

INSTALLATION INSTRUCTIONS

BMS-2 RECEIVERS

VC AND PWM VERSIONS



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SAFETY

SAFETY ALERTS

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.



DANGER:IMMINENTLY HAZARDOUS SITUATION! *If not avoided, WILL RESULT in death or serious injury.*



WARNING: POTENTIALLY HAZARDOUS SITUATION! *If not avoided, COULD RESULT in death or serious injury.*



CAUTION: POTENTIALLY HAZARDOUS SITUATION! *If not avoided, MAY RESULT in minor or moderate injury. It may also be used to alert against unsafe practices.*

NOTATIONS

NOTE: General reference information for proper operation and maintenance practices.

IMPORTANT: Specific procedures or information required to prevent damage to unit or attachment.

PRACTICES AND LAWS

Practice usual and customary 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.

REQUIRED OPERATOR TRAINING

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.

POSSIBLE SOURCES OF DANGER

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

1. Switch "OFF" the transmitter when it is not in use. If equipped, remove the key if the unit is placed any distance away from the operator.
2. Disconnect the power supply from the receiver before any assembly, maintenance or repair work is done.

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

3. Never remove or alter any of the safety features.
4. **ALWAYS** confirm that the machine and radio remote control Stop functions work properly **BEFORE** beginning any machine operation.

PROTECTIVE FEATURES

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

TO STOP IN AN EMERGENCY

Push the emergency stop on the machine.

MAINTENANCE

Always shut off power to the machine, transmitter and receiver before any assembly, maintenance or repair.

INTRODUCTION

Thank you for purchasing the Hetronic radio remote control system. Hetronic radio remote controls provide outstanding remote control value, quality, performance and safety.

YOUR MANUALS

Before operation of your machine and radio remote control system, read and understand the manuals for all of your system components.

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 label affixed to the unit.

REPLACEMENT PARTS

Use only Hetronic replacement parts. Use of other replacement parts may adversely affect the performance, durability, and safety of this system and may void the warranty.

Hetronic disclaims liability for any claims or damages, whether warranty, property damage, personal injury or death arising out of the use of unauthorized replacement parts.

BEFORE OPERATING YOUR SYSTEM

Confirm that installation of all your system components has been properly completed.

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.

Confirm that surge suppressors are used when the receiver is controlling magnetic contactors.

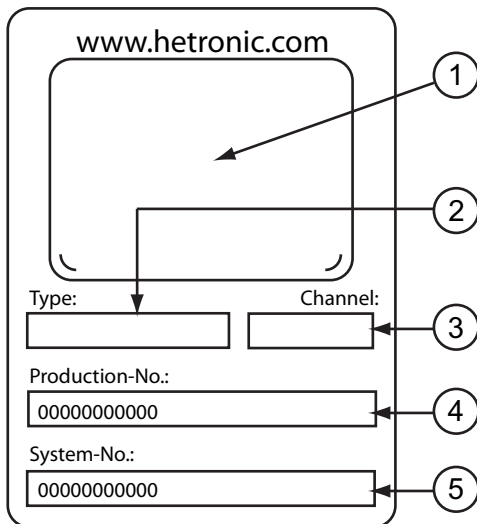
When not in use, turn the transmitter off and store in a safe place to prevent unauthorized use.

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 and remove the key (if so equipped) 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.



Unit Label Areas and Meanings

1. Specific approvals, such as BTZ, FCC, CE, etc.
2. Type of transmitter or receiver.
3. Frequency and RF unit.
4. Eleven-digit Production Number.
5. Eleven-digit System Number.

Figure 1: Unit Label Areas and Meanings

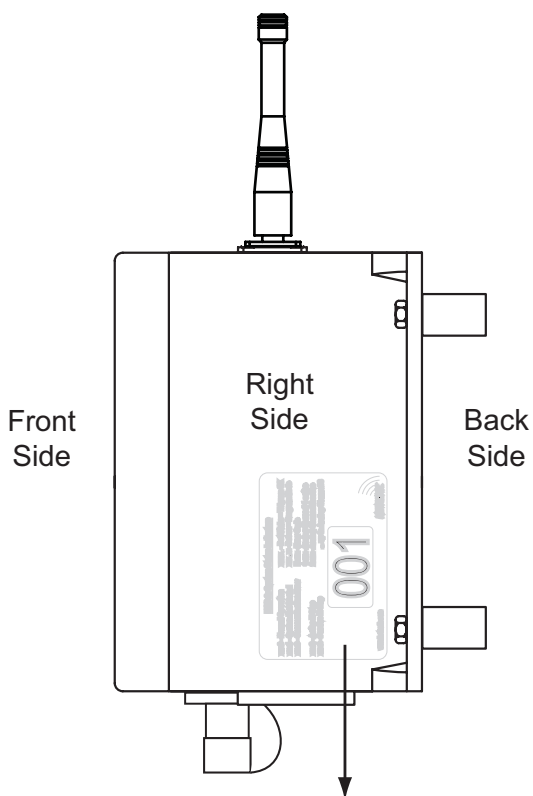
ABOUT YOUR RECEIVER

GENERAL DESCRIPTION

The BMS-2 is a radio remote control receiver that has been designed to work in conjunction with a variety of transmitting devices.

The BMS-2 receiver components are contained within a IP65-rated polymer composite housing, providing reliable protection from routine cleaning and the elements.

The 3-digit, 7-segment receiver display located on the right side of the housing provides operating status information and error codes assigned for your configuration.



BMS-2: System Status Indicators

x x 0 - Normal Operation	x x x . - Dot blinks = Telegram OK
x x 1 - System Not Started	x x . x - Dot on = Program Mode
x x 3 - Communication Error	E x x - Error Code
	1 x x - Analog Channel 1 active
x x 2 - Active E-Stop	2 x x - Analog Channel 2 active
x x 4 - Passive E-Stop	... up to Analog Channel 8

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Error Code	Meaning
x x 0	Receiving Correct Signal, no E-Stop, System Started. Example: 0 0 0 means that the receiver is getting a valid control telegram and all joysticks are in the neutral position.
x x 1	Receiving Correct Signal, BMS-2 in E-Stop, no E-Stop from TX. Example: 0 0 1 means that the receiver is getting a valid control telegram, all joysticks are in the neutral position with E-Stop condition in the receiver.
x x 2	Receiving Correct Signal, BMS-2 in E-Stop, E-Stop Transmission from TX. Example: 0 0 2 means that the receiver is getting a valid control telegram, and the transmitter E-Stop is engaged.
x x 3	RF Interface
0 0 4	Not Receiving Signal, no RF Communication, or TX is OFF.
0 0 0 .	Flashing Dot After the Third Digit, Change the Status with Each Correct Received Telegram (Green LED).
0 0 . 0	Flashing Dot After the Second Digit Indicates Programming Mode (Quick Set).
1 x x	Analog Output 1 Activated (up to 8). Joystick not in the Neutral Position. Joystick must be in the Neutral Position to Start.
E x x	Error Codes are Assigned Numbers Based on Configuration Requirements. See your Technical Documentation for your Specific Codes.

Figure 1: Receiver Display and Codes (Rotated)

The BMS-2 is available in 2 standard models:

- BMS-2-VC
- BMS-2-PWM

Both models are equipped with speed control functions, ramp functionality, interlocking operator commands, dead man and hold functions, and optional feedback and cable back-up.

Power can be supplied using 12 or 24 VDC.

For information regarding your transmitter, see your transmitter documentation that was provided with your system.

For a complete list of standard model features, see the following Standard Features list.

STANDARD FEATURES (VC AND PWM MODELS)

- 1 Stop output
- 1 Safety Valve Output
- 11 hardwired digital outputs
- Expansion of up to 16 additional digital outputs
- 6 Digital Inputs
- CAN Interface for Control and Feedback
- RS-232 interface for back up cable control and programming
- Expanded Self-diagnostics with 3-Segment LED Display
- Back-up Cable Control Interface with Sure Seal Connector
- 12-24Vdc supply power for DC applications
- Built-in Hetric 70 pin quick disconnect connector
- External antenna

BMS-2 VC STANDARD MODEL ONLY

- 8 Analog Outputs
- 8 Switching Outputs for Valve Power Supply
- 8 Error Inputs for Sauer-Danfoss Valve

BMS-2 PWM STANDARD MODEL ONLY

- 8x2 PWM Outputs

MOUNTING YOUR RECEIVER

1. Determine the receiver location, keeping in mind the following conditions:
 - The receiver will be accessible and protected from violently thrown materials.
 - The status lights will be visible to the operator.
 - The mounting area will accommodate 4 mounting holes in the required pattern.
 - There will be enough room for the antenna and connector plugs or housings.

- NOTE: If the receiver will be mounted inside of a control panel or other enclosure, see “Installing Your External Antenna (Optional)” on page 7.
2. Drill 4 mounting holes. See “Drill Pattern and Hardware” for illustration.
 3. Attach the receiver housing to the desired mounting surface.

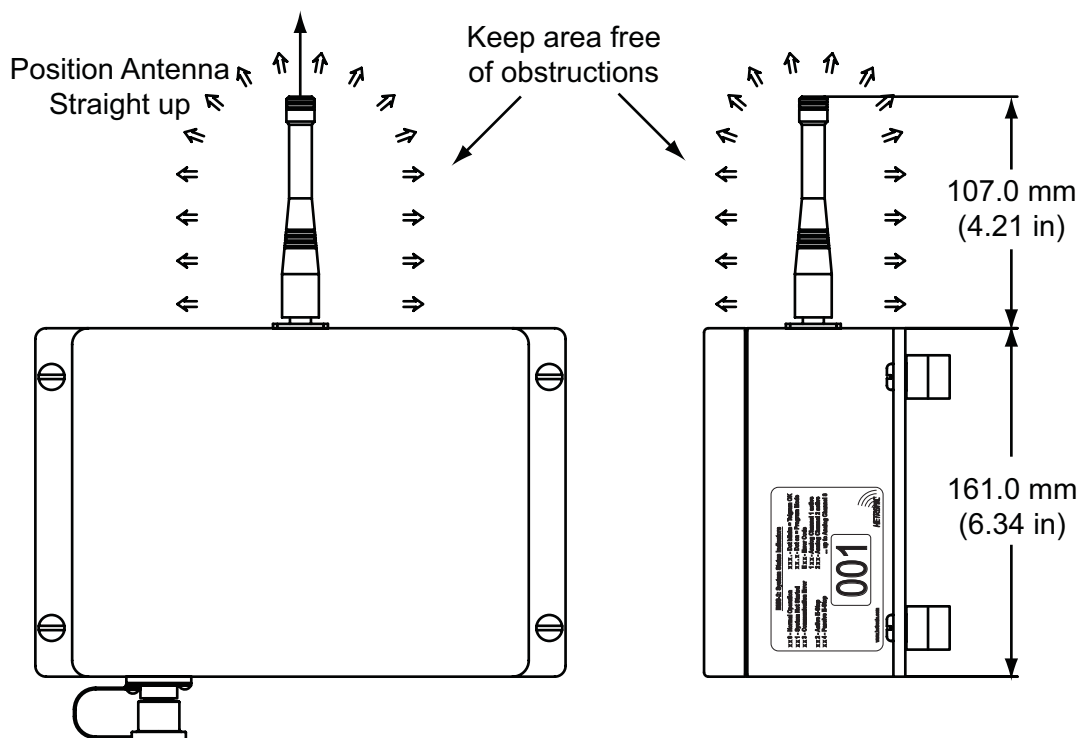


Figure 1: Receiver Dimensions

4. Screw on the antenna provided with the receiver (by the nut). Do not overtighten.

NOTE: For best reception, position the antenna straight up and confirm that the surrounding area is free of obstructions, especially metal.

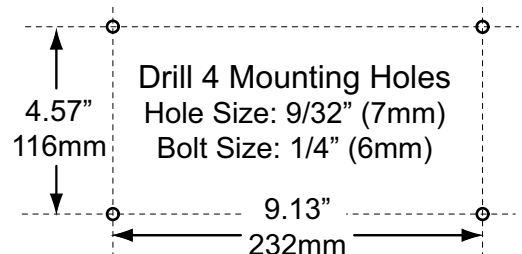


Figure 2: Drill Pattern and Hardware

INSTALLING YOUR OUTPUT WIRING



CAUTION: Assign a qualified technician to connect the wiring.

Improper wiring connections may cause serious component damage and void the warranty.

Output wiring must be properly connected for your specific requirements. Make all connections with good quality contacts or solder joints to ensure proper electrical contact.

Detailed receiver wiring information is supplied with the documentation inside the front cover of your receiver.

Supply voltage and ground wiring must be connected to reliable connecting circuitry.



WARNING: Do not use a chassis ground or equipment ground. Connect the ground wire to the vehicle battery negative post.

Assign a qualified technician to calculate the current and voltage drop, and determine the proper cable size for your application.

Power supply wiring must be at least AWG 12 for DC applications (to prevent power drop). For metric equivalent wire and cable sizes, see "AWG Metric Conversions" on page 12.



WARNING: Induced voltage spikes can cause erratic controls performance.

Make sure output control signals for any proportional control valves are routed separately from wiring that could produce transient voltage interference.

CONNECTING YOUR ELECTRICAL WIRING

Connect all remaining wires according to the wiring diagram of the machine and the radio remote control.

ATTACHING YOUR WIRING HARNESS

Plug your wiring harness into the receiver and into the corresponding machine controls.

COMPONENTS

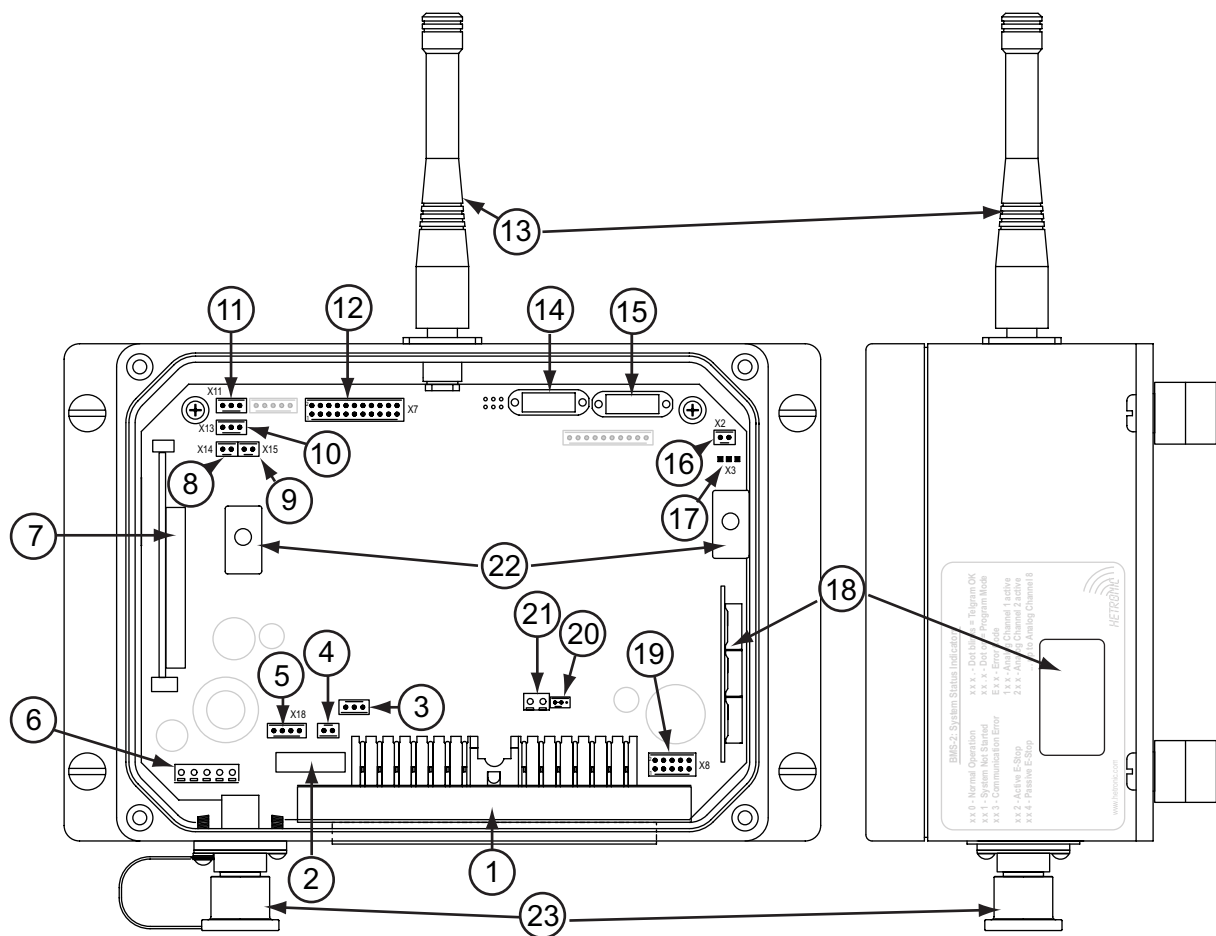


Figure 1: BMS-2 Components (VC)

Table 1: BMS-2 Components (VC)

1	70 Pin Connector (X1)	13	Antenna
2	Fuse (7.5Amp)	14	Address Module (Stop Decoder)
3	External Inputs	15	Address Module (Main Decoder)
4	2-Pin Connector (output)	16	CAN Termination (X2)
5	RS232 Interface	17	CAN Interface (X3)
6	Terminal Block	18	Status Indicator
7	RF Module (A2)	19	Internal Analog Outputs (X8)
8	Green LED (X14)	20	URef Select (Internal/External)
9	Transmitter OFF Connection (X15)	21	Common YO/Stop Output
10	Transmitter Feedback (X13)	22	Mounting Screw Recesses
11	Receiver RF Module Connection (X11)	23	Cable Control/Programming Port (X2)
12	TTL Digital Outputs (X7)		

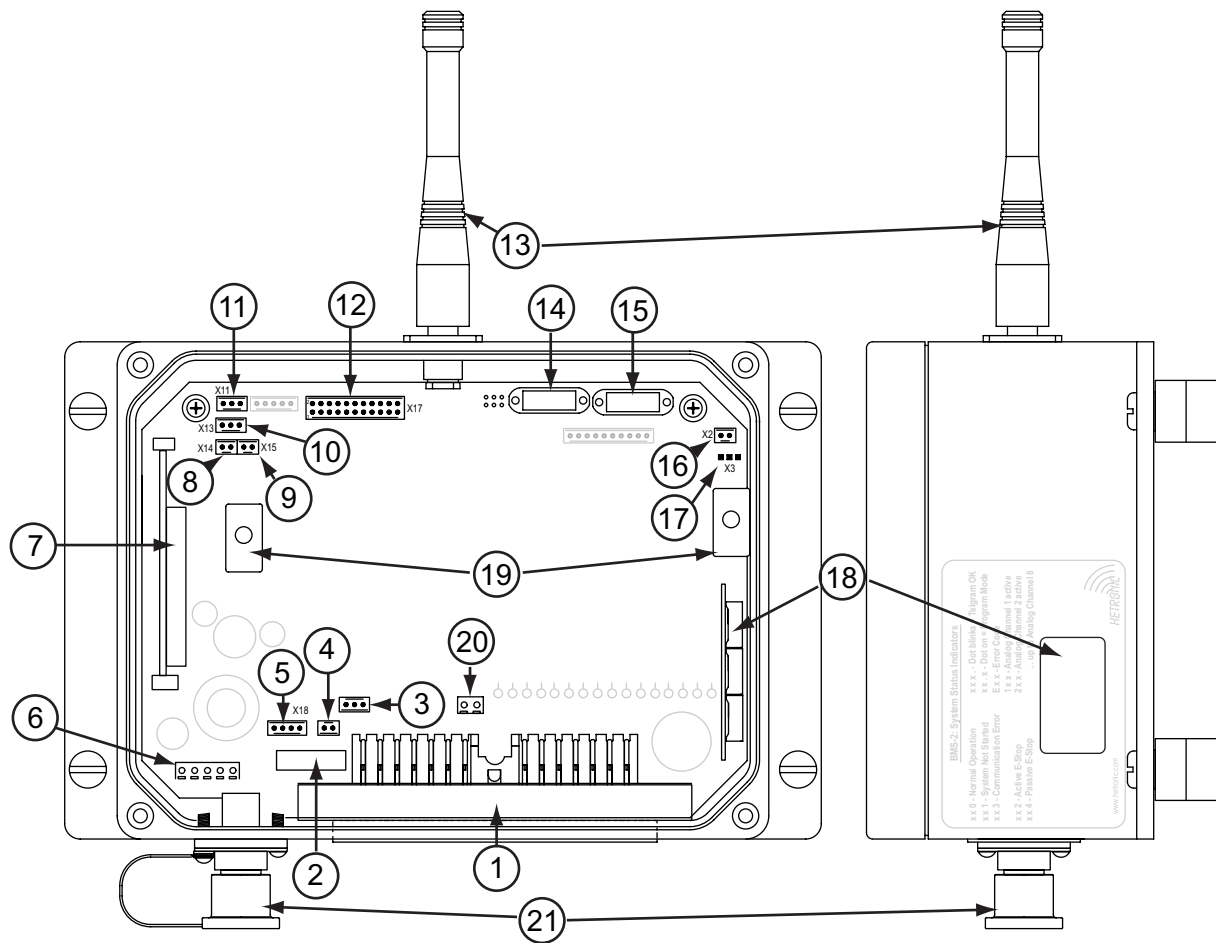


Figure 2: BMS-2 Components (PWM)

Table 2: BMS-2 Components (PWM)

1	70 Pin Connector (X1)	12	TTL Digital Outputs (X7)
2	Fuse (7.5Amp)	13	Antenna
3	External Inputs	14	Address Module (Stop Decoder)
4	2-Pin Connector (output)	15	Address Module (Main Decoder)
5	RS232 Interface	16	CAN Termination (X2)
6	Terminal Block	17	CAN Interface (X3)
7	RF Module (A2)	18	Status Indicator
8	Green LED (X14)	19	Mounting Screw Recesses
9	Transmitter OFF Connection (X15)	20	Common YO/Stop Output
10	Transmitter Feedback (X13)	21	Cable Control/Programming Port (X2)
11	Receiver RF Module Connection (X11)		

ACCESSORIES

INSTALLING YOUR EXTERNAL ANTENNA (OPTIONAL)



CAUTION: Choose the correct antenna length for your application.

Do not cut, splice, alter or coil your antenna or reception may be adversely affected.

There are numerous configurations of external antennas. The following procedure explains how to install the external antenna commonly used with this receiver.

If you need further information, please contact your supervisor for next steps.



CAUTION: Unscrew antennas by the nut or equipment damage will result.

1. Unscrew the existing antenna (by the nut) from the receiver housing.

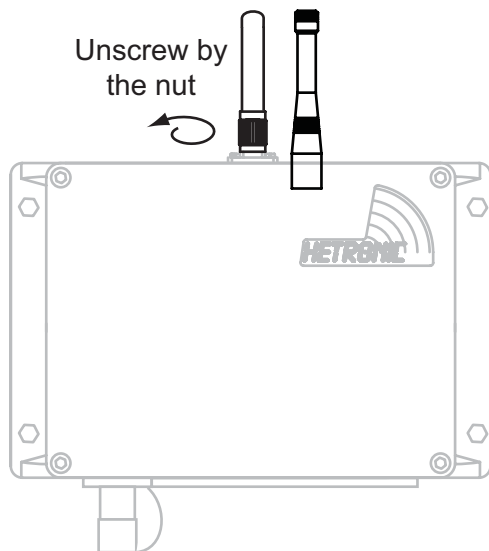


Figure 1: Existing Antenna

NOTE: See the following Antenna Extension Diagram for illustration.

2. Screw the antenna (1) to the antenna extension (4). Do not overtighten.
3. Screw the receiver connection (5) to the antenna base (6). Do not overtighten.

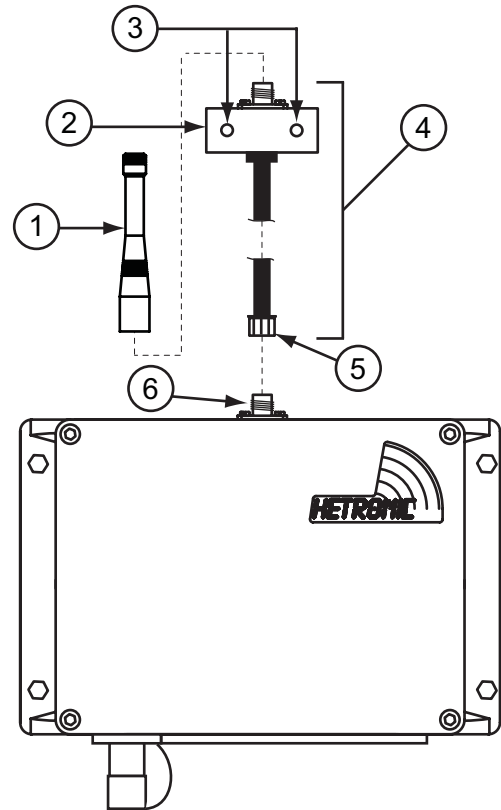


Figure 2: Antenna Extension Diagram

Table 1: Antenna Extension

1	Existing Antenna
2	Antenna Wall Mount Holder
3	Mounting Screw Holes
4	Antenna Extension
5	Receiver Connection
6	Antenna Base



WARNING: Do not route the antenna cable with power or control wiring. Intermittent signal loss will result.

4. Insert the mounting screws through the mounting screw holes (3).
5. Secure the Antenna Wall Mount Holder (2) to the desired mounting surface.

SPECIFICATIONS

Housing Material	Impact resistant polymer composite
Environmental Protection	IP 65 (Exceeds Nema 12/13)
Dimensions	Length: 10.4 in., 245 mm Height: 6.3 in., 161 mm Depth: 4.4 in., 90 mm
Weight	2,5 kg (5.5 lbs)
Antenna	External, TNC socket
Voltage Supply	12 to 24 Vdc (-50% - +20%)
Decoding	Multiple bit scanning, self-monitoring
Fuses	7.5 Amp. / 80 V car fuse
Frequency Range	419 MHz, 429 MHz, 434 MHz, 447 MHz, 458 MHz, 480 MHz, 868 MHz
Output	Intrinsically safe stop with double - FET, 1 safety valve (dump valve), 11 digital, 16 internal digital.
RF Unit	Type CS synthesized with multiple frequencies
Typical Operating Range	Up to 100 m (300 ft.)
Safety Address	20-bit (over 999,999 individual possibilities) Address Module (ADMO)
Safety	Active and passive Stop function Parity & Checksum
Temperature Range	-11 to +158 degrees F (-20 to +70 degrees C)
Humidity Range	0 - 97% maximum non-condensing
Response Time	Less than 100 msec.
Data Format	2400/4800 Baud, hamming distance 3.

FORMS AND ADDITIONAL INFORMATION

INSTALLATION AND SAFETY DATA SHEET

This form must be completed and signed by the person responsible for installation of this radio remote control system.

Hetronic assumes no responsibility for the correct installation of the radio remote control system.

The equipment operator must ensure that the radio remote control system and the machine operate correctly together.

The operator must also ensure that all safety devices and features are in place and operating correctly.

The operator is responsible for understanding and following all safety precautions in this and other applicable documentation.

MACHINE DATA

Manufacturer	
Model Number	
Serial Number	
Year of Production	
Radio Remote Control Data	
Manufacturer	Hetronic
Model	
System/Transmitter Type	
Transmitter Production Number	
Receiver Production Number	
System Number	
I/We installed the radio remote control system, performed the safety test and inspected the machine. The appropriate instructions and rules of this machine type are followed.	
Place	
Date	
Company	
Name of Installation Technician	
Signature	

AWG METRIC CONVERSIONS

AWG	Metric Equivalents	
	mm sq.	Cable Size mm sq.
20	0.52	0.75
18	0.82	1.0
16	1.32	1.5
14	2.1	2.5
12	3.3	4
10	5.32	6
8	8.5	10

GLOSSARY

Acoustic signal	A buzzer or other sound intended to be heard as an alert
Analog signal	Proportional - stepless or infinite control
Belly box	A transmitter that is secured to the front of the operator's body by a belt, strap or breastplate/harness.
Coder	Converts parallel signals into a serial data message
Decoder	Converts a serial data message into parallel signals
Digital signal	On/off control
Latching control	The function activates when the control is pushed and released. The function stays on until the control is pushed and released again.
Mainline contactor	The primary power supply contactor to the machine controls.
Maintained control	The function activates when the control is placed in the ON position. The function stops when the control is placed in the OFF position.
Momentary control	The function activates when the control is placed in the ON position. The control must be held in place to stay ON. When the control is released, it returns to the OFF position and the function is stopped.
Proportional control	A multi-speed function control that goes faster as the control is pressed further.

ABBREVIATIONS

A/D	Analog to digital conversion	MOV	Metal Oxide Varistor type of surge suppressor
AK	Analog channel (German: Analog Kanal)	mW	Milliwatt
AMP	Ampere	NiCd	Nickel Cadmium
AWG	American Wire Gauge	NiMh	Nickel Metal Hydrite
BPS	Bits Per Second	PLC	Programmable Logic Controller
CPU	Central Processing Unit	PLL	Phased Locked Loop
DPST	Double Pole Single Throw	PTO	Press to operate
DPDT	Double Pole Double Throw	PWM	Pulse Width Modulation
DK	Digital channel (German: Digital Kanal)	R/C	Resistor/Capacitor type of surge suppressor
EMC	Electromagnetic Compatibility	RF	Radio Frequency
EMI	Electromagnetic Immunity	RMS	Root Mean Squared
EEPROM	Electrically Erasable Programmable Read-Only Memory	Rx	Receiver
EPROM	Erasable Programmable Read-Only Memory	RxD	Receiving data
FM	Frequency Modulation	SMD	Surface Mount Device
GND	Ground	SMT	Surface Mount Technology
HF	High Frequency	SPST	Single Pole Single Throw
KHz	Kilohertz	SPDT	Single Pole Double Throw
LED	Light Emitting Diode	TTL	Transistor transistor Logic
LTO	Lift to operate	Tx	Transmitter
mAh	Milliampere hours	TxD	Transmitting data
mA	Milliampere	Ub	Operating power
msec	Millisecond	VAC	Volts Alternating Current
MHz	Megahertz	VDC	Volts Direct Current



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