



# V5 180 kHz Coded Transmitters

VEMCO's miniature coded transmitters open up a new world for small fresh and salt water species research



0.65	0.77
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## Smaller Fish, More Species

Weighing just 0.38 and 0.46 grams in water (0.65 and 0.77 grams in air), the V5 tag family is one of the smallest of VEMCO's line of miniature coded transmitters. The V5 enables researchers to track and monitor smaller fish and a broader range of species than ever before!

## Why 180 kHz Frequency?

Operating at 180 kHz, the V5 is designed to work well in both fresh and salt water. Choosing this frequency enabled VEMCO to develop a small, lightweight tag that would still operate well in marine environments. Tags with operating frequencies greater than 200 kHz are less effective in salt water. Depending on the conditions of your location, the V5 can have 150-200 metres range.

## Detect More Tags

Researchers can now tag and release many more fish simultaneously due to the detection capabilities of our new tag transmission systems. See the following page for more details on HR and PPM.

## Salmon Smolt Migration and Survival

With excellent performance in all aquatic environments, and flexible programming options to cover a wide variety of life cycles, the V5 enables you to study animals as they migrate from rivers to the ocean and back.

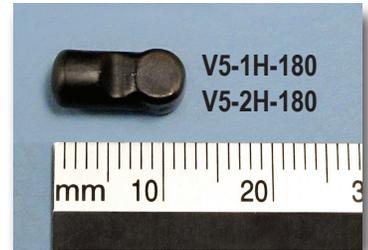
## Juvenile Fish in Nursery Areas

Nursery areas are important for the life cycle of fishes and cover a relatively wide range of habitat types and depth ranges. With the V5, you can now effectively study juvenile fish of any species that congregate in nursery areas.

## Physical Specifications

Battery Option	V5-1H	V5-2H
Frequency (kHz)	180	180
Length (mm)	12.7	12.7
Height (mm)	4.3	5.7
Width (mm)	5.6	5.8
Weight in air (g)	0.65	0.77
Weight in water (g)	0.38	0.46
Power Output (dB re 1uPa @1m)	143	143

*Stated tag length, weight and output power are nominal. Small manufacturing variations can be expected.*



## Compatible with HR2 and VR2W-180kHz Receivers

The V5 works with VEMCO's new High Residence Receiver (HR2) as well as the time proven workhouse, the VR2W-180 kHz. The V5 can also be detected by VEMCO's VR100 acoustic tracking receiver. A VH180 transponding hydrophone is required for use with the VR100. The VR4-UWM, which is capable of long term deployments and communicating remotely to a surface modem, can detect both 69 kHz and 180 kHz transmitters. **V5 tags cannot be detected by a VR2W-69 kHz receiver.**



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**High Residence (HR) and Pulse Position Modulation PPM transmission schemes offer new ways of detecting your tagged animals! 180 kHz transmitters can transmit ID codes on HR and PPM virtually at the same time.**

**High Residence (HR)**

HR represents a more aggressive transmission system that offers the ability to detect many more tagged animals at once compared to PPM (Pulse Position Modulation). Each HR ID code is embedded in each short ping transmitted by the tag. This allows the HR2 receiver to detect many IDs in a short period of time. When used with the new HR2 receiver, HR technology is also capable of very precise signal timing which makes HR ideal for anyone interested in accurate spatial positioning of many tagged animals in a short period of time or monitoring the movements of animals moving quickly through acoustic gates (i.e. river survival study).



**Pulse Position Modulation (PPM)**

PPM is a series of pings (typically 8) transmitted as a pattern that represents a unique ID code. A 180 kHz PPM ID is typically transmitted over a one to two second period. A randomized delay between transmissions permits the researcher to monitor many fish over time. PPM is also a very reliable method for transmitting data meaning that error rates are very low. Therefore, researchers do not have to put a significant amount of effort into validating data. Typically, researchers can accept two transmissions within a short period of time as validation that the tagged animal is present.

**Advantages of VEMCO's 180 kHz Product Line**

- ▶ Two transmission systems (HR and PPM) in one tag provides flexibility for study designs and research objectives
- ▶ Two VPS systems in one - researchers can position the same fish with two coding systems (i.e. HR could have an advantage over PPM in specific conditions)
- ▶ Combine HR2 and VR2W-180 kHz receivers in the same study
- ▶ Real time monitoring of HR and PPM tags (HR2s)
- ▶ HR and PPM available in all 180 kHz tag models (V5, V9)

VEMCO will soon publish application notes to provide researchers with field deployment tips and guidance on how to choose tag programming and design receiver layouts.

**V5 Battery Life Examples**

V5-1H (0.65 g)			
Type	Nominal Delay (sec)	Life (days)	
		95%	50%
HR	1.5	25	30
HR	5	65	80
HR	10	100	120
PPM	20	58	70
PPM	30	75	90
PPM	40	90	105
HR/PPM	5/30	42	50

V5-2H (0.77 g)			
Type	Nominal Delay (sec)	Life (days)	
		95%	50%
HR	1.5	30	35
HR	5	80	95
HR	10	125	145
PPM	20	70	85
PPM	30	95	110
PPM	40	110	130
HR/PPM	5/30	52	62

Please consult with VEMCO if you are considering 180 kHz products. We can help you fine tune your needs!

**VEMCO Tag Activator (VTA)**

The VTA is a handheld device that enables users to quickly and easily activate 180 kHz transmitters. The manual on how to use the VTA can be found on the VEMCO website Downloads page.



## Programmable ON/OFF

VEMCO transmitters are available with programming options that allow users to take greater advantage of fish behaviour over the life of their tags. In order to control the characteristics of their tags, users have the option of using between one to four programming steps to define the tags transmission: Status (ON/OFF), time interval, acoustic power level (H) and nominal delay.

This is an example of how V5-1H tag programming options can be utilized to provide a staged release tag behaviour.

Interval	Status	Time Days	Power (H)	Nominal Delay (sec)
Step 1	ON	1	H	30
Step 2	OFF	9		
Step 3	ON	45	H	60
Step 4	ON	147	H	180

When finished, LOOP back to Step 4.

Step 1: The tag is programmed to start in HIGH power mode with a nominal delay setting of 30 seconds for a period of 1 day. This allows a researcher to activate a tag and have it transmit for 1 day during the surgical implantation phase of the study.

Step 2: The tag is programmed to turn OFF for a period of 9 days. In order to conserve battery life while the animals recover from surgery, the tags are switched to the OFF status since the location of the animals is known.

Step 3: The tag is programmed to turn ON in HIGH power mode with a nominal delay setting of 60 seconds for a period of 45 days. This allows a researcher to release and track the animals during a 45 day migration period through a given study area.

Step 4: The tag is programmed to stay ON in HIGH power mode with a nominal delay setting of 180 seconds for a period of 200 days. This allows a researcher the ability to track the animals for 200 days during what might be a more residency type setting. Note the Loop control setting is set to Step 4 thus keeping the tag in the ON status until the tag reaches its battery end of life.