must be reported to the supervisor without delay. Operation must not continue until all required repairs are completed. Any changes to the condition of the remote or equipment must be recorded and communicated to or made accessible by the following operators on shift.
3. Ensure that there is nobody in the path of the travel of the equipment. If there is, stop and sound the alarm before proceeding.
4. When leaving the equipment area for any reason, switch off the transmitter, remove the USB Key and store it in a safe and secure place to prevent unauthorized operation.
5. Do not allow any unauthorized person to operate the transmitter at any point.
6. Do not operate the transmitter at a distance where the equipment and all surrounding objects are not visible. Make sure that your view is not obstructed.
7. Do not attempt to override any of the safety features built into the Radio Remote Control.
8. Put rechargeable batteries on charge at the end of each shift.
9. Use protective gloves when surface temperature of unit exceeds 58°C (136°F) as per IEC 62368-1:2014.

B.2 Safety Checklist

The following checklist provides general safety guidelines for radio control operation of equipment by fully qualified and trained operators. These recommendations do not take precedence over any of the following requirements relating to cranes, hoists, lifting devices or other equipment which use or include Hetronic products:

- Instructions, manuals, and safety warnings of the manufacturers of the equipment where Hetronic products are used,
- Plant safety rules and procedures of the employers and the owners of the facilities where the Hetronic products are being used,
- Occupational Health and Safety Administration (OSHA) regulations,
- Safety standards and practices for the industries in which Hetronic products are used.

Transmitter Start-up and Safety Checklist		
1	Are batteries fully charged?	
2	Are all switch labels clear and legible?	
3	Is the transmitter free from cracks and damages?	
4	Are the battery enclosures free from cracks and damages?	
5	Is the STOP function working as it should be?	
6	Is the correct USB Key being used?	
7	Has each function of the transmitter been tested independently to ensure the equipment is responding correctly?	
8	Is the TFT free from cracks, deep scratches and damages?	
9	Is there any debris inside the USB port which will prevent the USB Key from being inserted /functioning properly?	
10	Are the Status LEDs on the transmitter clearly visible?	
11	Are the charger and plug in good working condition?	
12	Is the cable control cable (where applicable) free from kinks and damages?	

Appendix C

C.1 Spare Parts List

Keep the safety instructions for future reference. Always download the User Manual instructions from our website for the latest version available.

Always contact your nearest Hetronic dealer or service center for service and maintenance work on the product.

Below is a list of spare parts, together with their part number, which by time may need to be replaced due to wear and tear:

Item	Part number	Notes
Joystick	67109050	
Joystick Gaiter	67240320	
Joystick Label Ring for ERGO-S	67230200	
Blind Plate Joystick ERGO-S	67139023	To be ordered together to be replaced as a whole set
O-Ring for Blind Plate	2195026020	
TFT 2.4" Display 240x320	25503441	
Attachment Board LED's	66703090	
Display Protector	11570011	To be ordered together to be replaced as a whole set. No adhesives must be used when assembling the parts in place
Display Protector Gasket	11123916	
Side Switch Unit	6040306010	
Stop Switch ERGO-S Unit	1117851502	
2xPB 1 Step Attachment Board	66703093	
2xPB 2 Step Attachment Board	66703095	
Gasket for ERGO-S	11123911	
Top Housing ERGO-S PB8	11178820	
O-Ring 3.0x1.0mm	21949093	
Screw K25x8	291142585	
Battery 3.0V / BR1225	68301651	For coder
Battery Li-Ion 3.7V/3.4Ah	68303700	
USB Flash (Unprogrammed)	60103400	
USB Seal Cover	11625100	
Yellow Ergo-S Holster	11404570	
Charging Station Grippers	11231245	These hold the transmitter in place in the Charging Station
Charging Station Base	11231240	Used in Bench top configuration
Belt Clip Magnetic	11504340	
Belt Clip (Without Magnet)	11504335	

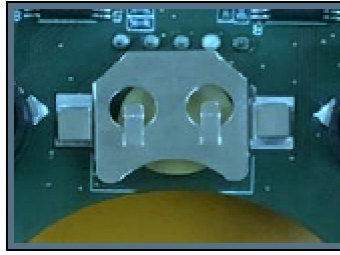
Table 9. List of Spare Parts

NOTE: Replacement of parts must be carried out by an authorized service centre specified by Hetronic.

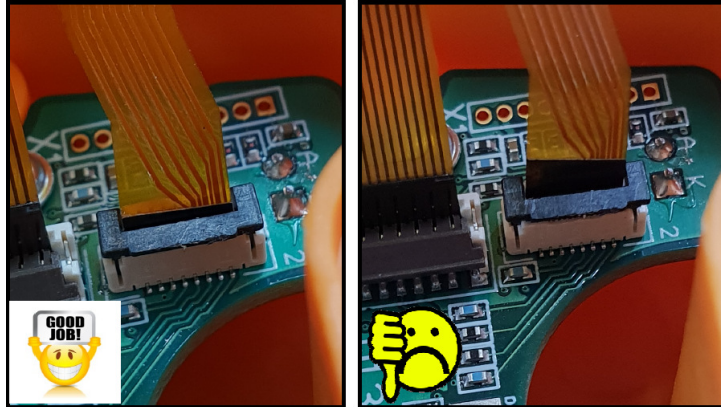
C.2 Battery 3V Button Cell Replacement Instructions

The below steps are to be followed cautiously so as to replace a drained RTC button battery without causing any damage to the housing or parts inside the transmitter:

1. Remove the Li-Ion 3.7V Battery from the transmitter and the eight screws and O-rings closing the transmitter.
2. Open the transmitter carefully, ensuring that the ribbons and wires are not stretched.
3. Slide open the metal cover of the battery cell on the coder and replace the battery cell (#68301651) with a new one, '+' side up.
4. Close the metal cover and make sure it clips in place.



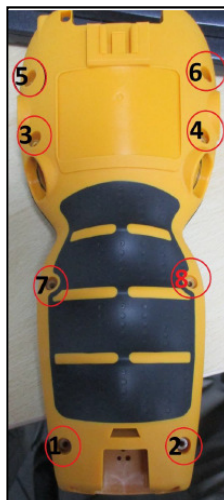
5. Make sure that all ribbons, joystick wires and RF antenna are well aligned and secured in place and none of them are within the range of the closing walls of the housing to avoid pinching/damaging them.



The LED and LCD ribbons are to be bent as shown below, curving on top of the RF. Gently close the unit ensuring that nothing is damaged.



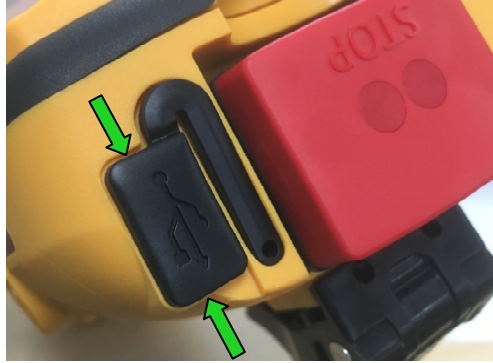
6. Turn the transmitter face down and use the same set of eight screws (#291142585) and O-rings (#21949093) to close the top and bottom housings together. Use a cordless screwdriver with torque value set to between 0.725Nm and 0.820Nm to close the screws in the following manner.



C.3 Removal of USB Key

The USB Key can be removed from the transmitter to be replaced by another one or to update graphics or configuration file. The below steps are to be followed cautiously so as to replace a USB Key without causing any damage to the housing, rubber or USB Key itself:

1. Remove the USB rubber cover by simultaneously lifting the two areas indicated by the green arrows in the photo below, using two fingers.



2. Pull the USB Key by grabbing it from its plastic casing and lifting it using two fingers.

3. Once available, slide the updated/new USB Key in the USB port, noting its orientation with respect to the port and ensuring it is pushed completely in.

4. Close the USB interface by placing the rubber cover back in its place and ensuring it seals all round the USB Key.