

NOVA Transmitters

PROGRAMMING AND SERVICE MANUAL

08/2019

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 NOVA Transmitter

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



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

Do not keep your NOVA transmitter 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 battery in a closed container is a potential fire hazard and may shorten its lifespan. Batteries give off heat when charging and when discharging. Keep your battery percentage between 40%-80% for longer battery life.



Clean your transmitter 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 NOVA 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 NOVA transmitter
3. Eleven-digit Production Number
4. Eleven-digit System Number
5. Ingress Protection Rating
6. Frequency information
7. Supply voltage
8. Current rating

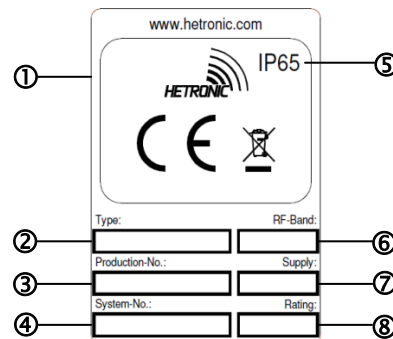


Figure 1. Blank Rating Plate

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 NOVA Transmitter

3.1 General Description

The NOVA family consists of a variety of transmitter sizes offering the user an endless array of possibilities from the most basic to the most complex requirements to satisfy most applications. All transmitters are ergonomically designed, programmable wireless units capable of transmitting a wide variety of functions to remotely control a machine or equipment.

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 sets of rechargeable batteries and a battery charger.

3.2 NOVA Basic Features

- Fully programmable via Hetric PC-Link (depends on type of coder)
- Push buttons with up to two detents
- Single detent Start button/switch
- Joysticks (cross or lever, optional)
- Minimum 150 m (300 ft.) range using CS4XX and CS8xx modules (Line-of-Sight)
- Minimum 40 m (196 ft.) range using CS2400 RF module (Line-of-Sight)
- Internal Antenna (can also be external)
- Auto power off feature (configurable)
- Programming mode
- Low Battery detection
- Status bi-colour LED Red/Green
- Multi-Address Mode
- Belt/shoulder strap/harness/shoulder bar
- Buzzer (configurable)
- Rechargeable battery pack

Additional NOVA options

- Feedback LEDs
- Display (depends on type of transmitter, can be monochrome or colour)
- Tilt Sensor
- Cable Control (RS232, CAN)
- Palm Sensor (only available on Nova M, Nova L, Nova XL, Nova XL 2.8, Nova XXL 4.3)

4. Product Description

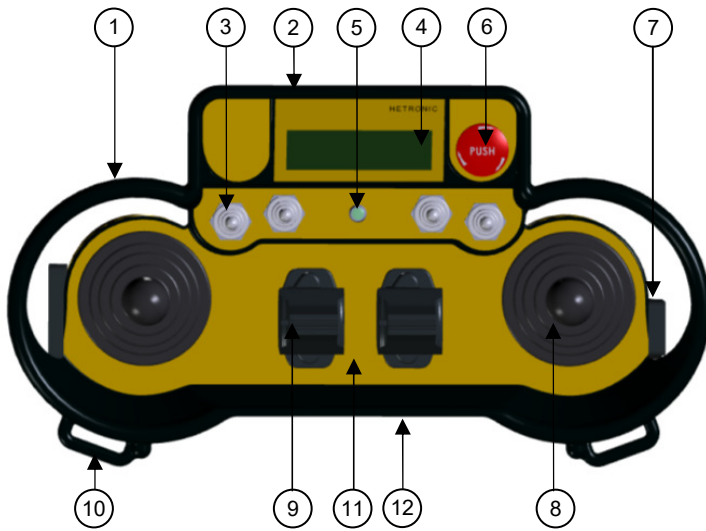


Figure 2. Generic Transmitter Front view

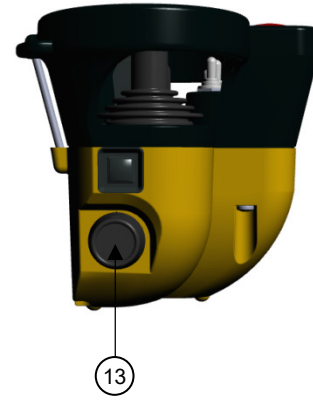


Figure 3. Generic Transmitter Side View

1	Transmitter Handlebar
2	Customizable Logo
3	Toggle Switch
4	TFT/LCD
5	Status bi-colour LED
6	STOP Pushbutton
7	Start Push button
8	Cross Joystick
9	Paddle Lever
10	Gripping handles for belt clips
11	Customisable labels
12	Battery Compartment (located in the bottom)
13	Key switch with Key Cap

Table 1. Nova Transmitter Generic features

Some basic features of a standard Nova Transmitter are toggle switches, pushbutton controls, rotary switches, key switches, STOP button, LED status indicator, dual-axis joysticks (digital or proportional) or proportional paddle levers, optional graphical display (size dependant on the transmitter size), optional half or full duplex, cable back up, LEDs for feedback.

The optional graphic display provides real-time visual information during operation of the Nova transmitter. It can be 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 LED is normally a bi-colour (green/red) LED and feedback LEDs can be white, yellow, blue, green or red (and these can also be of the high brightness type).

5. Operating Your Transmitter

5.1 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.

5.2 Visually Checking Your Transmitter

Always check the transmitter, batteries and accessories 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.

5.3 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 battery adapter with fresh batteries into the battery compartment of the transmitter.
3. Make sure that the **STOP** switch (#6) is not pressed and that no other switch is in the operational position.
3. Insert the black key cap supplied with the transmitter in the key switch and turn it to the ON (I) position.
4. Turn ON the receiver.
5. Press **START** (#7). The transmitter will perform a routine initialization upon start up.

Note: The Start button is usually on the right hand side of the transmitter as indicated above, however, it can also take the form of a momentary toggle switch or round push button anywhere on the top face with the symbol ■. This can and is usually paired with the horn function ◀.

Note: For the powering up and starting procedure for the standard Nova-S transmitter refer to the respective section in the Nova S appendix in the User Manual.

5.4 Transmitter Initialization with Standard Status LED Indicator

Upon turning the transmitter ON, all the LEDs light up as solid colours, the buzzer beeps twice (approximately two seconds apart) and then the LEDs 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 RED status LED at the baud rate. The transmitter (all Nova L, Nova XL and Nova XXL variants) may then be connected to Hetronic PC-Link (refer to Section 7 for instructions) for the Error to be corrected.

Note: If the buzzer output remains continuously ON, this shows that the Address module is not present, not plugged in correctly or in error state.

After a successful initialization, the transmitter will enter Normal Operation Mode. The Green LED 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.

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

Upon turning the transmitter ON, the TFT screen turns ON and the 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 RED status LED at the baud rate. The transmitter (all Nova L, Nova XL and Nova XXL variants) may then be connected to Hetronic PC-Link (refer to instructions in Section 7) for the Error to be corrected.

Note: If the buzzer output remains continuously ON, this shows that the Address module is not present, not plugged in correctly or in error state.

After a successful initialization, the NOVA transmitter will enter Normal Operation Mode and display the software version and splash screen (if present).

The basic home screen will then be displayed and the Green LED 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.

5.6 Stopping the Radio Remote Control

In order to completely stop the transmission of data manually, the user must press the **STOP** button (#6).

Then the text **STOP** appears on the display (if present), 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.



If the user wishes to resume operation, this is possible by deactivating the STOP switch and pressing the Start switch again.

Note: For the stopping procedure for the standard Nova-S transmitter refer to the respective section in the Nova S appendix in the User Manual.



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.

5.7 Battery 'State of Charge' 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 will blink at a slow rate. The GREEN status LED will still blink at the same rate as the baud rate. The Low Battery detection threshold can be configured via Hetronic PC-Link (refer to Section 7.1.3 for instructions).

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.

5.8 LED Behaviour and Meanings

All transmitting units are equipped with LED lights that signal operating status, battery level and fault messages.

GRN LED Behaviour	RED LED Behaviour	Buzzer	Meaning
Off	Off	Off	Power OFF
Off	On	Off	Power ON initialization
On	Off	On	Startup process ~1.5s
On	Off	Off	Startup process ~ 1.5-2.8s
On	Off	On	Startup process ~ 2.8-3.5s
Blinking	Off	Off	Start of Normal Operation GRN LED is toggled every telegram frame transmitted
Blinking	Slow Blinking	-	Low Battery Warning
Blinking	Fast Blinking	-	Critical Battery Warning
Blinking	Blinking Randomly	-	Hetronic PC-Link communication
Blinking	-	On/Off	Buzzer output is activated

Table 2. LED and Buzzer Outputs Description

Note: For LED Behaviour on Nova-S Transmitters refer to respective Appendix in the User Manual

5.9 Turning OFF the Transmitter

To turn off the transmitter, the operator must turn the key switch clockwise to the "0" position. It is suggested that the battery is removed from the transmitter when not in use and stored in a safe place so as to avoid accidental operation.

Note: For the powering off procedure for the standard Nova-S transmitter refer to the respective section in the Nova S appendix in the User Manual.

The coder can also be switched off through either one of the following:

- 1) through the manual activation (Active Stop) of the Stop switch (#6) which will in turn, open the 'Machine Stop' relay in the receiver
- 2) when the Stop function is automatically triggered (Passive Stop) due to an error, such as, transmitter out of range
- 3) when the duration of the Auto-OFF timer has elapsed during which no operational activity has been detected.
- 4) when the battery has been discharged to 3.4V and the critical battery duration has elapsed.

6. Generic Radio Remote System functionalities

6.1 “Start” Function

Start switch (#7), generally in green and very close to the key switch, is required to initialize radio remote control. For safety reasons, the “Start” command must be given to give the receiver control every time there is an interruption in the control signals. This switch is in many cases paired with the Horn function ■/◀.

In order to start up the radio remote control system from the transmitter one has to make sure the stop button (#6) must be released and all control levers must be in neutral position. The key switch must be turned to the “ON” position (I) on the transmitter and the “Start” button (#7) pressed.

6.2 Stop Switch

The most important feature of the radio remote control system is the Stop function. The transmitter sends the Stop status signal along with the rest of the commands through the telegram. This method confirms that ongoing operations are safe. If the Stop pushbutton is pressed (Active STOP), the Stop relay in the receiver causes all functions/motions to stop and the receiver goes into Safe mode.

To restart the system, the Stop button (#6) must be disengaged and the Start/Horn button (#7) is to be pressed again to close the relays in the receiver and resume function.

The Stop functionality responds faster than any other command. When Stop is engaged, the system ignores any other signal that is transmitted. The problem must be corrected before the system will respond to any other signal.

The Stop functionality is self-monitoring and redundant in the transmitter and receiver. The system performs a self-test to ensure the Stop circuit is working properly. If an error is detected, the system automatically goes into Safe mode.

When the transmitter is turned on, it performs a self-test to be sure that communications are within designated parameters. If an error is detected, the transmitter will not transmit any signals.

Whenever Safe mode is active without having the STOP button pressed, the system is said to be in Passive STOP. This means that the Stop button (S0) is still disengaged however the relays in the receiver are open so as not to allow any operation. Possible triggers for Passive STOP (Safe Mode) are:

1. Transmitter Auto shutdown after period of inactivity
2. Radio signal interference
3. Transmitter out of operating range
4. Low battery sends Stop signal after time out elapses

While it is perfectly protected against unintentional collisions, the STOP button is easily accessible and can be quickly operated with priority.

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



Pressing the STOP pushbutton does not ensure the machine will come to a complete stop. STOP button functionality is subject to the wiring of receiver STOP relays to machine emergency stop circuit and controlled machine logic where applicable.

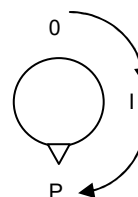
ALWAYS test the STOP function at the beginning of every operation session or when there is change of operator/shift.

6.3 Quickset/Programming mode

In most cases, the snail-rabbit toggle switch is present so as to change between slow and fast speed levels of the joystick. However when the transmitting unit has another toggle switch/push buttons with “+” and “-” labels, it is possible to manually change the slow speed levels for each joystick in real time, so as to adapt the application’s response to the load and precision requirements at that point in time.

In order to activate this functionality, the user has to:

1. Switch OFF transmitter and remove black key cap.
2. Insert red key cap and turn the key to “I” position to switch on the transmitter. An acoustic signal is heard.



3. Turn the key to 'P' position to activate 'Programming' mode and keep holding the "Start" button down for 2 seconds.
4. In order to set the minimum speed for a function, slowly move the joystick until it reaches the point when the safety DK is activated. Hold the joystick in this position and press the '-' or '+' buttons to reduce or increase the speed, respectively.
5. In order to set the maximum speed, move the joystick until its maximum position is reached and press the '-' or '+' buttons to reduce or increase speed.

N.B. Ensure that the speed of only one function is programmed at one go. Whenever a speed setting is completed, wait for approx 10 seconds before disconnecting the transmitter so as to make sure that the correct values are stored in the system.

N.B. The "Snail" and "Hare" functions are independent to each other, thus if the speed of the function "Snail" is to be set, this has to be selected beforehand.

6. When all required joysticks speeds have been set, switch off transmitter by turning the red key cap to the '0' position.
7. Replace red key cap with black key cap and switch on transmitter to resume operation.

7. Configuring Your NOVA Transmitter

7.1 Using Hetronic PC-Link

Nova L, Nova L 2.4, Nova XL, Nova XL 2.8, Nova XL 4.3, Nova XXL 4.3 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.

7.1.1 Connecting Transmitter to Hetronic PC-Link wirelessly

1. Insert the Hetronic Dongle in the computer where Hetronic PC-Link is installed.
2. Make sure transmitter STOP button (#6) is pressed, switch on the NOVA transmitter by turning the key switch to the ON position and press 'Connect' on Hetronic PC-Link.
3. Input Hetronic PC-Link password from 'Password > Login' menu and configure the settings file as required.
4. Save settings to transmitter by selecting 'Transfer settings to device' from 'File' menu.
5. Release STOP switch (#6) and turn the key switch ON for operation.

8. Setting up your Nova Transmitter for Operation

8.1 Coder

8.1.1 Address

The coder address with which the NOVA transmitter has been programmed from the factory can be found listed on the datasheet. This must not be changed as otherwise the transmitter will not communicate with the receiver when placed back on the field. The address on both the transmitter and the receiver must be identical in order for the system to work.

8.1.2 Telegram Type

Three types of telegrams are available for selection. These are:

- a) 32DK
- b) 32DK + 8AK
- c) 80DK + 2AK
- d) 32DK + 9AK

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

8.1.3 Low Battery Warning Time

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.

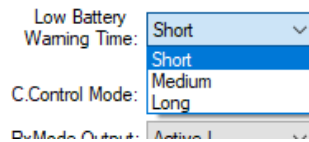


Figure 4. Low Battery Warning Configuration

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.

8.2 Communication

Following are the standard communication parameters which can be set using Hetronic PC-Link from the 'RF' tab.

Parameter	Description
Address	0-999999
Telegram Type	32DK 32DK + 8AK 32DK + 9AK 80DK + 2AK
Radio Module	- CS419TR - CS429TR - CS434TR - CS458TR - CS868TR - CS434TXN - CS458TXN - CS480TR - CS9xxTR - CS1216TR - CS2400TR
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

Table 3. Radio parameters

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

8.2.1 Radio Settings

The NOVA coder is designed with the possibility to connect two on board RF modules either operating in the sub 1GHz range as well as 2.4GHz. 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 available from the Hetronic website. 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.

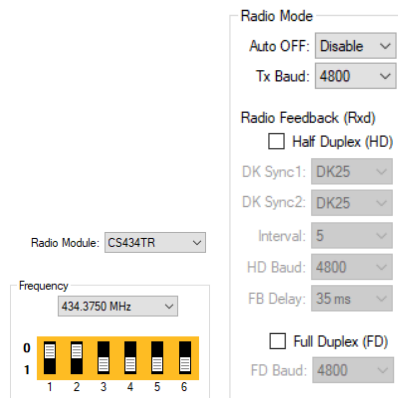


Figure 5. Radio Mode menu selections on Hetronic PC-Link

The allowable baud rates of the control telegram that may be configured are 4800 or 9600bits/second for the Hetronic standard 4xx-8xx MHz and CS2400 radio modules. The baud rate of 115200 bits/second is used for CF2400 radio modules.



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.

8.2.2 Enhanced mode

For those systems using an onboard radio module the transmitter is programmed with “Enhanced Mode” enabled. When this feature is enabled, the control telegram will be encrypted before being transferred to the receiver and the feedback telegram will be encrypted before being transferred to the transmitter. For systems using an external radio module the jumper setting J6 must be open for Enhanced mode to be enabled and jumper setting J5 must also be set for the receiving baud rate. Contact your nearest Hetronic service centre for further details.

Coder

Address:

Telegram Type:

Radio Module:

☒ Enhanced Mode

☐ Frequency Channel Change

Figure 6. Hetronic PC-Link setting for onboard radio modules

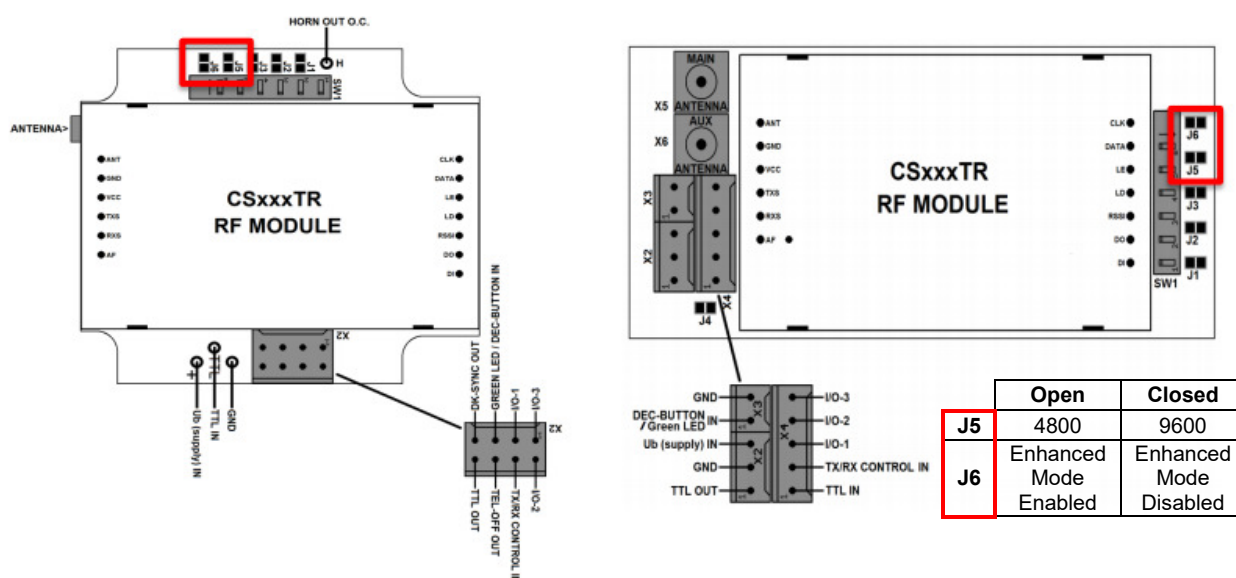


Figure 7. Jumper settings for external radio modules

8.2.3 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 level is reached and thus the transmitter switches off automatically.

Note: In the case of Nova S and Nova M transmitters, a jumper setting on the coder determines whether the transmitter switches off or not after 10 minutes of inactivity.

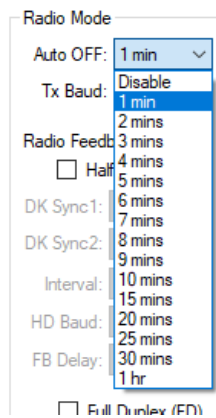


Figure 8. Setting the Auto-OFF timer

8.2.4 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.

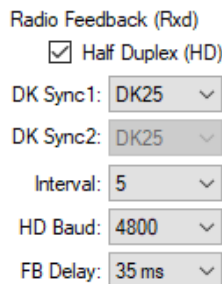


Figure 9. Half Duplex Configuration

8.2.5 Full Duplex Communication

The baud rate has to be configured when full duplex is selected.

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

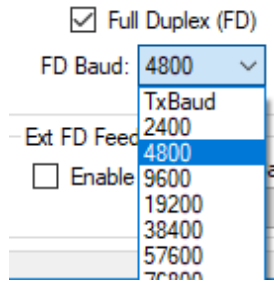


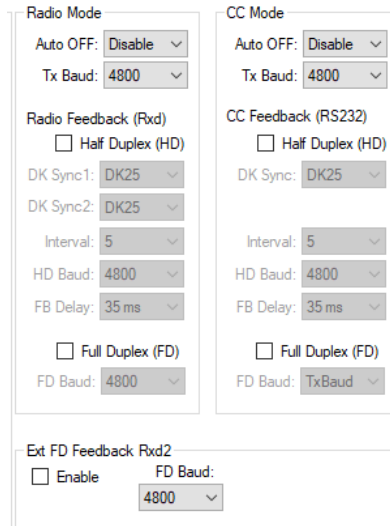
Figure 10. Full Duplex Configuration

8.2.6 Radio Mode vs Cable Control Mode

Detection of the presence of Cable Control supply can be set automatically to switch to Cable Control mode. When in Cable Control mode, the telegram will be sent through the cable RS232 and the Radio mode will be OFF.

Cable Control detection can also be disabled. In this case, the Radio mode will always be used. This is useful whenever the remote control is required to work in Radio mode and the available voltage supply is between 5 and 30V, thus must be supplied via the cable control connector.

The presence of Cable Control supply can be used as signal to activate a C12HL output.



The following settings can be configured independently for each of the two transmitter modes:

- **Auto-OFF**

When the coder detects no DK activity for a certain preset amount of time, it can be set to automatically switch off. The idle time can be set from 1 to 10mins in 1min increments, 15 to 30mins in 5mins increments or 1 hour. This function can also be disabled.

- **TX Baud**

Transmitter baud rate is selectable to 2400, 4800, 9600, 19200, 38400, 57600, 76800, 115200bps. The selection of baud rate is dependent on the RF module being used and the paired receiver's capability. RF modules are normally limited to 4800 or 9600. In Cable Control mode, a higher baud rate is possible however this still depends on the receiver. Receivers like MLC, DC-Mobile, or Rx-ES-CANHL automatically adjust Cable Control baud rate.

- **Feedback**

The coder has the capability of automatically detecting different digital feedback frames. The feedback bits can in turn be set to activate certain outputs, either in half or full duplex feedback reception.

Half Duplex:

In Radio Mode, the user can opt to set two DK Sync triggers. By default, DK Sync1 is the same as DK Sync2, which is equivalent to having one DK Sync. One application of dual sync triggers is having two receivers, each assigned with a different DK sync, paired with one transmitter. In this configuration, it will be possible for the transmitter to receive feedback frames from both receivers.

In Cable Control mode, the feedback baud rate is always the same as the transmit baud rate.

Full Duplex:

In Radio Mode, the receiving baud rate or FD Baud should be set to the expected baud rate of the incoming feedback telegram.

In Cable Control Mode, the FD Baud is limited to the selected TX Baud.

External Full Duplex RXD2

A secondary receive port (RXD2) can be used for Full Duplex feedback reception both in Radio and Cable Control modes. The receiving baud rate must be set to the expected baud rate of the incoming feedback telegram. This is especially useful in cases where different baud rates are expected for incoming feedback frames.

Figure 11. Configuration

8.3 DK Configuration

8.3.1 DK Assignment

There are 32DK switch assignments on the coder board and an additional 48DK switches can be used when an optional expansion board is added to the system. The 80DK switches have fixed assignments corresponding to DK1 to DK80 and cannot be modified. The final status of the telegram DKs is dependent on the Hetronic PC-Link configuration which is a logic combination of Input Signal/s and its corresponding DK switch for telegram DK1-DK32 and selected Input Signal or DK switch for telegram DK33-DK80.

Figure 12. Configuring DK switch assignments

The Sub Telegram Frame is a coder secondary control frame with separate configuration. A different address must be assigned which can be used to control a second receiver. The Transmit Interval can be configured so that it will be transmitted after a number of main telegram frame transmissions.

8.4 AK Configurations

There are 16 configurable AK channels (AK1 to AK16). Each AK channel can be independently assigned to a particular signal. When no signal is configured to the AK, the corresponding AK channel will remain in neutral position. The neutral position can be 0x7F or 0x00 hex value corresponding to the Type selected which is Uref/2 or 0-Uref respectively.

Analog Input

When Analog Input is selected as a Signal, the corresponding analog input will be used (Analog Input 1 to 10 corresponds to AK1 to 10 respectively). Since there are only 10 analog inputs, should AK11 to AK16 be also set to 'Analog Input' as their Signal, they must be manually mapped to the desired analog input. The analog input is calibrated to the internal Uref of the coder which is 2.8Vdc. Detection of

open to ground or supply will keep the AK channel in neutral position and trigger an AK error signal which can then be used to trigger a digital output.

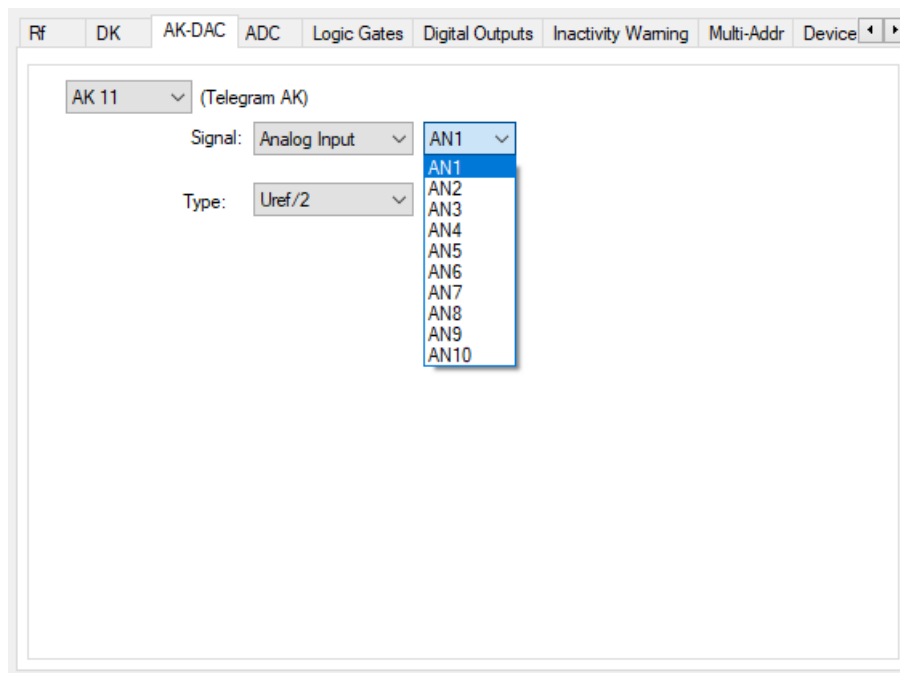


Figure 13. Configuring AKs as Analog Inputs

- Digital Steps

When setting the Signal as 'Digital Steps', a different DK can be assigned to each step with a different AK channel value. Each step is assignable with percentage values corresponding to the actual AK channel value, such that when the higher step switch is activated, the lower step switch is disregarded. Also, separate DKs are assigned for directions A and B.

Step	DK	%
Step1	DK 10	10 %
Step2	DK 11	20 %
Step3	DK 12	30 %
Step4	DK 13	60 %
Step5	None	0 %
Step6	None	0 %

Figure 14. Configuring AKs as Digital Steps

- Gray Code

When Gray Code settings are to be assigned to an AK channel, 6 DKs can be selected to represent a 6-bit gray code value. Directions A and B require different DKs.

Bit	DK
b5	None
b4	None
b3	DK 13
b2	DK 12
b1	DK 11
b0	DK 10

Figure 15. Configuring AKs as Gray Code

8.5 ADC Configurations

The ADC allows the use of analog inputs to generate digital step or gray code signals that can be used to trigger telegram DKs. All 10 analog inputs can be configured using ADC independently from each other, with digital steps or gray code as their outputs.

RF DK AK-DAC ADC Logic Gates Digital Outputs Inactivity Warning Multi-Addr Device

ADC 2 (Analog Input 2)

Digital Output: Digital Steps

Type: Uref/2

Safety DK: None

Note
Assign ADC Output Step signals to desired Telegram DKs

Digital Steps

Priority	Step	%	Signal
(Lowest Priority)	Step 1	15 %	Step 1 signal
	Step 2	30 %	Step 2 signal
	Step 3	45 %	Step 3 signal
	Step 4	60 %	Step 4 signal
	Step 5	75 %	Step 5 signal
(Highest Priority)	Step 6	90 %	Step 6 signal

Figure 16. Configuring Digital Steps as ADC output

Either Uref/2 or 0-Uref can be selected as the output Type, and this will affect the neutral position when no input is given, similarly as to how an AK is configured. If Uref/2 is selected then the neutral position is half the reference, which is 127 (0x7F). This is usually used for joysticks. If 0-Uref is selected then the neutral position is 0. This setting is usually used for potentiometers. Setting a Safety DK will ensure that the Digital Steps or Gray Code are in neutral or OFF position when the Safety DK is still OFF.

- Digital Steps

There are six configurable steps for each ADC channel and each one can be assigned with a percentage level. Once the analog input level is greater to or equal to a particular percentage level of that same ADC channel, the step will trigger an internal signal to the coder which in turn can be used as a signal to activate a DK. Only one step signal can be triggered at a time with Step 6 having the highest priority.

- Gray Code

The analog input is converted into a 6-bit gray code with minimum gray code value at neutral position. All enabled bits can be used as a signal to activate Telegram DKs. A minimum of 4-bit resolution gray code will be used if Bits 4 and 5 are both OFF. Thus, for 5-bit Gray Code resolution bit 4 must be enabled. Likewise, for 6-bit Gray Code resolution bit 5 must be enabled.

RF DK AK-DAC ADC Logic Gates Digital Outputs Inactivity Warning Multi-Addr Device

ADC 2 (Analog Input 2)

Digital Output: Gray Code

Type: Uref/2

Safety DK: None

Note
Assign ADC Output Bit signals to desired Telegram DKs

Gray Code

Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
OFF	OFF	Enable	Enable	Enable	Enable

4-Bit Gray Code

5-Bit Gray Code

6-Bit Gray Code

Figure 17. Configuring Gray Code as ADC output

8.6 Digital Outputs

The coder has 25 configurable outputs which include the Buzzer, two open collector outputs, 6 push pull digital outputs (TTL1 to TTL6) and 16 optional outputs (LED1 to LED16) when an additional expansion board is used. All the outputs can be assigned with DK signals, feedback bits, logic gates and any coder status signals available. The output active state can be set as either continuous or pulsing with adjustable On/Off durations.

The Buzzer can be assigned with 4 different trigger signals, Trigger 1 having the highest priority and all triggers independently adjustable.

Out1 and Out2 can also be assigned 3 different trigger signals, again Trigger 1 having the highest priority, and these can be used to drive higher current loads such as a buzzer, vibrating motor or small dc motor requiring up to 500mA.

TTL1 to TTL6 and the optional outputs LED1 to LED16 can be configured as active High or Low. Similarly, the output active state can be configured as continuous or pulsing with adjustable On/Off times.

All outputs can be configured latching, meaning it will remain active once the signal is activated and remains active even after the signal is deactivated. The latched output turns OFF after the signal is reactivated. The latching function can also be set to switch OFF once the Stop function is activated by setting the "Cancel on Stop" feature.

Figure 18. Digital output configuration

8.7 Inactivity Warning

This feature is mainly used in applications which require one or more functions to be continuously ON and thus, the switch operations are monitored for abnormal conditions. The 14 Timer Triggers can be assigned different trigger signals and timer durations.

When any of these 14 timers is triggered they will in turn trigger a Level 1 Warning signal which will be used to trigger an output. The Level 1 Warning signal is reset when the input trigger is disabled. When the Level 1 Warning signal is activated this automatically triggers a second independent timer which will be used to monitor the presence of the Level 1 Warning signal. If the Level 1 Warning signal remains active all throughout the second timer duration, the Level 2 Warning signal will become active (if this is configured). The Level 2 Warning signal can also be used to trigger an output. The Level 2 Warning signal will remain ON once it is activated until the next system power OFF and ON.

When a logic output signal is used as a trigger, the corresponding timer will be reset every time one of the inputs of the logic signal changes state.

Rf	DK	AK-DAC	ADC	Logic Gates	Digital Outputs	Inactivity Warning	Multi-Addr	Device
						Timer Trigger	Timer Duration 1	Timer Duration 2
1	DK 16					6 secs	Level 1 Warning	30 secs
2	None					1 sec		
3	None					1 sec		
4	None					1 sec		
5	None					1 sec		
6	None					1 sec		
7	None					1 sec		
8	None					1 sec		
9	None					1 sec		
10	None					1 sec		
11	None					1 sec		
12	None					1 sec		
13	None					1 sec		
14	None					1 sec		

Figure 19. Configuring Inactivity Warning Timer Triggers and Durations

8.8 Multi-Address Mode

This function provides the possibility to have the transmitter control a number of receivers, one at a time, depending on the address selected. The user can set the addresses to be used by an offset value configurable from 1 to 999 relative to the base address.

Incrementing or decrementing address offset is only possible whenever the assigned “Enable/Select DK Switch” is active. This DK can be assigned from DK11 to DK80.

The Maximum Address Offset defines the total number of additional addresses that the coder can use, thus the highest address possible will be the base address of the coder plus 999.

Increment DK switch and Decrement DK switch are the configured DKs which will be used to change the current address of the coder with the corresponding offset value. The possible DKs are DK11 to DK80 and these can also be configured to offset change the address digits by 10s or 100s for faster operation.

Confirm DK switch is used to confirm the change in address offset and can also be assigned from DK11 to DK80.

N.B. The DKs used for Multi-Address Mode configuration can only be the DK switch inputs of the coder.

Rf	DK	AK-DAC	ADC	Logic Gates	Digital Outputs	Inactivity Warning	Multi-Addr	Device
Enable / Select DK Switch DK11 Maximum Address Offset 005 Address Range: 000000 ~ 000005 Displayed Base Offset 000 Increment DK Switch 100's 10's 1's None None DK15 Decrement DK Switch None None None Confirm DK Switch DK12 LCD Module 70x32 sc+5 000000								

Figure 20. Configuring Multi-Address Mode

8.9 Cable Control (optional)

Cable control is also possible on NOVA Transmitters and this allows for the operation of the transmitter with no wireless radio transmission, e.g in cases where radio transmission is not allowed or when the batteries are exhausted and the transmitter must be kept on for continual crane operation. This feature requires an additional cable and this can be either plugged in the battery compartment in place of the battery or connected directly to a plug on the side of the transmitter. In either case, both the transmitter and the receiver must be configured 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 21. Enabling RS232 communication

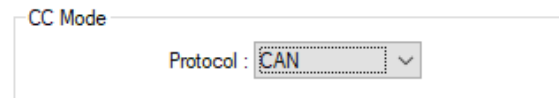


Figure 22. Enabling CAN Communication

When the control cable is used all the pre-set adjustments and other optional functions do not change. When not in use, the cable should be stored in a safe compartment inside the truck cabin. The cable with the battery enclosure must not be stored in an area subject to magnetic fields as this could cause damage to it. When CAN is selected, the 'CAN' tab becomes available to configure the required CAN settings.

The following three cable options are available in standard lengths of 10m to choose from depending on the application:

- a) CAN without termination jumper
- b) CAN with termination jumper
- c) RS232

However, these too can be customized according to the requirements set by the application.

8.9.1 Installation of Cable Control Cable

1. Switch off the receiver and NOVA transmitter and remove the battery.
2. Plug in the cable/battery enclosure for cable control in the transmitter and the other end in the receiver, making sure they are securely fastened.
3. Switch on the receiver and the transmitter and press 'Start' to enable communication.

Note: The cable connection point is located on the lower side of the installed receiver unit.

Types of Cable Control:

Sure Seal to Sure Seal connector



Amphenol to Amphenol connector



Battery to Amphenol connector



8.9.2 Operation of NOVA 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.

8.9.3 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.

8.9.4 Battery charging capability

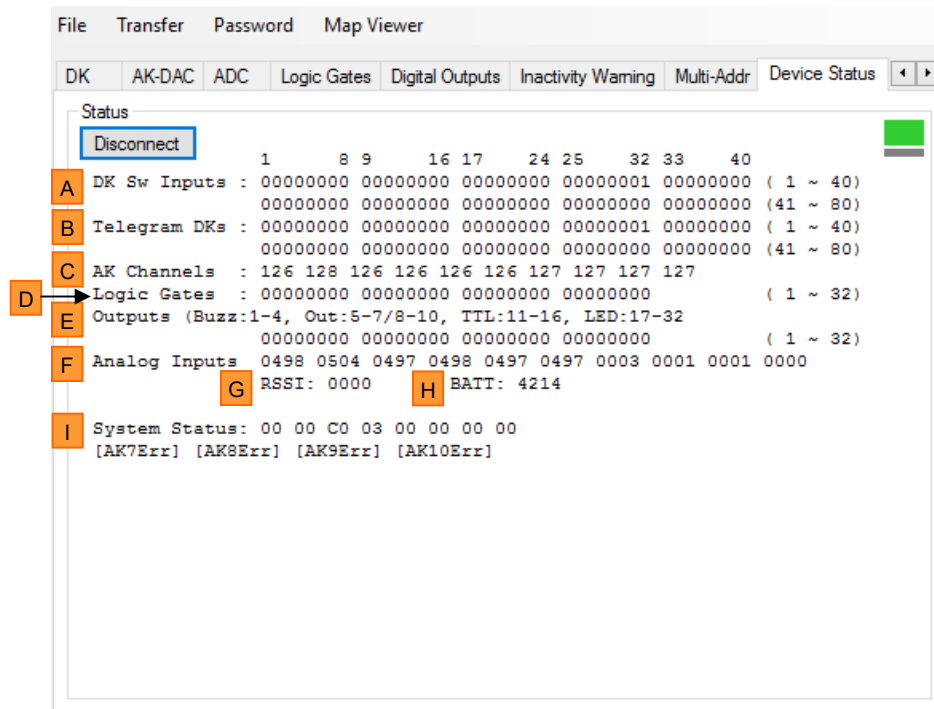
The coder used on Nova transmitters has a built-in charging circuit that allows automatic battery charging when cable control supply is available. The charging circuit is designed for Hetronic rechargeable battery packs only.

8.9.5 Decoder Address Learning (CC interface)

The coder address can be configured by a decoder (ex. BMS2, Rx14HL, DC Mobile) through its cable control (RS232) interface whenever the same coder is powered directly by the decoder. This is possible on all transmitters with a colour display. To put the coder in address learn mode, it must be powered ON with DK1 switch (#7) ON and not in STOP condition. During this stage the red status LED (with the symbol ) starts blinking confirming the coder is in address learn mode. Once the coder is in address learn mode DK1 must be turned OFF and ON again to send address learn command to the decoder. In this mode, it will wait for receiver address information which will be provided by the decoder. Once the address information is being received, the green LED will turn ON. The coder will receive the address sent from the decoder and validates the address. The address will be saved into the ADMO if the received address is valid and the green LED turns OFF. If the address received is not valid or if there is an error in the communication while receiving the address, the green LED will remain continuously ON. If there is an error then the coder must be turned OFF and the address learning procedure outlined above must be performed again.

8.10 Device Status

Your NOVA 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 (denoting communication). The 'Device Status' tab acts as a receiver thus all the logic gate results, interlocking features, delays, etc can be seen when active.



NOTE: Whenever changes to the configuration need to be downloaded on to the transmitter the Device Status tab must be disconnected first.

The Device Status tab is split into the following:

Reference	Title	Notes
A	DK SW Inputs	These are the digital inputs on the coder. First line shows DKs 1-40 and second line shows DKs 41-80.
B	Telegram DKs	These are the digital channels that are transmitted to the decoder. First line shows DKs 1-40 and second line shows DKs 41-80.
C	AK Channels	These are the telegram analogue channels and are listed from AK1 to AK10. The values are 8-bit therefore 0 to 255.
D	Logic Gates	This is the activity of all 32 Logic gates.
E	Outputs	From left to right the bits are as follows: 1. Buzzer Trigger 1 2. Buzzer Trigger 2 3. Buzzer Trigger 3 4. Buzzer Trigger 4 5. Active Low Out1 Trigger1 6. Active Low Out1 Trigger2 7. Active Low Out1 Trigger3 8. Active Low Out2 Trigger1 9. Active Low Out2 Trigger2 10. Active Low Out2 Trigger3 11. TTL Out1 12. TTL Out2 13. TTL Out3 14. TTL Out4 15. TTL Out5

		16. TTL Out6 17. LED1 18. LED2 19. LED3 20. LED4 21. LED5 22. LED6 23. LED7 24. LED8 25. LED9 26. LED10 27. LED11 28. LED12 29. LED13 30. LED14 31. LED15 32. LED16
F	Analog Inputs	These are the analogue inputs of the coder and these are monitored from analogue input 1 to analogue input 10. These are 10-bit therefore their values can be between 0 and 1023.
G	RSSI	This is the Receive Signal Strength indicator and is a measure of how strong the feedback signal is of the onboard RF part.
H	BATT	This is the battery voltage in mV. The actual value is displayed when using the serial to sureseal cable (not the USB).
I	System Status	Any warnings or errors are displayed here. The following is a list of possible errors: • Cable control • Low battery • Critical battery • Feedback error • Address Error • RF-Mod Error Cable Control • Low Batt (see RF Tab) • Critical Batt (see RF Tab) • Feedback Err (see RF Tab) • Address Err (see RF Tab) • RF-Mod Err (see RF Tab) • TxStop (see RF Tab) • AK 1 Error (see AK-DAC Tab) • AK 2 Error (see AK-DAC Tab) • AK 3 Error (see AK-DAC Tab) • AK 4 Error (see AK-DAC Tab) • AK 5 Error (see AK-DAC Tab) • AK 6 Error (see AK-DAC Tab) • AK 7 Error (see AK-DAC Tab) • AK 8 Error (see AK-DAC Tab) • AK 9 Error (see AK-DAC Tab) • AK 10 Error (see AK-DAC Tab) • Level 1 Warning (see Inactivity Warning Tab) • Level 2 Warning (see Inactivity Warning Tab)

The coder used on Nova transmitters has an on-board 2G4 RF interface which is active during the first 10 seconds of operation of the coder itself and is used for Hetronic PC-Link configuration. This 2G4 interface is only usable if the STOP switch is ON (DK31 is ON or DK32 is OFF) and will remain active while valid Hetronic PC-Link communication is detected. When the PC-Link communication is no longer detected, the 2G4 RF interface will become disabled after 10 seconds of no valid H-Link activity. Also, if the Stop Switch is deactivated the 2G4 RF interface is immediately disabled.

It is also possible to use cable control RS232 and the USB interface on the coder for Hetronic PC-Link communication. When monitoring the device status via Hetronic PC-Link, any of these interfaces can be used, however the 2G4 interface will be limited to the Stop condition without the possibility of checking the switch DKs status.

8.10.1 Device Status with Optional Palm Sensor

The Device Status tab offers the possibility of tuning the sensitivity of palm sensors installed on the Nova transmitters and connected via a serial connection to the coder. This can be performed real time either using the slider or the text box.

8.11 Optional Add-Ons

8.11.1 Tilt Sensor

The tilt sensor is a module attached to the inside of the transmitter which is used to trigger an output whenever the transmitter is tilted further than the preset angle. The module consists of two axis angles which are independently adjustable. The switched output time delay can also be adjustable from 1 to 60 seconds and the angle detection adjustment can be up to 90° in both the X and the Y axes.

8.11.2 Palm Sensor

The palm/touch sensor is used on Nova enclosures to act as a “man-down” safety feature. Its purpose is to detect the presence of a hand through the plastic handle of the housing, even if wearing leather or rubber gloves. The sensor can be cut to different lengths to accommodate the smaller Nova housings, however these must be tuned accordingly for each length using Hetronic PC-Link. The Palm sensor can be used on the Nova M, Nova L, Nova XL, Nova XL 2.8, Nova XL 4.3 and Nova XXL 4.3 variants.

8.11.3 Proximity Detection Sensor

This module operates in the 2.4GHz band to measure the distance between two nodes contained within a specific range and communicate between them. By using a Proximity Detection Module in a paired transmitter and receiver, the location from where the operator can stand to operate the system can be chosen. The user can choose to either operate the system from within the configured distance to the receiving PDM node or else from outside the configured range.

9. Troubleshooting

If your NOVA transmitter does not function as it should be 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 nearest Hetronic dealer.

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 4. Troubleshooting tips

10. Flash Programming

10.1 Bootloader Programming

Tools required: USB Flash Programmer and USB cable

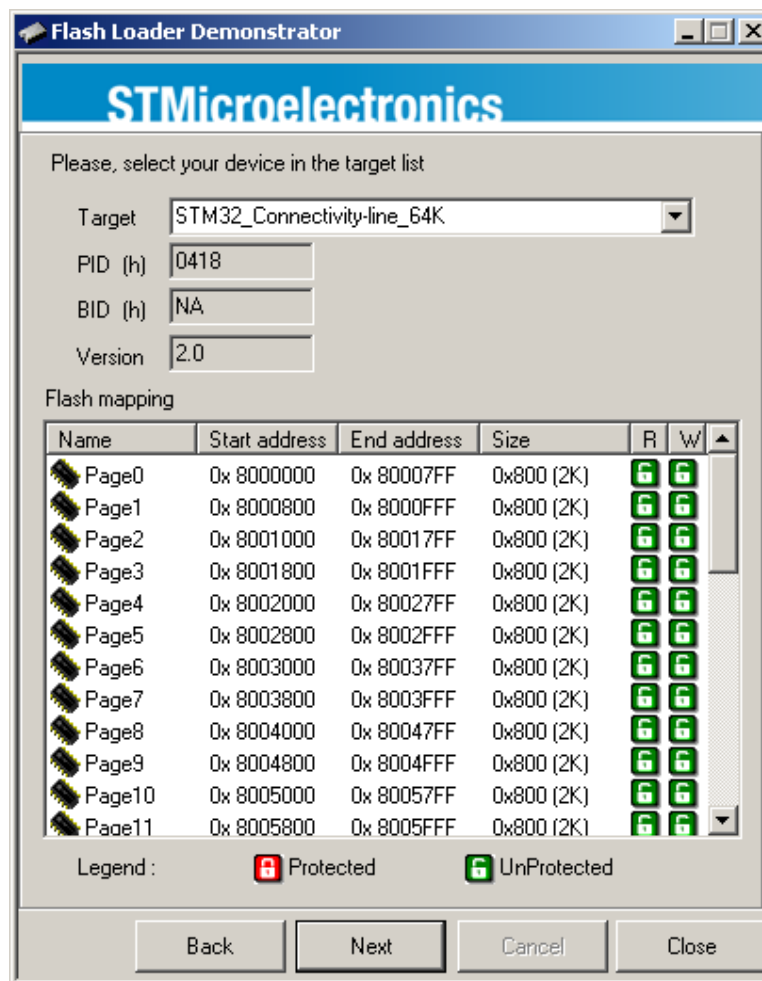
Initial programming of the microcontroller with necessary boot loader will be done through RS232. Once the boot loader is programmed, the main program can be loaded and/or updated using Hetric USB Flash programmer (V0.96 or later).

Programming via RS232 using ST Flash Loader

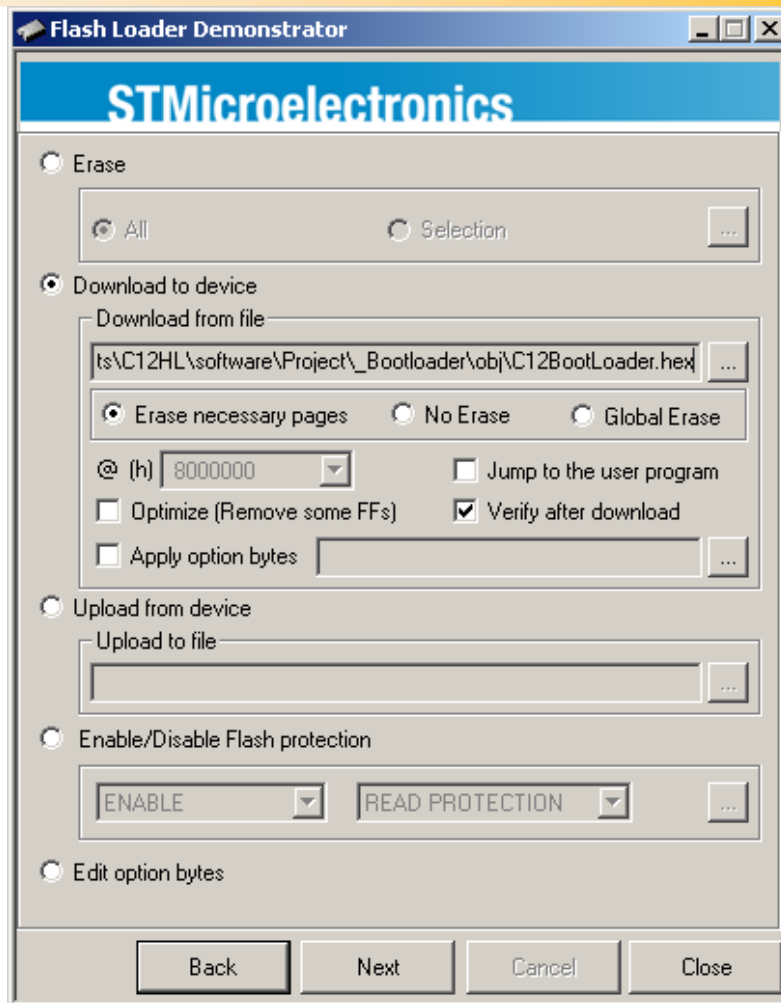
1. Connect PC to the RS232 interface of the coder board
2. Initially short BOOT jumper J6 and reset power to the coder board
3. Run ST Flash Loader
4. Select the correct Port and click "Next"

The Flash Loader software should detect the presence ST32F105R8 microcontroller.

5. Press 'Next'.



6. Press 'Next'.



7. Set "Download to device" and select the file to be downloaded (C12BootLoaderRxx.hex). Follow settings as shown above and click "Next".

8. Verify that download operation is finished successfully.

9. Click "Close".

10. Disconnect the RS232 from the coder.

10.2 Main Flash Application Programming

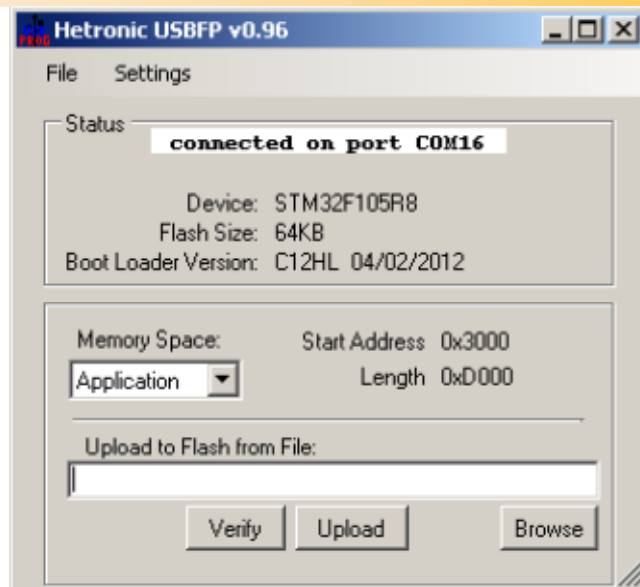
Tools required: Mini USB cable, USB Flash Programmer

1. Disconnect power supply to the coder board.

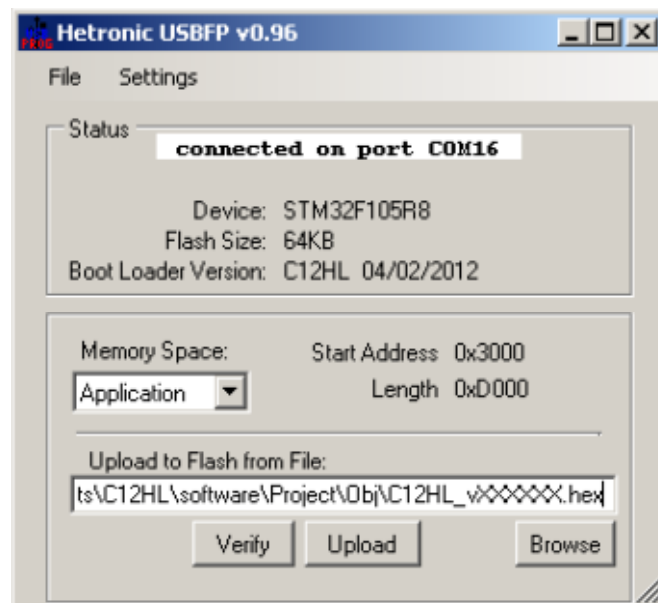
2. Connect the mini USB to the coder.

The watchdog LED on board will be ON. The GLED output will be ON and RLED output will be OFF.

3. Run the USB Flash Programmer application (v0.96 or later).



4. Select the binary file provided for Main Flash Application (C12HL_vDDMMYY.hex).



5. Click "Upload" and "Yes" to continue Flash programming.
6. After programming verification is completed, "Verification successful" will be prompted. Click "OK" and exit USB Flash Programmer.
7. Disconnect the USB from the coder.

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
- 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 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 web shop for items available as spare parts.

12. Regulatory Information

12.1 Europe

CE Marking

Transmitters - Hetronic hereby declares that the safety component "Radio Remote Control Transmitter Type NOVA" types listed in this manual are in compliance with Directive 2006/42/EU article 2(c) and are designed for installation on machinery or other devices. Furthermore, the listed safety component meets the following relevant directives at the time of delivery from the Hetronic manufacturing facilities:

Machinery Directive	2006/42/EU
RED Directive	2014/53/EU

Batteries - Hetronic declares that the components listed as "Rechargeable Battery Type MINI NiMH 1.2Ah and 2Ah" are in accordance with all provisions of Annex I of the EU Council Directive 2014/30/EU referred to as EMC Directive.

Chargers - Hetronic declares that the safety components listed as "Battery Charger UCH 2" and "Battery Charger UCH 3", in accordance with 2006/42/EU article 2(c), are designed for installation on machinery or other devices. Further, the above listed safety components meet the following directives at the time of delivery from the Hetronic manufacturing facilities:

Machinery Directive	2006/42/EU
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The latest version of the complete EU Declarations of Conformity for the NOVA Transmitter, MINI Battery and UCH-2 and UCH-3 chargers are 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, RoHS2 and RoHS3, 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

California Proposition 65

As a designer and manufacturer of electrical and electronic products, 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 chemicals listed on California's Safe Drinking Water & Toxic Enforcement Act of 1986 (commonly known as California Proposition 65).

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 residential 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 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 RSS standards. 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 the device.



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Appendix A

Definition of terms

The following terms are used throughout the NOVA Programming and Service Manual and may be unfamiliar to some operators.

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.
latching	A state which is maintained once activated. The result will only change state if the function (or one of the function inputs) is re-activated.
base address	The base address is the Hetronic PC-Link assigned address of the coder

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 key cap 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. Chargers are not intended for outdoor use. Use only indoors.
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 key cap being used?	
7	Has each function of the transmitter been tested independently to ensure the equipment is responding correctly?	
8	Is the TFT (where applicable) free from cracks, deep scratches and damages?	
9	Are the switches/rubber caps free from damages/tears?	
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?	