VQ™ Vector

Patient Operating Manual

VQ OrthoCare℠ is not liable for any misuse or misunderstanding of the VQ Vector™ product or operating manual. Please call your local representative if any additional assistance is required regarding this product and its operating instructions.

VQ OrthoCare℠

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VQ™ Vector

Table of Contents

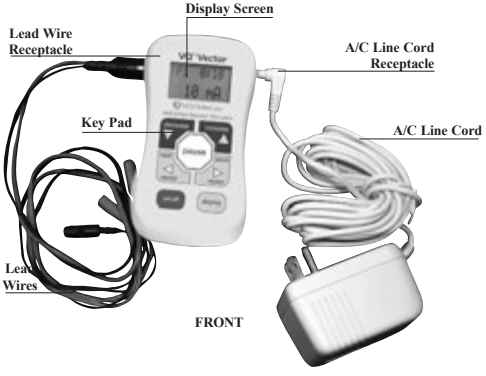
System Components

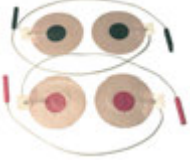
The VQ™ Vector stimulation system is operated with:

- One (1) VQ Vector stimulator
- One (1) package of electrodes
- One (1) lead wire (4 lead)
- Four (4) AA alkaline batteries, or one (1) battery pack

In addition, the system comes with:

- One (1) carrying case
- One (1) operating manual
- One (1) AC adapter




ELECTRODES


BATTERY PACK

Letter to the Patient

Your physician has selected the VQ™ Vector device because it is the most applicable to your specific need.

Your VQ Vector is a portable stimulator that generates small pulses of electrical current that are delivered through lead wires and the electrodes you place on your skin. These electrical pulses pass through your skin and activate underlying nerves. At lower levels of stimulation, the VQ Vector stimulates sensory nerves, producing a tingling sensation. Higher levels of stimulation activate motor nerves, resulting in muscle contractions.

It is important to realize that the VQ Vector is not a substitute for proper medical evaluation and treatment. You should always consult your physician or therapist if you have specific questions or problems regarding the use of your stimulator. Your physician or therapist possesses technical knowledge about the VQ Vector and is familiar with your specific condition and requirements. In addition, always follow the instructions of your physician or therapist to gain the most benefit from your VQ Vector.

Your physician or therapist will instruct you on the correct degree of stimulation and provide you with direction on the proper mode of operation for your condition.

This device should only be used by the person for whom it was prescribed and should never be used by any other individual.

Please read the following sections carefully before using your VQ Vector.

- Precautions and Prescription Information
- Controls and Features
- Treatment Sessions
- Care and Maintenance

VQ™ Vector

Precautions and Prescription Information

NOTE: Please read the following prescription information carefully before using your VQ™ Vector. If you have any questions on this information, consult with your physician or therapist before proceeding.

CAUTION

Federal law restricts this device to sale by, or on the order of, a practitioner licensed by law of the State in which he/she practices to use or order the use of the device.

Indications

- Symptomatic relief of chronic intractable pain and as an adjunctive treatment in the management of post-traumatic and post-surgical pain
- Relaxation of muscle spasms
- Prevention or retardation of disuse atrophy
- Increasing local blood circulation
- Muscle re-education
- Immediate post-surgical stimulation of calf muscles to prevent venous thrombosis
- Maintaining or increasing range of motion

Stimulators should only be used under medical supervision for adjunctive therapy for the treatment of medical diseases and conditions.

Contraindication

- Should not be used on patients with cardiac demand pacemakers

Warnings

- The long term effects of chronic electrical stimulation are unknown
- Stimulation should not be applied over the carotid sinus nerves, particularly in patients with a known sensitivity to the carotid sinus reflex
- Stimulation should not be applied over the neck or mouth; severe spasm of the laryngeal and pharyngeal muscles may occur and the contractions may be strong enough to close the airway or cause difficulty in breathing
- Stimulation should not be applied transthoracically in that the introduction of electrical current into the heart may cause cardiac arrhythmias
- Stimulation should not be applied transcerebrally
- Stimulation should not be applied over swollen, infected, or inflamed areas or skin eruptions, e.g., phlebitis, thrombophlebitis, varicose veins, etc.
- Stimulation should not be applied over, or in proximity to cancerous lesions

Precautions and Prescription Information *(cont.)*

Precautions

- Safety for use during pregnancy has not been established
- Caution should be used for patients with suspected or diagnosed heart problems
- Caution should be used for patients with suspected or diagnosed epilepsy
- Caution should be used in the presence of the following:
  - When there is a tendency to hemorrhage following acute trauma or fracture
  - Following recent surgical procedures when muscle contraction may disrupt the healing process
  - Over the menstruating or pregnant uterus
  - Over areas of the skin which lack normal sensation
- Some patients may experience skin irritation or hypersensitivity due to the electrical stimulation or electrical conductive medium; the irritation can usually be reduced by using an alternate conductive medium, or alternate electrode placement
- Electrode placement and stimulation setting should be based on the guidance of the prescribing practitioner
- Keep out of reach of children
- Use only with the leads and electrodes recommended for use by the manufacturer
- Portable stimulators should not be used while driving, operating machinery, or during any activity in which involuntary muscle contractions may put the user at undue risk of injury

Adverse Reactions

- Skin irritation and burns beneath the electrodes have occasionally been reported with the use of electrical muscle stimulators and when the electrodes are placed too close together (less than 1 inch apart)
- If you experience any initial symptoms of skin irritation due to the electrode, discontinue use immediately and contact Patient Care at VQ OrthoCare, 1-800-452-7993 or consult a physician.

ON/OFF Button
Press the On/Off button when you are ready to begin your therapy session. The VQ™ Vector always turns on with 0 intensity. Pressing the On/Off button at any time during the therapy session will immediately stop stimulation and turn the device off. If you press and hold the On/Off button you will see your serial # displayed on the screen.

Display Button
Press this button to display each of the parameters for the preset. There will be at least two screens of information for each preset. Additional screens may be made available by your clinician.

Increase Button
Pressing and releasing this button increases the intensity of the stimulation. The display will show you in milliamps how high your intensity is set. The range is from 0 to 50 milliamps in 0.5 milliamp increments.

Decrease Button
Pressing and releasing, or pressing and holding this button decreases the intensity of the stimulation. Usually when your treatment is over the unit will turn off automatically. It is not necessary to decrease the intensity to turn the unit off.

Next Button
Used by your clinician to set up the unit.

Save Button
Used by your clinician to set up the unit.

Vector ◀ Button
Pressing this button during treatment will rotate the stimulation pattern to the left so that you will feel the stimulation more intensely in the left side of your treatment area and less in the right side. Pressing and holding this button will make the stimulation pattern sweep from side to side every 60 seconds.

Controls and Features (cont.)

Vector ▶ Button
Pressing this button during treatment will rotate the stimulation pattern to the right so that you will feel the stimulation more intensely in the right side of your treatment area and less in the left side. Pressing and holding this button will make the stimulation pattern sweep from side to side every 60 seconds.

Pause Button
Press and release this button to instantly stop stimulation. The device remains on and the timers are paused. Press and release the button a second time to return to the same point in the therapy program.

LCD Display
The LCD display will keep you informed about your treatment showing you the following items.

- Upper left corner will indicate the preset you are using
- Upper right corner will indicate the time remaining in your treatment
- Lower left corner will indicate if the vector is being used
- Lower right corner is your output amperage
- In between the rows there are flashing bars to indicate the current is flowing
- Low battery indicator to the left of the preset display
- Pause indicator to the right of the remaining time display
- Backlighting will illuminate the screen and buttons in order to make it easier to view in low light situations

Low Battery Indicator
This will flash on when the batteries are nearly depleted, indicating you have approximately 5-30 minutes of battery life left, depending on your parameter settings. Try to replace them as soon as possible. When the batteries are sufficiently depleted, the device automatically shuts itself off.

Belt Clip
The belt clip is used to attach the VQ™ Vector to a belt loop for mobility during a therapy session. By rotating the belt clip to the upper position the VQ Vector can be used as a tabletop device.

Lead Wire Socket
The electrode lead wire is plugged into this socket. There is an index mark on the unit that will align with the index mark on the lead wire.

Power Supply
For your convenience, the VQ Vector can be operated with an AC adapter. Make sure the Vector is turned off before connecting or disconnecting the adapter. THE AC ADAPTER WILL NOT CHARGE THE BATTERIES IN THE UNIT–THESE ARE NOT RECHARGEABLE BATTERIES. It is not necessary to remove the batteries to run the unit using the AC adapter. Use only the adapter provided, as other products' adapters may cause damage to the VQ Vector.

Proper Skin Care

By properly caring for skin covered by electrodes, you will:

- Allow more stimulation to reach targeted nerves
- Prolong the life of your electrodes
- Reduce the chance that any skin irritation will develop

To reduce the risk of skin irritation, observe the following instructions for proper skin care before each treatment. However, if skin irritation develops, remove the electrodes, discontinue use immediately and contact Patient Care at VQ OrthoCare, 1-800-452-7993 or consult a physician or therapist.

- Wash all electrode sites with mild soap and water before applying electrodes
- Dry your skin thoroughly before electrode application
- Trim excess body hair from electrode sites with scissors, being careful not to cut (or break) the skin; DO NOT SHAVE THE AREA YOU ARE ABOUT TO TREAT! Shaving will create small cuts to the surface layer of skin

CAUTION

DO NOT apply lotion, oils or any other ointments to your skin prior to the application of electrodes, unless directed to by your clinician or a VQ OrthoCare representative. Topical agents may increase your risk of skin irritation.

DO NOT clean skin with anything other than soap and water. Anything else may interfere with the proper electrical conductivity of the electrode.

If you experience any initial symptoms of skin irritation due to the electrode, discontinue use immediately and contact Patient Care at VQ OrthoCare, 1-800-452-7993 or consult a physician. Please save the electrodes for return to a VQ OrthoCare quality assurance representative.

Electrodes

- Electrodes should always be placed **at least one (1) inch apart**
- Do not place electrodes on cut, broken or irritated skin
- Never remove the electrode by pulling on the lead wire, as this may damage your electrode
- If your electrodes dry out, you can rub a few drops of water into them to remoisten them for continued use
- After repeated usage, reusable electrodes begin to lose their adhesion deliver less stimulation and shorten battery life; when this happens and remoistening them does not work, you should replace the electrodes
- If you received your device following a surgical procedure:
  - Sterile, single-use electrodes may have been applied (These electrodes will have a white, foam backing to them)
  - These electrodes **must be** removed using the adhesive remover towelettes included in your kit; gently grasp the edge of the electrode and slowly peel away from the skin while wiping the adhesive remover towelette back and forth between the sticky surface of the electrode and your skin
  - **IMPORTANT: After application to skin, these electrodes must be replaced and/or disposed of on first dressing change or within ten (10) days, whichever occurs first.**

CAUTION

Use caution when using this device while sleeping. Wires may get tangled and be pulled from the electrodes, which may cause skin irritations and/or burns.

If you experience any initial symptoms of skin irritation due to the electrode, discontinue use immediately and contact Patient Care at VQ OrthoCare, 1-800-452-7993 or consult a physician. Please save the electrodes for return to a VQ OrthoCare quality assurance representative.

Treatment Sessions

1. Insert (4) AA batteries or (1) VQ OrthoCare℠ battery pack into the VQ™ Vector as shown in the battery compartment and then replace the battery door. If desired, use the AC adapter that came with your VQ Vector instead of batteries.
2. Prepare the skin: Wash the electrode application sites with mild soap and water then dry your skin thoroughly. Remove any excess body hair with a pair of scissors, being careful not to cut your skin.
3. Connect the lead wires to the electrodes. Do not use unnecessary force in connecting the electrodes to the lead wires. If they do not fit, use a different set of electrodes, and return the unusable electrodes to your physician or therapist or whoever supplied you with your unit.
4. Place the electrodes on the sites prescribed by your physician or therapist and press them firmly onto the skin. Always make sure your electrodes are placed at least one (1) inch apart.
5. Insert the end of the lead wire into the VQ Vector.
6. Turn the VQ Vector on by pressing and releasing the On/Off button.
7. To select your preset, press the display button once or until "Preset #1" appears on the screen. Then, press increase or decrease to select the preset you want to use. Press display button again to set the intensity and begin your treatment.
8. Increase the stimulation intensity level by repeatedly pressing and releasing the Increase button. Continue increasing the stimulation level to the amount prescribed by your physician or therapist.
9. If desired, in interferential mode, use the vector button (right or left) to "vector" (move) the stimulation pattern. The arrows will then display on your screen to indicate that the stimulation pattern has been rotated. To use the automatic vector sweep, press and hold either vector button until "SWEEP" displays on the screen.
10. At the end of the prescribed treatment time, the VQ Vector will automatically turn itself off.

When your therapy session is completed:

- Grasp the edge of the electrode and gently remove it from your skin; then return it to the plastic storage sheet
- Replace the electrodes in the plastic storage sheet in the re-sealable pouch provided

Care and Maintenance

CAUTION

Do not immerse the VQ™ Vector stimulator, lead wires, AC adapter, or batteries in water.

Cleaning

Clean the outside of the VQ Vector casing as needed with a damp cloth and mild soap. Never immerse your stimulator or batteries in water, alcohol or other fluids since this could seriously damage the internal electronics. Avoid using cleaning fluids or solvents to remove stains and dirt because such liquids may damage the casing.

Storage

When not in use, store your VQ Vector in its carrying case to prevent inadvertent damage. During periods of prolonged storage, remove all batteries to prevent possible damage caused by battery leakage or corrosion.

Battery Information

CAUTION

Always use the battery packs that are provided with your VQ Vector. For your safety, never attempt to recharge an alkaline battery, as this may result in an explosion. Never mix alkaline with nickel-cadmium batteries.

Technical Data and Specifications

Physical

Power Source:	One (1) VQ OrthoCare℠ battery pack or VQ OrthoCare AC adapter
Size:	5.25" x 2.8" x 1.75" (including belt clip)
Weight:	10.8 oz. with batteries

Electrode

Use with any electrode approved for use with electrical stimulators.

Electrical

Tolerances:	All electrical specifications are ± 10% into a 500 Ohm load for each channel and using the AC adapter, unless stated otherwise.
Treatment Timer:	1-30 min in 1 min increments 35 min - 8 hrs in 5 min increments Continuous
Compliance Timer:	0-999 hrs, 59 min (41.66 days) in 1 min intervals Not changeable by patient.

Number of Preset Programs:

Preprogrammed:	5
Available:	75

User Interface

Custom LCD Display - 2 rows of 8 characters
Indicators for Low Battery & Pause
Flashing indicator to show current flow

Technical Data and Specifications *(cont.)*

Output Type

IF	Interferential
NM	Neuromuscular Interferential (Uses a 6 sec on/off cycle) There is a 2 sec ramp-up time for each cycle of stimulation.

Pulse Intensity

0-50 mA peak in .5 mA increments

Pulse Shape

Standard (4 electrode)	2 channels each having square wave outputs
Premodulated (2 electrode)	The channel with rectangular waves Output is only in channel 2 (black leads)
Carrier Frequency	4000 Hz

Pulse Duration

Standard	Fixed at 125 μSec
Premodulated	5-125 μSec

Beat Frequency 1-150 bps in 1 bps increments

Pulse Coordination Modes

Number of Modes	4	
Modes	C	Continuous
	1|1	Oscillating 60% of set frequency for 1 sec then 160% for 1 sec
	6|6	Oscillating 60% of set frequency for 6 sec then 160% for 6 sec
	6/6	60% of set frequency then ramps up to 160% of set frequency in 6 sec. The next 6 sec it ramps down from 160% to 60%. This cycle repeats every 12 sec.

Vectoring	Increases one channel's amplitude while simultaneously decreasing (by the same percentage) the other channel's amplitude with a single key press. The range of adjustment will be 25% of the user setting. At the maximum level of change, one channel will be at 75% of original setting and the other channel will be at 125% of original setting.
Vector Sweep	Continuously changes the amplitudes of the 2 channels through the vectoring range (75% of original setting to 125% of original setting) over 60 sec.
Automatic Switching to Next Preset	1-75 or OFF

Output of Carrier Frequency

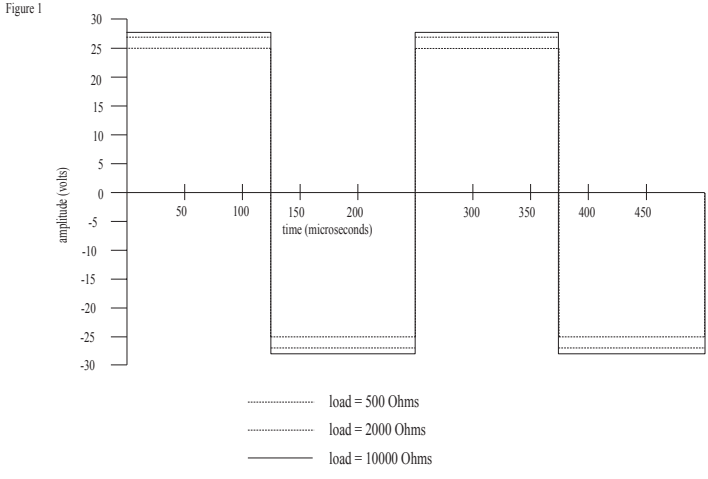


Figure 1: Electric output of carrier frequency with various loads with Amplitude Control set at 50% of maximum.

IF Mode

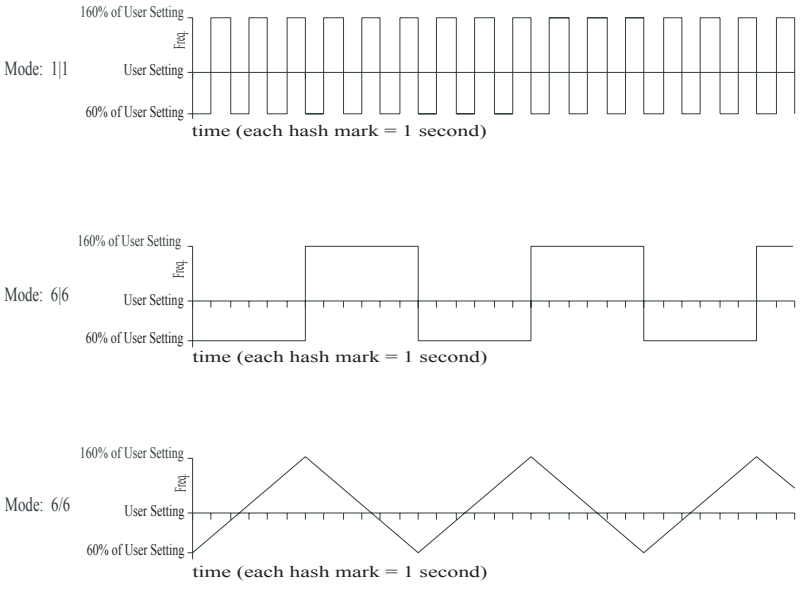


Figure 2: Electric output of carrier frequency on 1000 ohm resistive load with Amplitude Control set at 50% of maximum. Note constancy of voltage relative to Figure 1.

NMES Mode

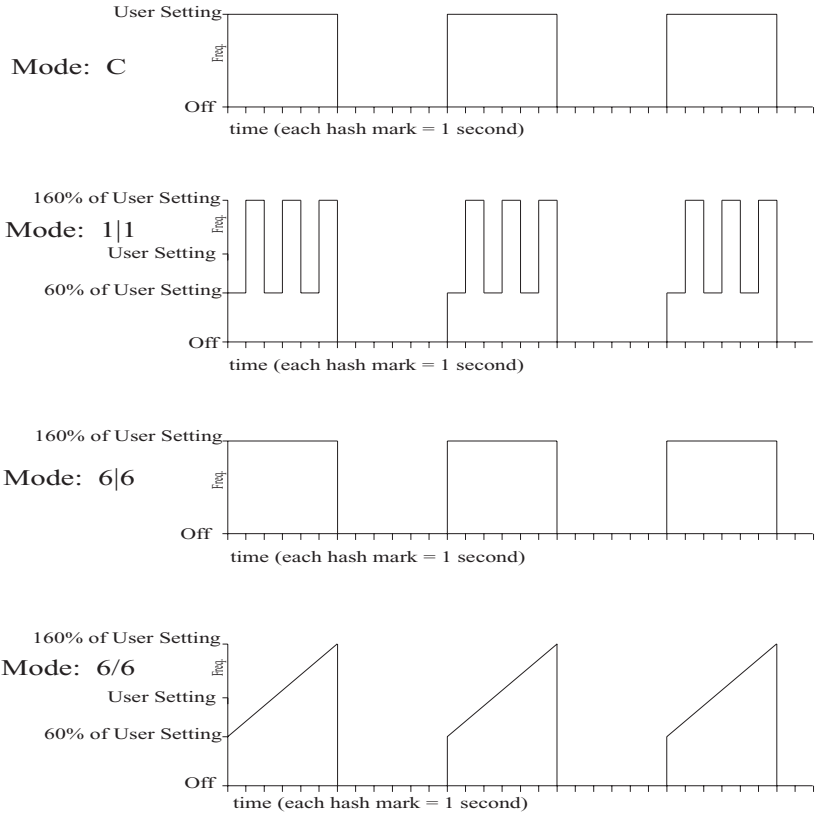


Figure 3: Voltage (top) and current (bottom) outputs of carrier frequency on 1K AAMI load (mimicking skin impedance).

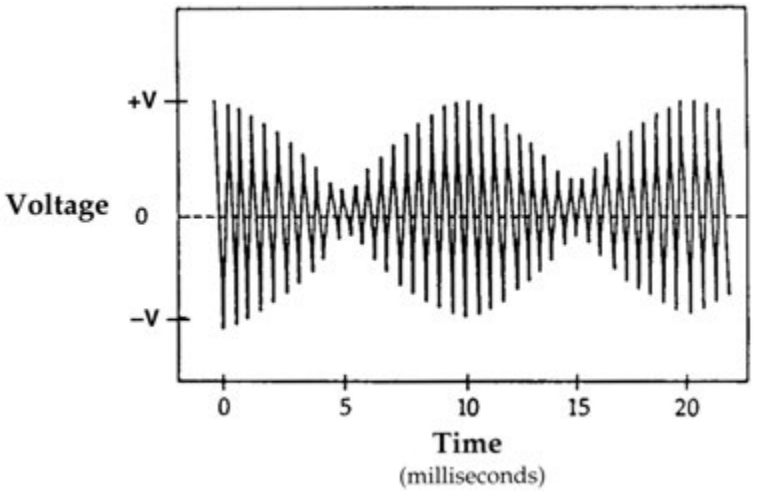


Figure 4: Electrical output during bipolar (2-electrode) stimulation measured across the capacitive element of the AAMI load. This shows the interaction of the carrier frequency and adjustable frequency which takes place internal to the stimulator. The interference frequency is evident as an "envelope" of stimulation occurring at 100 Hz. This figure is provided to illustrate interferential stimulation, but does not correspond exactly to the output which an oscilloscope would record with a skin load.

Waveforms *(cont.)*

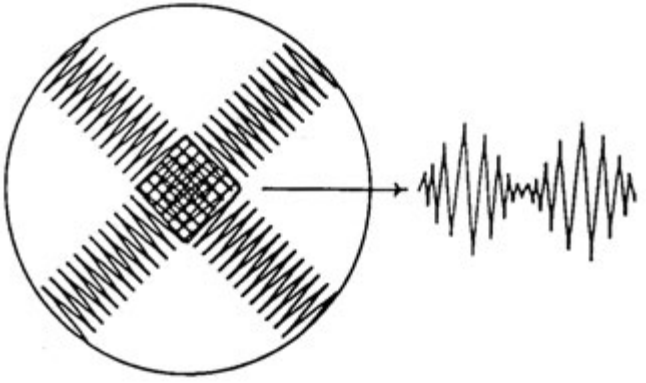


Figure 5: A conceptual diagram of quadrapolar (4-electrode) stimulation with interference taking place within the tissue.

Notes

Notes

Warranty

VQ OrthoCare℠ (VQ) warrants the VQ™ Vector, to be free from defects in workmanship and/or materials for three (3) years from the date of purchase. VQ will repair or replace any units found to have become defective within the above stated warranty period, subject to the below-referenced terms, conditions and exceptions.

The VQ Vector has been designed for use with VQ approved accessories, such as lead wires, electrodes and batteries. As such, this warranty does not apply to equipment that has been damaged while being used with supplies that have not been manufactured or approved by VQ.

Specifically, this warranty does not apply to accessories (including, but not limited to, lead wires, electrodes, batteries, tapes, gel, carrying cases, AC adapters, etc.). Additionally, this warranty does not apply to VQ products that have been damaged due to negligence, misuse, failure to follow VQ's instructions, and/or VQ products that have been repaired and/or altered by persons or entities other than VQ.

This warranty is in lieu and in place of all other warranties express or implied including any warranty of merchantability or fitness for any purpose and of any other liability or obligation. No person or entity is authorized to bind VQ to any representation of warranty other than those specifically set forth herein.

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