EchoPlus[®] Wireless Junction Box Installation and Operation Manual



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FCC NOTICE

FCC ID: ZOC-IMI672A01

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

INDUSTRY CANADA (IC) NOTICE

IC: 9732A-IMI672A01

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Introduction

The EchoPlus[®] Wireless Junction Box is a one-way wireless transmitter, located in a junction box, used for the condition monitoring of plant equipment through traditional ICP[®] accelerometers. The junction box, will "wake up" at determined intervals (8 hours by default) to measure and transmit vibration levels for all activated channels. An Echo[®] Receiver connected to a computer with the Echo[®] Data Server software installed is required to receive and collect transmissions. For information on the setup and installation of the Echo[®] Receiver and Echo[®] Data Server, please consult the Echo[®] Receiver System Manual.

Proper Handling

Proper handling of the EchoPlus[®] Wireless Vibration Junction Box is critical to preventing damage. The following should be avoided:

- Dropping the unit.
- Hitting the unit against hard surfaces.
- Submersing or spraying the units with fluids of any kind.
- Touching the electronic components under cover.
- Using excessive torque when mounting the unit.
- Exposing the unit to temperatures above 170° F.
- Exposing the box to any reactive chemicals.

Programming the EchoPlus[®] Wireless Junction Box

The Echo[®] Wireless Vibration Sensor can be programmed with a computer running the Echo[®] Data Server software through a serial port on the computer.



If your computer is not equipped with a serial port, a USB to RS232 adaptor can be used. These are readily available from computer electronics vendors.

Attaching the Programming Cable

To begin programming the EchoPlus[®] Wireless Junction Box, open the enclosure and connect a serial cable to the serial port located on the junction box and attach the programming serial port (use the USB to RS232 adaptor if necessary).



Connecting to the Junction Box with the Echo[®] Data Server Software

Launch the PCB Echo[®] Data Server and click Echo[®] EchoPlus[®] Sensors under the Configuration drop down menu in the upper left hand corner of the screen.

onfiguration	Receiver Utilities	Help
Data Display	Preferences	
Alarms	•	nterfaces
Echo™ Echo	Plus [™] Sensors Echo – keceiver comi	ections

The program will then ask if you wish to set up a Echo[®] Wireless Sensor or an EchoPlus[®] Wireless Junction Box. Select "I want to add, update, or view an EchoPlus[®] unit's Parameters".



Select the receiver that you would like this specific sensor attuned to. If you are using a single receiver select the default setting.

Select the Receiver	that this Sensor(s) is/will be	associated with
PCB	Echo 1	-
🗸 I	PCB Echo 1	

The software will then ask if you would like to set up the junction box, the database, or both. *If this is the first time you are activating this sensor you must do both.* Installing a new junction box and configuration of the database is covered in the Echo[®] System Setup Manual. We will continue by only changing the programming of the Echo[®] Sensor. Select "I will only configure the Echo[®] device at this time" button and click Next.

What system components will be changed?
I will configure the Echo [™] Device and update the Database (I have a cable and will connect to the device to configure it)
I will only configure the Echo [™] device at this time (I have a cable and will connect to the device but i do not want to update the database at this time)
I will only update or view the Database at this time (the factory defaults are fine or I will update them some other time)

Make sure the sensor is connected to the computer through the USB to RS232 programming cable and hit OK.



The connection window will appear. Select the appropriate COM port to which the cable is connected.

1	Access Level	
	Echo Sensor User	
	COM2 ▼	
	COMB	
	Refresh	
	Read Parameters	
	Transmit Test	

Reading the Current Programmed Parameters

Click "Link to EchoPlus[®]," and the green light will illuminate indicating the connection has been made. The fields at the right of the window will populate with the current programmed parameters.

ration										
	EchoPlus [™] Configuration Parameters	s								
Access Level	Transmission Interval (hh:mr	n:ss)	03:00:0	0			Tr	ansmission	Calibratio	n ‡0
Echo Sensor User	Sens	or ID	÷0	0	0	0	0	0	0	0
	RVL (ips rms)	>>>	0	0	0	0	0	0	0	0
Комі •	CF Report Threshold (g rms)	>>>	0	0	0	0	0	0	0	to
Link to EchoPlus™	Acceleration Gain	>>>	0	0	0	0	0	0	0	0
Read Parameters	Velocity Gain	>>>	0	0	0	0	0	0	0	0
Tennemit Tert	Sensor Status	>>>	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Transmit rest	Configure Sensor		Undate	Undate	Undate	Undate	Undate	Undate	Undate	Undat



The Sensor ID is set at the factory and CANNOT be changed. This ID is unique to each junction box and channel we manufacture. The factory default the Transmission Interval is 8 hours, RVL is 0 (off), and the CF Report Threshold is 0.15.

Explanation of Echo[®] Wireless Sensor Parameters

Sensor ID – The Sensor ID is a unique ID programmed for each channel of the junction box and set at the factory. This number cannot be changed.

Transmission Interval – The Transmission Interval is the time between transmissions. The factory default level is 8 hours. The junction box will "wake up" and make a measurement on each active channel every 8 hours (3 times per day).



Decreasing the Transmission Interval will provide data more often; however, transmitting more often will decrease battery life. Keep in mind "more data is not better data" and may be more than you can process and manage.

RVL (*Residual Vibration Level*) – This is the minimum Residual Vibration (that is, vibration that is currently present) for the junction box to wake up and make a measurement on that specific channel. If the current vibration is below the RVL, the junction box will assume the equipment is turned off and will not waste power transmitting unusable data. If the value is set to "0" this feature is disabled and will always make a measurement.

CF Report Threshold – Because crest factor is the ratio of true peak divided by RMS vibration, in some instances where the RMS value is extremely low (such as slow speed equipment) the crest factor will appear exceptionally high. This report factor is the minimum RMS level in g for the Crest Factor to be reported.

Sensor Status – The sensor status displays if the specific channel is enabled or disabled. If no sensor is attached to a channel, it is recommended to disable the channel to save power and avoid bulking the database with bad information.

Acceleration Gain – Gain value used to normalize and calibrate acceleration measurements.

Velocity Gain – Gain value used to normalize and calibrate velocity measurements.

Calibrating the Junction Box to Specific Accelerometer Sensitivities

The EchoPlus[®] Wireless Junction Box can be calibrated to work with an accelerometer of any sensitivity. It can also be used to fine tune and normalize data collected from sensors with slightly different sensitivities. To do this, we need to get the specific Velocity Gain and Acceleration Gain values.

To start, click the Calibration dropdown and select Velocity Calibration.



In the calibration menu select the nominal sensitivity of each accelerometer. If you have specific calibration values, input the actual accelerometer sensitivities next to the nominal value. Click the Calculate button to compute the Velocity Gain needed for the sensitivity.

		Nominal		Actual Sensiti	vity		
	Current Cal	Sensitivitie	s	(mV/g)		New Cal	Accept
1	1897	100 mV/g	•	100	Calculate	1897	
2	18970	10 mV/g	•	12.5	Calculate	15176	
3	379	500 mV/g	•	\$ 500	Calculate	379	
4	37940	5 mV/g	-	\$ 5	Calculate	37940	
5	3794	50 mV/g		\$ 50	Calculate	3794	
6	1897	100 mV/g	-	100	Calculate	1897	
7	1897	100 mV/g	-	\$ 85	Calculate	2232	
8	379	500 mV/g	•	\$ 495	Calculate	383	
Ins 1) ! 2) i 3) / 4) !	tructions: Select the nomi f you know the t in the 'Actual Activate the 'Ca Check the appr Swit from this si	nal sensitivity e actual sensit Sensitivity' fi Iculate' butto opriate 'Accepter reen, channe	for tivity eld o on wi pt' bo	the sensor atta (from the cal c or enter the no nen the values ox. Only chann e undated unc	ached to each o ert) for the sen minal value. are entered. wel 'accepted' w on return to the	hannel. sor enter /ill be update:	d,

	Current Cal	Nominal Sensitivitie	s	Actual Sensiti (mV/g)	vity	New Cal	Accept
1	1897	100 mV/g	-	100	Calculate	1897	
2	18970	10 mV/g	-	12.5	Calculate	15176	
3	379	500 mV/g		\$ 500	Calculate	379	
4	37940	5 mV/g	-	\$ 5	Calculate	37940	
5	3794	50 mV/g		\$ 50	Calculate	3794	
6	1897	100 mV/g	-	100	Calculate	1897	
7	1897	100 mV/g	-	\$85	Calculate	2232	
8	379	500 mV/g	-	\$ 495	Calculate	383	
Ins 1) : 2) i 3) / 4) /	tructions: Select the nomi If you know the t in the 'Actual Activate the 'Ca Check the appr Exit from this se	inal sensitivity e actual sensit Sensitivity' fi Iculate' butto opriate 'Accej creen, channe	/ for tivity eld c on w pt' b els ar	the sensor att, (from the cal o or enter the no hen the values ox. Only chanr e updated upd	ached to each o ert) for the sen minal value. are entered. nel 'accepted' w on return to the	hannel. sor enter ill be update configuratio	d. n utility.

Click Accept to accept the new gain values.

Close the window and the software will automatically import the new values to the configuration window.

ation										
	EchoPlus™ Configuration Parameters	5								
Access Level	Transmission Interval (hh:mn	n:ss)	03:00:00)			Tr	ansmission	Calibration	÷ 0
Echo Sensor User	Sens	or ID	÷ 0	0	0	0	0	0	0	0
	RVL (ips rms)	>>>	0	0	0	0	0	0	0	0
K COM1	CF Report Threshold (g rms)	>>>	0	0	0	0	0	0	0	0
Link to EchoPlus™	Acceleration Gain	>>>	0	0	0	0	0	0	0	0
Read Parameters	Velocity Gain	>>>	1897	15176	379	37940	3794	1897	2232	383
Transmit Test	Sensor Status	>>>	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
	Configure Sensor	>>>	Update	Update	Update	Update	Update	Update	Update	Update

To change velocity gain, again click the calibration menu and this time select Acceleration Calibration.

C	alibration	
	Velocity Calibration Acceleration Calibration	EchoPlus™
	Access Level	Trai
	Link to EchoPlus™ Read Parameters	

In the calibration window enter the nominal sensitivities, and if available, the actual sensitivities for each accelerometer. Click calculate to calculate the Acceleration Gain values.

	Current Cal	Nominal Sensitivitie	s	Actual Sensitiv (mV/g)	ity	New Cal	Accept
1	2109	100 mV/g	-	100	Calculate	2109	
2	21090	10 mV/g	•	12.5	Calculate	16872	
3	422	500 mV/g	-	\$ 500	Calculate	422	
4	42180	5 mV/g	-	\$ 5	Calculate	42180	
5	4218	50 mV/g		\$ 50	Calculate	4218	
6	2109	100 mV/g	•	100	Calculate	2109	
7	2109	100 mV/g	-	85	Calculate	2481	
8	422	500 mV/g	-	495	Calculate	426	
Ins 1) 5 2) i 3) / 4) (5)	tructions: Select the nom f you know the t in the 'Actual Activate the 'Ca Check the appr Exit from this si	nal sensitivity eactual sensit Sensitivity' fi Iculate' butto opriate 'Accej creen, channe	for livity eld o n wh ot' b ls are	the sensor attac (from the cal ce r enter the nom ien the values a ox. Only channe e updated upor	hed to each o t) for the sen inal value. re entered. I 'accepted' w return to the	hannel. sor enter fill be updated configuratio	d, n utility.

	Current Cal	Nominal Sensitivitie	s	Actual Sensitiv (mV/g)	vity	New Cal	Accept
1	2109	100 mV/g	-	100	Calculate	2109	
2	21090	10 mV/g	-	12.5	Calculate	16872	
3	422	500 mV/g	-	\$ 500	Calculate	422	
4	42180	5 mV/g	-	\$ 5	Calculate	42180	
5	4218	50 mV/g		\$ 50	Calculate	4218	
6	2109	100 mV/g	-	100	Calculate	2109	
7	2109	100 mV/g	•	\$85	Calculate	2481	
8	422	500 mV/g	-	\$ 495	Calculate	426	
Ins 1) : 2) i 3) / 4) -	tructions: Select the nom f you know the t in the 'Actual Activate the 'Ca Check the appr Exit from this s	nal sensitivit; eactual sensi Sensitivity' fi Iculate' butto opriate 'Acce reen, channe	/ for tivity eld c on wl pt' b els ar	the sensor atta (from the cal ce or enter the nor hen the values ox. Only chann e updated upo	ched to each c et) for the sen ninal value. are entered. el 'accepted' w n return to the	hannel. sor enter vill be update configuratio	d. m utility.

Accept the values by clicking the accept button next to each accelerometer you wish to update.

Close the window and the software will import those new values to the programming screen.

ration										
	choPlus™ Configuration Parameters	5								
Access Level	Transmission Interval (hh:mm:ss) 🗍 03:00:00 Transmission Calibra									:0
Echo Sensor User	Sens	or IC	0	0	0	0	0	0	0	0
	RVL (ips rms)	>>>	0	0	0	0	0	0	0	0
COM1	CF Report Threshold (g rms)	>>>	\$ 0	0	0	0	0	0	0	0
Link to EchoPlus"	Acceleration Gain	>>>	2109	16872	422	42180	4218	2109	2481	426
Read Parameters	Velocity Gain	>>>	1897	15176	379	37940	3794	1897	2232	383
Transmit Test	Sensor Status	>>>	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
maismunet	Configure Sensor	>>>	Update	Update	Update	Update	Update	Update	Update	Update

Click update to save the settings for each accelerometer you wish to make changes to. After all settings are adjusted, close the window.

The database configuration window will open allowing the configuration of each channel in the junction box. In this window each channel can be set for alarm and alert levels, name and location, and other features. The setup of the database will be covered in the "Echo[®] Wireless System Manual".

Sensor Detail (right click on a sensor column * These fields should match the values progra	to set defaults ammed in the) sensor						
	Sensor 1	Sensor 2	Sensor 3	Sensor 4	Sensor 5	Sensor 6	Sensor 7	Sensor
Sensor ID	0	0	0	0	0	0	0	0
Receiver Assignment	1	1	1	1	1	1	1	1
**Transmission Interval	03:00:00	03:00:00	03:00:00	03:00:00	03:00:00	03:00:00	03:00:00	03:00:0
**RVL (ips rms)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
**CF Report Threshold (g rms)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Model Number	640M67	640M67	640M67	640M67	640M67	640M67	640M67	640M6
Sensitivity (mV/g)	100	100	100	100	100	100	100	100
Machine	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
Location	BigFan	BigFan	BigFan	BigFan	BigFan	BigFan	BigFan	BigFan
Alarm Setup								
Velocity (ips rms) Critical	1	1	1	1	1	1	1	1
Velocity (ips rms) Warning	1	1	1	1	1	1	1	1
Velocity (ips pk) Critical	1	1	1	1	1	1	1	1
Velocity (ips pk) Warning	1	1	1	1	1	1	1	1
Acceleration (g rms) Critical	1	1	1	1	1	1	1	1
Acceleration (g rms) Warning	1	1	1	1	1	1	1	1
Acceleration (g pk) Critical	1	1	1	1	1	1	1	1
Acceleration (g pk) Warning	1	1	1	1	1	1	1	1
Acceleration (g true pk) Critical	1	1	1	1	1	1	1	1
Acceleration (g true pk) Warning	1	1	1	1	1	1	1	1
Crest Factor Critical	1	1	1	1	1	1	1	1
Crest Factor Warning	1	1	1	1	1	1	1	1
Type (0-Disable; 1-Latch; 2-Non Latch)	0	0	0	0	0	0	0	0
Missed Transmission Count	2	2	2	2	2	2	2	2
Max Transmissions to Store (0=All)	0	0	0	0	0	0	0	0
Warning Alarm Email List (0=none)	7	7	7	7	7	7	7	7
Critical Alarm Email List (0=none)	1	1	1	1	1	1	1	1

After all database settings are acceptable, click finish to update the database.

Mounting

The Echo[®] Wireless Junction Box should be mounted in a clean and convenient location where it can be accessed.