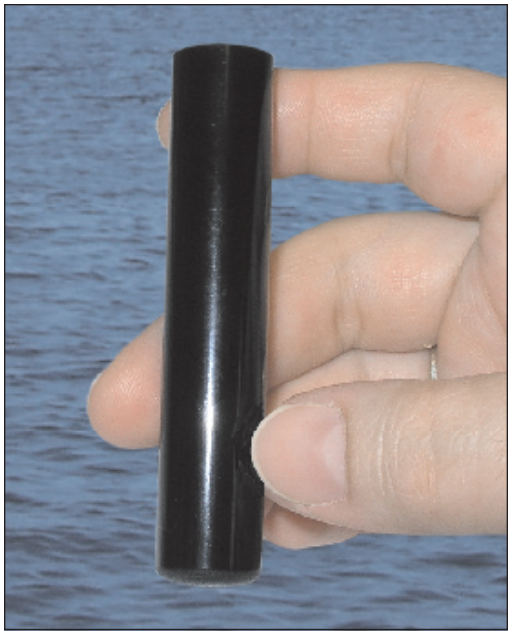
TRANSMITTERS

V16 Coded Transmitter

Multi-purpose transmitter for medium and large species

The V16 coded tag, with its 16 mm diameter, is a multi-purpose transmitter. Developed for medium and long term tracking studies, it can function as a simple pinger giving location only, or for more detailed research it can be equipped with a depth and/or temperature sensor. Depending on the battery size, the tag will last between one month and several years and give a transmission range in excess of several hundred meters (this varies significantly with environmental conditions). Given its size, the coded V16 tag is best suited for studies involving medium to large species types. When V16 transmitters are used with the VR2W and/or VR3 receiver, they can help meet the challenges of tracking large numbers of fish over large areas. The V16 can also be tracked using the VR2, VR28, the VR100, or VR60 (with Option 07 version 2.01) receivers, or the VRAP system.



V16 transmitter.

Coded Mode

"Coded mode" V16 tags send acoustic pings at 69kHz that are infrequent and random about an average delay. This ping train includes an ID number which permits identification of the specific tag.

For applications such as site residency studies and automated monitoring of migrations, coded transmissions are desirable because of significantly increased battery life and the large number of tags that can be used on the same frequency.

Physical Specifications

The physical measurements of the V16 vary with battery option and if pressure sensors are included. Specifications are shown in the table below. (Note that the table is for internally implanted tags only).

		Silver Oxide				Lithium					
Battery Option:		**1L**	**1H**	**3L**	**3H**	**4L**	**4H**	**5L**	**5H**	**6L**	**6H**
V16/V16T	Length (mm)	54	54	64	64	68	68	95	95	95	95
V16P/ V16TP	Length (mm)	57	57	67	67	71	71	98	98	98	98
All V16s	Power Output (dB re 1uPa @1m)	150	159	157	165	152	158	157	165	153	160
V16/V16T	Weight in air (g)	19		25		24		36		34	
V16P/ V16TP	Weight in air (g)	20		26		26		37		36	

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

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V16 Coded Tag Sensor Options

For research requiring temperature and depth information, V16 tags can be equipped with temperature, V16T, or depth, V16P, or both temperature and depth sensors, V16TP. V16P pressure transmitters are available in the following full scale pressure options: 17, 34, 68, 136, 204, 340, and 680 meters. V16T temperature transmitters are available in four temperature ranges: -5 to 35°C, -4 to 20°C, 0 to 40°C and 10 to 40°C.

Temperature Sensor		
Range	**Accuracy**	**Resolution**
-5 to 35 °C	±0.5 °C	0.15 °C
-4 to 20 °C	±0.5 °C	0.1 °C
0 to 40 °C	±0.5 °C	0.15 °C
10 to 40 °C	±0.5 °C	0.12 °C

Pressure Sensors (at room temperature)		
Max Depth	**Accuracy**	**Resolution**
17 m	±1.7 m	0.08 m
34 m	±1.7 m	0.15 m
68 m	±3.4 m	0.3 m
136 m	±6.8 m	0.6 m
204 m	±10 m	0.9 m
340 m	±17 m	1.5 m
680 m	±34 m	4.1 m

Case Options

The V16 comes in two case styles. The internally implanted unit comes in an epoxy case with rounded ends. The externally mounted unit is made of PVC with attachment holes at either end. The externally mounted unit is approximately 20mm longer than the internal V16 model. All V16 tags come with an external magnet to activate or deactivate the tag.

Range Testing Tag

Range testing tags can be provided, at the same output power as your proposed study, to be used to conduct in situ range testing. Range test tags are configured with a FIXED delay and an on-time of two weeks. This is a precautionary measure to ensure that the tag will expire within a reasonable period of time if accidentally dropped. The tag on-time can be reset using the external magnet. Range test tags come encased in an external case (shown above).

Expected Battery Life

The life span of the V16 coded tag depends on battery type/size (either 1, 3, 4, 5, or 6), power output (high (H) or low (L)), the delay between code transmissions (in seconds), and the types of sensors included. The larger the battery, the greater the life and/or power output. Larger batteries increase transmitter length and weight. The table below shows the estimated battery life for the V16-4L and V16-4H transmitter battery options using the most common delay settings. Note that V16 pingers incur a small current drain prior to activation. Tag life will be reduced if tags are shelved for a significant period of time (months). Contact VEMCO for information.

Projected Battery Life (Days)		
Nominal Delay (seconds)	**V16-4L**	**V16-4H**
60	2356	715
120	3650	1338
180	3650	1931

Notes: The transmission rate varies randomly ±50% about the nominal delay value. For example, a 120 second nominal delay indicates that the tag transmits randomly every 60 to 180 seconds.

The projected battery life is an estimate and users will experience a decrease in battery life if their tags are operating in extreme warm or extreme cold temperatures.

VEMCO transmitters are programmed to stop transmitting when they reach their stated battery life. This ensures that tags will operate at published specifications until expiration.

Tags can be programmed for shorter lives, if required.

The table above is for our most popular nominal delay settings. Please contact VEMCO for more information regarding battery life or other battery options and nominal delay settings.

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Programmable ON/OFF

VEMCO transmitters are available with programming options that allow users to take greater advantage of the transmitter's 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 (L/H) and nominal delay.

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

Interval	Status	Time (Days)	Power (L/H)	Nominal Delay (sec)
Step 1	ON	1	L	30
Step 2	OFF	9		
Step 3	ON	183	H	30
Step 4	ON	2204	L	120

When finished LOOP back to Step 4. Estimated tag life in this example is 2397 days.

Step 1: The tag is programmed to start in LOW 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 switch 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 30 seconds for a period of 183 days. This allows a researcher to release and track the animals during a 183 day migration period through a given study area.

Step 4: The tag is programmed to stay ON in LOW power mode with a nominal delay setting of 120 seconds for a period of 2204 days. This allows a researcher the ability to track the animals for 2204 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.