



The Wireless Instrument Company

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## **QarVision™ Elevator Performance Analyzer Specifications**

QarVision is a complete diagnostic tool for evaluating elevator performance. The QarVision controller is placed on top of the elevator car, or on the floor, to measure the parameters that the rider would experience, such as acceleration/deceleration, door timing, and travel times. When used with the optional **Machine Room Monitor (MRM)**, the QarVision controller measures the parameters of the drive system, including motor current and temperature, machine room temperature, secondary current (car), and hydraulic pressure. The energy used by the drive system and the car are calculated for when the elevator is running and when it is idle.

The QarVision system has three modes of operation: **Acceleration Test**, **Inspection** and **Speed Test**. While some of the functions and measurements overlap, each mode is designed for a specific purpose.

### **Inspection**

This is the normal mode of operation for the QarVision system. A summary of the parameters of every trip are recorded so that a complete picture of the elevator's operation can be seen. The mechanic can determine what happened when he or she was not on-site. This eliminates the "Running on Arrival" problem. This mode also provides a record of what happened when an incident occurred.

### **Acceleration Test**

This mode records the complete acceleration curves at the user-specified interval up to 1/100 of a second. The motor current and hydraulic pressure are recorded along with the magnitude of the acceleration. The recording can be initiated automatically whenever the car is accelerating, or it can be started manually for a fixed period of time. This mode is very useful for adjusting the elevator and for graphically evaluating the quality of the vertical motion.

### **Speed Test**

This mode records the instantaneous speed of the elevator as it travels at the user-specified interval up to 1/100 of a second. It starts and stops recording automatically whenever the elevator moves. It is useful for adjusting the elevator and for graphically evaluating its performance. The cumulative energy used by the elevator as it moves is also calculated and recorded.

Once started, each of these modes runs automatically until stopped. Should the power fail, the system will resume operation when the power is restored. The user remotely selects the test to be run, without interfering with the operation of the elevator. The stored data can wirelessly be retrieved at any time and examined using a graphical program on a PC or laptop.

The QarVision system can be temporarily installed in the elevator during maintenance activities, or it can be permanently installed to record the history of the elevator's operation. Unique features of the QarVision system allow it to run for long periods of time without filling its memory. The QarVision Controller contains 4 or more GBytes of flash memory for storing data, on a removable/replaceable USB flash memory device. This memory will be retained even during power losses. The user has control how the data are recorded. Every recorded sample includes the date and time to the millisecond of when it occurred. The types of data recorded in each mode are shown in the following table:

Mode	Data Type	Bytes per sample	When recorded
<b>Inspection</b>	<b>Periodic Data</b> – motor current, hydraulic pressure, motor temperature, brake / machine room temperature, secondary current	20	At user-specified interval
	<b>Acceleration Events</b> – maximum acceleration, duration of acceleration, max. current, max pressure, idle energy, total energy	26	When elevator accelerates or decelerates
	<b>Trip Speed</b> –speed, cumulative energy, total energy	22	For each trip
	<b>Door Events</b> – direction, elapsed time, trip energy, total energy	16	When door moves
	<b>Relay Event</b> – state of the three relays	11	When the state of one of the relay changes
<b>Acceleration Test</b>	<b>Acceleration</b> – current acceleration, motor current, hydraulic pressure	16	At user-specified interval. Records only when car is accelerating or decelerating
	<b>Door Events</b> – direction, elapsed time, trip energy, total energy	16	When door moves
	<b>Relay Event</b> – state of the three relays	11	When the state of one of the relay changes
<b>Speed Test</b>	<b>Speed</b> – current speed, cumulative energy, total energy	22	At user-specified interval. Starts recording when the door starts closing and ends when the door is fully open.

Examples of the capacity of the system for each type of test are shown in the table below. This assumes 4 GByte of flash memory.

Acceleration Test		Inspection		Speed Test	
20	Samples per second	60	Trips per hour	20	Samples per second
7	Seconds of acceleration per trip	12	Periodic samples per hour	20	Seconds per trip
60	Trips per hour	12	Hours of use per day	60	Trips per hour
12	Hours of use per day	2	Door events per trip	12	Hours of use per day
2	Door events per trip	6	Relay events per trip		
6	Relay events per trip				
<b>6.5 Years</b>		<b>102 Years</b>		<b>1.7 Years</b>	

QarVision measures several parameters of the elevator's operation. Some of these are recorded and displayed continuously. Others are recorded and displayed during specific events (as listed in the table above).

Parameter	Minimum	Maximum	Traction	Hydraulic	Uses MRM
<b>Motor Current</b> - AC motor current measured continuously. Recorded periodically and during Acceleration Events.	0 Amps	250 Amps (1)	Yes	Yes	Yes
<b>Secondary Current</b> - car current measured continuously. Recorded periodically and during Acceleration Events.	0 Amps	50 Amps (1)	Yes	Yes	Yes
<b>Motor temperature</b> - measured continuously and recorded at periodic interval. Can also be used to measure the oil temperature.	0° F	250° F	Yes	Yes	Yes
<b>Brake Temperature / Machine Room Temperature</b> - Temperature of the brake housing measured continuously and recorded at periodic interval. Can also be used to measure the machine room temperature.	0° F	250° F	Yes	Yes	Yes
<b>Door Time</b> - Opening or closing time of door. Measured and recorded whenever door moves.	0 Sec	unlimited	Yes	Yes	No
<b>Door Cycles</b> - Count of the number of times door opens. Recorded on occurrence.	0	99,999,999	Yes	Yes	No

<b>Trips</b> - Count of number of trips the elevator car has made. Recorded on occurrence.	0	99,999,999	Yes	Yes	No
<b>Acceleration</b> - Positive and negative acceleration of the elevator car measured continuously. Recorded during Acceleration Events or at specified interval.	-1g	+1g	Yes	Yes	No
<b>Pressure</b> - Hydraulic pressure measured continuously. Recorded periodically and during Acceleration Events.	0 PSI	1000 PSI (2)	(3)	Yes	Yes
<b>Relay Status</b> - On/Off status of 3 relay or solenoid devices. Recorded whenever the status changes			Yes	Yes	Yes
<b>Speed</b> – Speed of the elevator car is measured using the acceleration. Recorded after each trip or at specified interval.	0 ft/min	unlimited	Yes	Yes	No
<b>Idle Time</b> – Time from the end of the last trip. Not recorded, but displayed in real-time.	0 Sec	unlimited	Yes	Yes	No
<b>Primary Energy</b> – Energy used by drive during travel. Recorded after each trip.	0 WHr	unlimited	Yes	Yes	Yes
<b>Primary Idle Energy</b> – Energy used by drive between trips. Recorded when car starts to move.	0 WHr	unlimited	Yes	Yes	Yes
<b>Total Energy</b> – Energy used by drive and car during travel. Recorded after each trip.	0 WHr	unlimited	Yes	Yes	Yes
<b>Total Idle Energy</b> – Energy used by drive and car between trips. Recorded when car starts to move.	0 WHr	unlimited	Yes	Yes	Yes

Notes:

- 1) Can be decreased for higher resolution by changing a jumper on the sensor and recalibrating the unit.
- 2) Pressure sensors with other ranges can be used. Please contact Qameleon Technology.
- 3) Other types of sensors can be used to measure different properties, such as temperature, internal car pressure, etc. Please contact Qameleon Technology.

The QarVision system has user-defined limits for some of the parameters that are measured. The real-time display will show the current value of the parameter, as well as a colored background for the reading: **green** = normal, **yellow** = caution, **red** = warning. In addition, some of the parameters have output signals asserted when the "Warning" level is exceeded. These can be used to turn

on alarms, provide feedback to the controller, etc. If the QarVision system is connected to the Internet or a building LAN, an email will be sent when the “Warning” limit is exceeded.

The Idle Time is a special case of the handling of the limits. The QarVision Controller has a set of relays that are used for automatic testing of the elevator. When the “caution” limit of the Idle Time is exceeded, the unit issues a car call to the top landing and a car call to the bottom landing. The unit then checks that the car actually moves. This automatic testing can also be initiated at a particular time of the day, or manually from the use display.

The types of data that produce outputs are shown in the following table:

Parameter	Real-time Display Indicator	Output Signal	Email
Motor Current	Yes	Relay contact shared for all currents	Yes
Secondary Current	Yes		Yes
Motor temperature	Yes	Relay contact shared for all temperatures	Yes
Brake Temperature / Machine Room Temperature	Yes		Yes
Door Time	Yes		Yes
Door Cycles	Yes		Yes
Trips	Yes		Yes
Acceleration	Yes	Relay contact	Yes
Pressure/Other	Yes		Yes
Idle Time	Yes	Relay contacts used for automatic testing	Yes

## Physical and Electrical Specifications

Size	210 x 130 x 76 mm (8.3 x 5.2 x 3.0 inches)
Weight	1 Kg (2.2 lbs)
Power	10 - 18 VDC (360 mA @ 12 VDC) - AC adapter is included.
Environmental	Weatherproof polycarbonate NEMA 4x enclosure with weatherproof connectors
Communication	Integral WiFi Ethernet LAN (optional) Cellular (optional) Email notification Text message notification
Sensor resolution	12 Bits

Internal data storage	4 or more GB flash (non-volatile) on replaceable USB flash drive
Sample rate for detecting movement	1000 Hz
Recording rate for Acceleration Mode (User specified)	1 Hz to 100 Hz (.01 – 1 Sec per sample)
Machine Room Monitor (optional)	<p>Size - 204 x 122 x 82 mm (8.0 x 4.8 x 3.2 inches)</p> <p>Weight - 900 g (2 lbs)</p> <p>Power - 10 - 18 VDC (220 mA @ 12 VDC)</p> <p>Environmental - Weatherproof polycarbonate NEMA 4x enclosure with weatherproof connectors</p>
AC Adapter	<p>Size - 113 x 61 x 34 mm (4.5 x 2.4 x 1.4 inches)</p> <p>Weight - 242g (8.5 oz)</p> <p>Input Power - 90 to 264VAC, 47 to 63Hz 1.0A (rms) max. @ 115VAC 0.5A (rms) max. @ 230VAC</p> <p>Environmental - Not weatherproof. Indoor use only</p>
Interface to other systems and equipment	<p>Communication - Ethernet, RS232/RS485</p> <p>Protocols - ModBus, ModBus TCP/IP</p> <p>Other - Digital inputs and outputs</p>