Vibration Sensor and Temperature

# PRODUCT MANUAL

# **SPECTRA 1.0**

**PN: PRD00504** 



VERSION 1.0 - 10/10/2024 |BRAZIL

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# Chapter 1

**Technical Information** 

#### **1.1 Description**

The IBBX Spectra is a smart sensor for asset monitoring with guaranteed connectivity in any application, even in environments with high electromagnetic pollution and/or physical obstacles. This connectivity takes place without the need for wires or frequent device battery changes.

This sensor (IBBX Spectra) is capable of monitoring the values of vibration and temperature of equipment, through collecting data and sending it to the Gateway (IBBX Bolt) which sends it to the cloud. Once there, and altogether with our real-time data analysis and visualization platform (IBBX Retina Software), it can predict risks and failures, enabling the reduction of unscheduled stoppages and granting more efficiency towards overall maintenance schedule, thus contributing to the adoption of predictive and prescriptive maintenance along the lines of Industry 4.0.

Main applications:

- Rotating Machinery;
- Transformers;
- Turbines;
- Generators;
- Agricultural Machinery;
- Refrigeration systems;
- Escalators;
- Elevators

#### 1.2 Sheet

	Dimensions	85.0 x 60.0 mm
Mechanics	Weight	0.245 Kg
	Working Temperature	-20°C to +60°C
	Degree of mechanical	IP65
	protection	
Communication		Proprietary LRLC protocol,
Interfaces	Wireless	ISM band, Operating
	Communication	sight)
Temperature	Measuring range	-20°C to +120°C
measurement	Tolerance	+-10°C
	Accelerometer	Triaxial
	Amplitude range	+-8g, +-16g, +-32g and +- 64g
	Detection Type	RMS
Vibration measurement	Global Measurements	<b>Global:</b> Acceleration, Velocity, Envelope, Temperature
	RMS Measurements	Acceleration, Speed
	FFT measurements	Acceleration, Envelope
	Spectra	Time Wave Form (g), FFT
	Measurements	Acceleration, FFT Speed, FFT Envelope <b>*Once a day</b>
	Stitches	4096
Data collection and	Data collection	10/10 minutes
transmission times	interval	
(Standard)	Data transmission	Global Transmission:
	Interval	Transmission: 1 time per
Food and	Built-in battery	LiPo 3.7V 4000mAh
consumption	Durite in Duttery	(rechargeable)
Fixation	Form 1	M8 screws per fixing hole
	Form 2	Chemical Adhesive
	Form 3	Magnetic (Neodymium Magnet)
Certifications	Anatel	Homologation: 100292314090

#### **Operational Notes and Recommendations**

The sensor is designed to measure temperatures of up to 120°C at the target. However, targets with high temperatures can transfer heat to the interior of the sensor, especially in hot outdoor environments.

As the internal temperature of the sensor is not directly accessible, it is essential to ensure that external conditions (of the target and the environment) remain within the specified working temperature limits -20°C to +60°C. Failure to comply with these specifications may cause damage to the sensor's internal components, negatively impacting data analysis and the useful life of the device.

#### 1.3 **Overview**



- 1. Case
- 2. Label with QR Code
- 3. Fixing Base
- 4. **Orientation Axis**
- Activation key 5.
- 6. Power charging input

#### 1.4 Packing

The Spectra 1.0 packaging consists of the following items:

- 1 PC – Spectra 1.0 Packaging Box
- 4 PC Spectra 1.0 device.
- 1 PC Inner Cradle Spectra 1.0 Packaging Box.
- 1 PC Bubble Wrap 10 x 10 cm.
- 1 UN Screw M3 Philips short
- 1 UN M8 Allen Fastening Thread •



Box IBBX Spectra 1.0



philips

M8 Allen Fastening Thread

Short Screw M3



QR Code do site IBBX

Dispositivo Spectra 1.0



Protection Bubble wrap

#### **1.5 Accessories**

#### 48 U IoT Charging Base



The Spectra 1.0's charging dock, for up to 48 units, optimizes simultaneous sensor recharging, ensuring efficiency in large-scale operations. Compact and robust, it distributes power safely with a simple coupling system.

#### **5V Individual Charger**



The individual charger for **Spectra 1.3** is a compact and efficient accessory designed to recharge the device's battery with ease. It uses a standard USB input, making it ideal for various environments, from field operations to industrial applications, ensuring reliable support for the continuous operation of the **Spectra 1.3**.

# Chapter 2

Installation, Configuration and Operation

#### 2.1 Powering on and connecting the Spectra 1.0

**Step 1:** Turn on the Spectra 1.0 by removing the golden Philps screw and adding the black Philips screw



Black Philips screw (minor length) Philips screw (longer length)

### Step 2: Access the Software Platform

Access the IBBX website through the link <u>https://ibbx.tech</u>, on the website you will find the path to login to the Platform Retina.Se you already have a shortcut to access Retina this step is dispensable.



#### Step 3: Login to Retina

With your registration in hand, log in to the Retina platform \*If you do not have an account to access the platform, look for your Commercial Manager to be registering.



#### Step 4: Access your Unit/Area/Sector

Access the desired unit by selecting "Monitored Units" from the left side menu.



## Step 5: Access the asset to be monitored

From the left side menu, select the equipment on which Spectra 1.0 will be installed



#### Step 6: Click on the Add Device button

Click on the "Add Device" button and follow the indicated step by step choosing the type of device

d	Home > IBBx > Burnin - Etronic -	MODBUS > LUMINARIA NOVO			Q	(( <del>1</del> ))	2	⊚	°2
	LUMINARIA NOVO	Risk: Attention	\$	Diagnosis Statistics 158 Probable defect in the luminaire.	_	_	_	10	
" <mark>-</mark>	Details:	Filling in data ar sensors under learning (30d) is missing. Click on <b>\$</b> to configure your risk graph							^ <sup>K</sup> s
e n	Add device     Add Inspection	<b>≆ (8346</b> )	~						٩
				)					<b>M</b>

#### Step 7: Choose Spectra 1.0

Make the choice of Spectra 1.0.



#### Step 8: Fill in the UUID

Fill in the UUID manually or scan the QR Code located on the device, clicking on the QR Code as indicated in the figure on the side

Home > IBBx > Burnin - Etro	NC - MODBUS > LUMINARIA NOVO		$\eta_{\rm P}$ Vibration and Temperature	
	Risk	4	UUID	• 82
Operation Status: AVAILABLE	Attention Filling in data or sensors under learning	(30d) is missing.	Position Name Position Implantation	
© ome	Click on the to configure your ris	sk graph	TAG - Opponal	
Add device			General Information Operation Mode:	
<ul> <li>Add Inspection</li> <li>Retina smart tag</li> </ul>	Lote 1 - Reprogramada - Com Relé e MT. : LUMINARIA NOVO	Luminária Lote 2 LUMINARIA NOVO	Contribuous • Intermittent	
具砌建			Bearing Codes 🧿	
ф.	LUMINARIA NOVO Burnin - Etronic - MODBUS UUTE: 54536	LUMINARIA NOVC	No records so far. Contains Gear: (9) Tes III No	
品物通	OFFLINE		Cancel 💦 3/21	Save

# Step 9: Fill in the name of the point

Fill in the name of the point in order to facilitate its identification



# Step 10: Select the asset's operating mode

Select the asset's operating mode, choosing between continuous or intermittent.

Home > BBitr > Burnin - Etronic - MODBUS > LUMBHARIA NOVO				4. Vibration and Temperature	
					· #2
Operation Status:	<u>_!</u>			Position Name	
AVAILABLE /	Filling in data or sensors under learning	(30d) is missing.		Position Implantation TAG - optional	
e ome	Click on the to configure your ris     Positions @ Occurrences (1) History @ 3D/2D +	k grapn	F	Ceneral Information	
+ Add device				Operation Mode: 0	
Add Inspection	Lote 1 - Reprogramada - Com Relé e MT. 🗄	Luminária Lote 2	L	Continuous Intermittent     Pointertation (rpm) (0)	
Retina smart tag	LUMINARIA NOVO Burnin - Etronic - MODBUS UULE: 409487	LUMINARIA NOV			
旦新祝旦				Bearing Codes 🔕	
	Luminária Lote 2 - Reprogramada :	002			
	Burnin - Etronic - MODBUS UUTO: 54535	LUMINARIA NOV( Burnin - Etronic - MO		Conteins Gean: () Yes No	
- 長期が時 -	II OFFLINE			Concel 📉 3/21	Save
	02 - Lote 2 - Madificada				

# Step 11: Enter the point rotation (rpm)

Fill in the rotation per minute of the monitored point.

Home > IBBx > Burnin - Et	ronic - MODBUS > LUMINARIA NOVO		As Vibration and Temperature	
	< Rislc		UUID	•
Operation Status:				
	Attention	(70 b is mission	Position Implantation	
Details:		(aud) is missing.	TAG - Optional	
		ik grapn		
Add device	Positions Q Occurrences 🗄 History 🚳 3D/2D 🕂		General Information	
			Operation Mode: ()	
Add Inspection	Lote 1 - Reprogramada - Com Relé e MT.	Luminária Lote 2	• • • • • • • • • • • • • • • • • • •	
	LUMINARIA NOVO	LUMINARIA NOVO	Point Rotation (rpm) ()	
Retina smart tag		Burnin - Etronic - MO		
			Bearing Codes ()	+
- 눇양(영)등 -	Luminária Lote 2 - Reprogramada	002		
		LUMINARIA NOV		
100.5	Burnin - Etronic - MODBUS UUED: 548526	Burnin - Etronic - MO	Yes No	
			Cancel S/21	Save
	00 Late 0 Madflands			

# Step 12: Add the bearing codes

Clicking on the add bearing codes button will open a field for you to choose the bearing code

Home > IBBx > Burnin - Et	ronic - MODBUS > LUMINARIA NOVO	ላ» Vibration and Temperature	
	< Risk:		UUTD 0
Operation Status:			
AVAILABLE / Details:	Filling in data or sensors under learnin	g (30d) is missing.	Petition Implantation TAG - Optional
		isk gruph	
Add device	T Position of Occurrences (a Heatery (a subject		General Information Operation Mode:
Add Inspection	Lote 1 - Reprogramada - Com Relé e MT.	Luminária Lote 2	Continuous 🔿 Intermittent
Retina smart tag	LUMINARIA NOVO Burnin - Etronic - MODBUS UUIE: 609487	LUMINARIA NOVO	Point Antrian (rpm) 🅦
문화정문		• • • •	Bearing Codes
	LUMINARIA NOVO Burnin - Etronic - MODBUS UUTO: 54/526	LUMINARIA NOVC Burnin - Etronic - M	Contains Gear. (3) Yes No
日本の		\$ •	Cancel 💦 3/21 Save

# Step 13: Inform if they contain gear

If the monitored point has meshes, selecting "Yes" will open a field to fill in the Number of teeth.



# Step 14: Fill in the lubricant type

Fill in the lubricant type of the monitored point.



# Step 15: Enter the Lubrication System

Inform the lubrication system used if it is for Loss or Permanent.

Home > IBBx > Bumin - Etronic - MODBUS > LUMINARIA NOVO			Jp. Vibration and Temperature
LUMINARIA NOVO 🖉 <	Risk:		UUID 0
Operation Status:	Attention		
AVAILABLE	Filling in data or sensors under learning	(30d) is missing.	Position Implantation
Details:			Contains Gezra () Yes No
	Positions @ Occurrences 🖹 History @ 3D/2D		
Add device			
Add Inspection	Lote 1 - Reprogramada - Com Relé e MT. 🗄	Luminária Lote 2	Lubristion Systems () By Loss  Permanent
Retina smart tag	LUMINARIA NOVO Burnin - Etronic - MODBUS UUTE: 404447	LUMINARIA NOVO Burnin - Etronic - MO	Vondole Mohanom
		• • •	Entry Distermediate Dist Direct Relation
	Luminária Lote 2 - Reprogramada :	002	Notor Unit
0000007	LUMINARIA NOVO	LUMINARIA NOVO	Nominal Motor Lisit Power (HP) 🍘
			Concel Concel Sove
	00 Late 0 Madificada		

#### Step 16: Fill in the Variable Rotation field

Fill in the Variable rotation field according to the monitored equipment.



# Step 17: Select the mechanical ratio

Perform the selection of the mechanical ratio of the monitored equipment



# Step 18: Fill in the rated power of the motor unit

Fill in the rated power of the drive unit in CV



# Step 19: Fill in the Drive Rotation

Fill the rotation of the motor unit in rpm



# Step 20: Fill in the sensor position

Perform sensor position filling

IBBX Inicio > IBBX > Capivari > Mot	or do Agitador		🥼 Vibração e temperatura
Motor do Agitador 🧪 🧹		Cons	UU1D • 52
Punpilo: 11			Name Nome do Rosto
Potência (KW): 11 KW Inspeção Nilo realizar -Equipamento sensitiva : enclavaurado			Ponte Impioniação
ê ALDEA			Unidade Motora
Adicionar Dispositivo	Pontos (2) Ocorrêncios (2) Histórico (2) 30/20 +		Potência nominal da unidade motora (CV) 🍈
- Adicionar Inspeção			Rotação da unidade motora (rpm) 👸
Reting smart tog	sensor motor 1 :	twast	
mtseedm	Capivari	Capivari	Sensor e Vibração
- 위전학회유 -	A. 🚥 🗊 📊 OFFLINE		Posição do sensor: ()
	teste :	teste	Horizontal     Vertical
	Motor do Agitador Capivari	Motor do Agitador Capivari	Exce visivels - Opcional  Horizontal  Vertical
112月2月2日	л		Cancelar Salvar

# Step 21: Select the visible Axes

Perform the selection of visible axes.



#### Step 22: Report the Maximum Vibration (g) Stopped

Fill the maximum vibration field (g) with the machine stopped



# Step 23: Report the maximum vibration (g) in operation

Fill the maximum vibration field (g) with the machine running

Hone > Blix > Dunin - Donk	- MODBUG > LUMINARIA NOVO		4. Vibration and Temperature	
				1
Operation Status:			Name Position Nome	
			Position Implementation	
Details:		g (aud) is missing.	Sensor and Vibration	
• ***	Positions & Occurrences (3) History (\$ 50,20)		Senser Posifier: 🗐 🖷 Harizontal 🔹 Vertical	
Add Inspection	幸 7 Lote 1 - Reprogramada - Com Relé e MT:	Luminária Lote 2	Visitare exes - Optional Haritoanal Versical	
Retina smart tag	LUMINARIA NOVO Burnin - Etronic - MODBUS Unitr Korker I I Korker	LUMINARIA NOV( Burnin - Etronic - MO	Radal Traversen versioning of Bonouni (Nor Pene) 0.2	
	Luminária Lote 2 - Reprogramada : LUMINARIA NOVO	002 LUMINARIA NOVC	Howenum vibration (g) during operation ())	_
部協會		ati 🖬 🗈	Cancel 3/21	Save

# Step 24: Enter the type of coupling

Fill in the coupling type field.



#### Step 25: Rigidity system

Select the type of stiffness system.



# Step 26: Fill in comments (optional)

If necessary, fill in the comment field.



# Step 27: Select the Deployment Tab

Select the deployment tab.

Home > IBBx > Burnin-			4. Vibration and Temperature	
			UUID Name	•
Operation Status:				
			Positier Implantation	
Details:	Click on # to configure you	ing (30a) is missing. r risk graph	Sentor Denuis	
	Positions © Occurrences 🗄 History 🖨 3D/20		Apply default configuration	
🕀 Add device			Spectral Window - Resolution	
			3.200 Hz - 1,56 Hz	~
+ Add Inspection	Lote 1 - Reprogramada - Com Relé e MT	Luminária Lote 2	Full Scole - Resolution	
	LUMINARIA NOVO	LUMINARIA NOVO	+- 16g - 7,81 mg	
Retina smart tag	Burnin - Etronic - MODBUS Uuto 4044		Acceleration	
			Apply filters	
	Luminária Lote 2 - Reprogramada		High pass	
	LUMTNARTA NOVO		Low poss	
108161454			Velocity	
			Cancel 💦 3/21	Save
	02 - Lata 2 - Matilianda			

## Step 28: Apply default configuration

Through the apply default configuration button, you set all the parameters of the deployment tab automatically according to the filling in the time tab.



# Step 29: Select the Spectral Window

Perform the selection of the expectral window (Frequency range to be monitored)

Home > IBEx > Burnin - Evonic - MODBUS > LUMINARA NOVO			اب، Vibration and Temperature	
LUMINARIA NOVO 🧪 <				32 32
Operation Status:	<u>! ک</u> Attention		Name Position Name	
AVAILABLE   Details:	Filling in data or sensors under learning Click on 🏚 to configure your ri	ı (30d) is missing. sk graph	Position Implantation Sensor Details	
Add device	Pesitions Q Occurrences 🗄 History 🖨 5D/2D		Apply default configuration	
+ Add Inspection	Lote 1 - Reprogramada - Com Relé e MT.	Luminária Lote 2	L200 Hz - 1,56 Hz Full Scele - Resolution	•
Retina smart tag	LUMINARIA NOVO Burnin - Etronic - MODBUS UUID: 4094437	LUMINARIA NOV Burnin - Etronic - MO	+- 16g - 7,81 mg	
日本が必要し			Acceleration Apply filters	
	Luminária Lote 2 - Reprogramada :	002 LUMINARIA NOV(	Low pass	
	Burnin - Etronic - MODBUS UUTD: SAESSA		Velocity Concel 3/21	Save
	02 - Lote 2 - Modificaria			

#### **Step 30: Select the Scale Background – Resolution** Perform the selection of the scale background.

Home > IBBx > Burnin - Etronic		ارم. Vibration and Temperature		
LUMINARIA NOVO 🦯 <				· 32
Operation Status:	Attention		Position Name	
AVAILABLE   Details:	Filling in data or sensors under learning Click on 🏚 to configure your ri	g (30d) is missing. sk graph	Position Implantation Sensor Details	
Add device	Positions Q, Occurrences () History () 30/20		Apply default configuration Spectral Window + Resolution	
+ Add Inspection	Lote 1 - Reprogramada - Com Relé e MT: :	Luminária Lote 2	3.200 Hz - 1,56 Hz Full Scole - Resolution	Ť
	LUMINARIA NOVO Burnin - Etronic - MODBUS UURD 404497	LUMINARIA NOV Burnin - Etroniu Mo	+- 16g - 7,81 mg Acceleration Apply fitters	×
	Luminária Lote 2 - Reprogramada : LUMINARIA NOVO Burnin - Etronic - MODBUS UUIZ SAESA	002 LUMINARIA NOVC Burnin - Etronic - MO	High poss Low poss Velocity	
「計算の」			Cancel 💦 3/21	Save

### Step 31: Selecting filters for acceleration

Select filters for acceleration, being able to choose high pass and low pass, after that inform the cutoff frequency (Hz) in both cases



### Step 32: Selecting filters for Speed

Select filters for speed, being able to choose high pass and low pass, after that inform the cutoff frequency (Hz) in both cases

MINARIA NOVO					•
peration Status:		<u>خ</u> ے		Position Name	
				Position Implantation	
etails:		Filling in data or sensors under learning	(300) is missing.	Velocity	
Add desire		Positions 60 Occurrences E History @ 30/20 -		High pass	1
			*	Low pass	
Add Inspection		Lote 1 - Reprogramada - Com Relé e MT	Luminória Lote 2	Envelope	
				Apply filters	
Retina smart ta		Burnin - Etropic - MODBUS 50007	Burnin - Etropic - MO	Low pass	
mip2038				Filter Range	
				500 Hz - 10 kHz	
R02-146-0	978 II	Luminária Lote 2 - Reprogramada :	002		
100 2 3 10		LUMINARIA NOVO	LUMINARIA NOVO	Environment and Protection	
222.00		Burnin - Etronic - MODBUS UJID: 148336			
and the second					

## Step 33: Selecting filters for Envelope

Perform the selection of envelope filters, being able to choose high pass and low pass, after that inform the cutoff frequency (Hz) in both cases

$\sim$			1/4 Vibration and Temperature	
				• 82
	<u></u>		Nome	
Operation Status:				
AVAILABLE	Filling in data or sensors under learning	(30d) is missing.	Position Implantation	
Details:	Click on the to configure your ri	sk arach	Velocity	
			Apply filters	
Add device	Designed of occurations El Heavy #8 solver		Feign pass	
			Low poss	
Add Inspection	Late 1 - Desensements - Com Ball o MT	Lumindain Lata 2	Envelope	
	Lote 1 - Reprogramada - Com Rele e Mill	Currinitaria Core 2	Anobe filters	
Reting smart tog	LUMINARIA NOVO	LUMINARIA NOV	High pass	
	Burnin - Etronic - MODBUS EUID: 604477	Burnin - Etronic - MO	Low pass	
		• • •	Filter Range	
	Luminária Lote 2 - Reprogramada :	002	500 HZ - 10 KH2	
	LUMINARIA NOVO		Environment and Protection	
- 나라나라 전문 동물	Burnin - Etronic - MODBUS UUID: 146536	Burnin - Etronic - MO		
			Concel S/21	-
一台的战争了			- Conton	Suie

# Step 34: Enter the filter strip



Perform the filter strip selection.

# Step 35: Enter the sensor's working environment

Inform the sensor's working environment

Home > BBx > Burnin - Etronic - MCOBUS > LUMINAMA NOVO			4. Vibration and Temperature	
LUMINARIA NOVO 🖉		\$		0 919. of 2
	· /!\		None	
Operation Status:	Attention			
AVAILABLE			Position Implantation	
Details:	Fining in data or sensors under learning	(300) is missing.		
ê cile	Click on \$\$ to configure your ris		Environment and Protection	
	Positions      Occurrences      History      SD/20			_
🕂 Add device			None	
			Excessive Humidity	
Add Inspection	Lote 1 - Depregramada - Com Pelá e MT	Luminária Lata 2	Excessive Heat	
	Lore 1 - Reprogramada - Com Rele e Ph.	Lummand P	Atypical ambient temperature	
Petina emart taa	LUMINARIA NOVO	LUMINARIA NOVO	Paint Access Particularity (1)	
Renna sinari lag	Burnin - Etronic - MODBUS UUID: 609487		Yes No	
			Enclosed Equipment: 🅐	
무엇이야하는			Yes No	
	Luminária Lote 2 - Reprogramada	002	Equipment with Protection:	
	LUMINARIA NOVO	LUMINARIA NOVO	Yes No	
- 以於於合義之王 -	Burnin - Etronic - MODBUS UUD: SAES36		Control and Fastening	
			Cancel 💦 \$/21	Save
	02 - Lote 2 - Modificada			

#### Step 36: Inform if there is any particularity in the access to the point

Inform if there is any particularity in the access to the point, if selected yes, a field will open to describe the particularity.

Home > IBBx > Bu				As Vibration and Temperature	
					0 872
		<u>_!</u> }		Name	
Operation Status:		Attention			
		Filling in data or sensors under learning	a (30d) is missina.	Position Implantation	
Details:		Click on 🏚 to configure your ri	sk graph	Environment and Protection	
A set dentes		Positions & occurrences (3 History 10 SU/20		Sensor Work Environment	
Add device				Constraints Manuality	
				Excessive Heat	
Add Inspection		Lote 1 - Reprogramada - Com Relé e MT.	Luminária Lote 2	Excessive Cold	
				Atypical ambient temperature	
Reting smart tog		LOMINARIA NOVO	LOMINARIA NOV	Point Access Particularity	
	_	Burnin - Etronic - MODBUS UUID: 604487	Burnin - Etronic - MO	🖀 Yes 🖀 No	
прочол	1			Enclosed Equipment: 0	
				🔮 Yes 📑 No	
- 883 - 487 ()		Luminária Lote 2 - Reprogramada :	002	Equipment with Protection: (1)	
		LUMINARIA NOVO	LUMINARIA NOV	Yes No	
0.000 1000		Burnin - Etronic - MODBUS UUID: SAES26		Control and Fastening	
- <b>1</b> 5100.5	5 L			Concel 💦 \$/21	Save
	<b>.</b> .				

### Step 37: Enter if the Asset is enclosed



Inform if the asset is enclosed.

Product Manual – Spectra 1.0

# Step 38: Perform theActiveFieldProtection selection

Select the active field with protection, if yes inform the height of the protection.



#### Step 39: Perform the Asset Stop/Lock Field selection

Select the stop/block field of the asset, if yes enter the block time (min)



**Step 40: Perform the selection of the Sensor Attachment Type Field** Enter the type of sensor attachment



# Step 41: Perform the selection of the required adequacy field in the asset/point

Inform if there is necessary adjustment in the asset/point, if yes it will open a field to fill in the type of necessary adjustment.



**Step 42: Click Save** To finish the sensor setup step, click Save.



#### Step 43: Synchronize the Spectra 1.0 with the IBBX connectivity network of the desired unit

It is important to understand that for each application you must choose/configure the gateway network differently, depending on the desired transmission interval (10 min, 1h, 24h, etc.).

In the "Bolt Gateway Setup Mode on Unit" section, select the current mode for "Sync" as highlighted in the figure opposite.

After the activation of the point, synchronization should occur automatically. The synchronization time depends on the number of sensors that



It is important to make sure that the Gateway is active in an operating state

Once the synchronization of the Spectra 1.0 to the Bolt is finished, it is necessary that the Bolt is in Operation Mode, as shown in the Figure. This step is necessary for the sensors to be able to send the data.

#### **ATTENTION**

You can only register one QR-Code per point, as the system does not allow you to register it at more than one point

#### Step 44: Spectra 1.0 Operation Management

To manage the clock, follow the following instructions:

Access the monitored unit
 Access the Connectivity tab
 Access the points tab

#### Points tab:

In the points tab you will have access to information from all devices connected to the Bolt Gateway 1.0, as well as battery status information and device connectivity quality

To access the battery conditions, click on the location

informed in the figure on the side, as described below

#### 4- Access to Battery conditions



Home > IBBx > Burnin - Etronic ·	MODEUS	🗆 (y) 💋 🖄	® <mark>e</mark>
Monitored Gateways (1) + <	General configuration of Gateways	General end-point connectivity	
New Science Contractivey - See Sectors           Burnin - Etronic - MODemission           ID: 198E2A           ID: 198E2A           ID: 198E2A           ID: 198E2A           ID: 198E2A           ID: 198E2A	Operation	4 » 3 » 3 Activated synchronized Connect	ed
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			ſ

Figure: Device Connectivity Quality

By clicking on the Battery you will have access to the Battery conditions of the Access Device (Green Measured Line/Expected Yellow Line)

5-Access to connectivity conditions and status By clicking on item 5, as shown in the image, you will have access to the device's connectivity line status (Green is the connectivity quality and yellow is the strength of the received RSS signal, which is measured in dBm)

Home > IBBx > Burnin - Etronic			
Monitored Gateways (1) + < New Screen: Donnectivity - See datatis	Luminária Lote 2: Connectivity Quality	x ctivity	。 
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#### Step 45: Alarm Set Configuration

To configure the alarm set, choose a chart you want to configure and click on the button as indicated in the image on the side.

Home > 198x > Burnin - Etronic	- MODBUS > LUMINARIA NOVO > Lots 1 - Reprogramada - Com Relé e MT38	506	🗆 🕪 🖉 💁 😫
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Then a screen will open for alarm configuration:

#### Configure case submission.

This step must be aligned according to the need to trigger the alarms, and there can be three conditions for sending.

1. Occurrence generated, when the collection data passes above the alarm:

> In this configuration, it is necessary to enter the limit point and the extreme of the alarm configuration.

sending.	Occu wher passe	irrence is ge the collect es above th	enera tion c e ala	ited lata rm	
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#### 2. Occurrence generated, when the collection data passes below the alarm:

In this configuration, it is necessary to enter the limit point and the extreme of the alarm configuration.

#### 3. Occurrence generated, when the collection data passes below the alarm:

In this configuration, it is necessary to enter the upper and lower limit point and the upper and lower end of the alarm configuration.

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Occurrence is generated

#### 2.2 Mode of operation

Spectra 1.0 collects data at scheduled intervals, configured as needed by each application, ensuring that the information captured accurately reflects the operational state of the monitored assets. In standard mode, data collections are carried out in 10-minute cycles, ensuring a continuous visualization of the dynamic behavior of the machines.

In terms of transmission, Spectra 1.0 is programmed to send global data every 1 hour, allowing the integration and analysis of this data in centralized systems, such as the IBBX Retina platform. This frequent submission makes it easier to identify trends and detect anomalies early, allowing corrective action to be taken quickly and effectively. In addition, dynamic data transmission occurs at 24-hour intervals, providing a more detailed view of operating conditions over extended periods, which aids in the detection of potential wear or intermittent failures. Adjustment of the RF setting is also performed every 24 hours, ensuring that communication between the devices and the monitoring system remains stable and efficient, even in environments with interference or changing operating conditions.

#### 2.3 Power Supply and Power Consumption of the Spectra 1.0

#### Internal Battery Power (No External Power Sources)

The Spectra 1.0 comes equipped with an internal rechargeable **4,000 mAh lithium-ion battery**, which allows independent operation of external power sources. With this configuration, the useful life of the device can vary between **14 months** transmitting at intervals of **1 h**, and **18 months** transmitting at intervals of 2 hours

In addition, the **Spectra 1.0** is rechargeable, which provides a practical and efficient solution to ensure its continuous operation in industrial environments. Below is a step-by-step process regarding the Spectra 1.0 battery charging process

#### 1. Spectra 1.0 Battery Charging

#### Spectra 1.0 Loading Process

#### 1- Check the Sensor Status

An image containing metal parts, screw, dark, single Automatic description **Spectra 1.0** is turned off by inserting the golden M3 philips screw.



#### 2- Connect the Charging Cable

Using a cable with 2 JST **PHR-2 ends** (female connector). Fit the end of the charging cable into this connector located on the base of the Spectra 1.0 and the other end into the charging base.



#### 3- Connecting the Charging Base to the Power Supply

An image containing luggage, green, old suitcase Automatic description

#### 4- Charging Time

Allow the sensor to charge long enough until the Power Supply Current indicator comes to Zero showing that the devices are fully charged. Charging time may vary depending on the condition of the battery, on average it can last between 3 and 4 hours.





#### 5- Disconnect

After full charging, disconnect the sensor cable carefully to avoid damage to the connector. Replace the sensor in its place of use and, if necessary, turn it back on using the short screw M3 philips black.

## 2.4 Connectivity to the IBBX gateway network (Distances and barriers and other factors)

The connection of Spectra 1.0 depends on the network of gateways available at the installation site, so make sure before installing it, how the local network is configured in terms of distance factors, barriers, transmission and performance times, among others, and confirm that it meets the project.

It is also important to understand the environment in which the project is located to know the distances between Spectra 1.0 and the nearest gateways. For this, we have prepared a guideline table below:

Environment	Characteristics	Examples	Maximum distance
A	Barrier-free open locations between Spectra 1.0 and the nearest gatewayBarrier-free open locations between Spectra 1.0 and the nearest gateway	Water and sewage treatment plants, agricultural crops, industrial yards, open fields, indoor industrial areas in general	2000m
В	Open sites with some barriers between Spectra 1.0 and the nearest gateway	Open, tall industrial sheds, mining conveyors, city streets, forests	1000m
с	Closed sites with many barriers between Spectra 1.0 and the nearest gateway	Closed industrial warehouses with many metal structures, reinforced concrete walls, basements, enclosed environments	300m
Special Cases	Outdoor use cases, distance over 5km among other factors	Connection between cities, underground equipment, mobile and armored equipment	On-demand IBBX project

Table of distances between Spectra 1.0 and gateway depending on the environment.

**Note1:** Remember that these distances are between the Spectra 1.0 and the gateway mais próximo, utilizando protocolo IBBX.

**Note2:** This table is indicative, in special projects or in lack of connection following the table below, look for the IBBX support team.

**Note3:** The distance in the "A" environment can reach 30km in special IBBX projects, for this, consult the Bolt 1.0 gateway manual or your commercial manager for more information.

#### Spectra 1.0 Attachment

#### Mounting

The applicable installation methods are briefly described in the following sections.

#### Spectra Installation on the Asset

The device must be fixed in such a way as to ensure the best mechanical coupling on the surface of the asset to be monitored. The point chosen for the fixation must be as close as possible to the bearing and in direct contact with the equipment.

The installation location on the asset must be prepared in advance: make sure that the attachment location is clean and dry and that there is no dust or oil residues, regardless of the installation method to be followed.

Installation Guidelines:



**Note:** The above positioning guidelines must be followed to ensure proper operation of Spectra.

Recommended positions are indicated as they provide accurate readings from more reliable data.

Improper positions can result in inaccurate readings, so they should be avoided.

#### **Installation Methods**

The Spectra 1.0 can be installed in three ways: fastening by screw, glue or magnet. These three methods will be presented below:

#### 1) Screw Installation

To facilitate the installation of the Spectra device, have the following items on hand:

- Hammer and punch;
- Drill/Screwdriver;
- 6.8 mm drill bit;
- T-T Stripper;
- Male of 8

#### Step 1: Identify the point for attachment

- Identify Points in the Asset stable and fixed (see figure on the side);
- Select from these points, which are workable for installation

the Spectra 1.0 device;

- Pay attention to possible environmental risks, such as: machinery working, cutting surfaces, among others, which are particular to every place or company.
- With proper authorization, start the booking process

#### Step 2: Marking the point to be pierced

- After Once the best possible place for fixing the Spectra device has been identified, pick up the tools necessary for marking the hole: hammer and punch. Attention: use gloves for your protection.
- Position the punch tool exactly at the point where the hole will be drilled and mark the place with the help of a hammer, leaving a mark on the surface. This procedure prevents the drill from sliding at the time of drilling.

#### Step 3: Drilling and Thread Preparation

 Position High Speed Steel Drill Bit 6 mm over marking previously punched, and start drilling gradually applying force under the drill. If necessary, use water Cut to facilitate drilling.

Attention! The hole should have the depth maximum of 4 mm, to avoid damage to the asset. After drilling, clean the place for the execution of the next step.

#### Step 4: Create Thread for Bolt Attachment

- In possession of a diswalker and a 8mm tap, fit the tap correctly in the disbander.
- Start the thread creation process

Rotating the tap inside the hole

previously done.

• Clean the site after the thread is manufactured.

#### Step 5: Screw Fastening

• In possession of the Allen M8 screw, apply a medium torque thread lock to its threads;

With the help of the Allen key, start threading the screw at the base of the sensor to the limit, applying enough force to lock it;

• If it is necessary to use a spacer to fix the sensor (insufficient space to screw the sensor, or lack of direct contact with the asset), repeat the previous steps for fixing the screw to the spacer (apply a thread lock to the spacer).

#### Step 6: Attaching the sensor to the asset

- Deposit threadlocker in the hole of the active, and thread the sensor into the active manually until you reach the end of the thread stroke.
- Use a 19 mm wrench to Spectra fixation, if possible.

The torque on the sensor should be only the necessary for its locking, thus ensuring a good transfer of energies from the asset to the sensor.

#### Step 7: Positioning according to axes

#### Sensor Adjustment

 Adjust the sensors according to the axes indicated at the top of Spectra. For a better adjustment, spacers can be used to ensure that the sensors are secured in position

Desired.

The closer the fixture is to the axles, the more accurate the information will be.

#### Side Clamping (Optional)

• If you can't pin Spectra to the

superior of the asset, it can also be

fixed sideways.

Make sure the axis is aligned with the asset,

as demonstrated in the previous step.

#### 2) Installation with Glue

To facilitate the installation of the Spectra device, have the following items available:

- Iron G180 Sandpaper
- Adhesive anaerobic structural AA 319
- Spray adhesion activator SF 7649

#### Step 1: Preparing the Site for Glue Fixation

• The site should be cleaned and sanded, removing

All ink and impurities present in the asset

before fixing the sensor.

#### Step 2: Application of activator for the glue

- Apply the SF 7649 activator to the asset, exactly in the place that was previously prepared.
- Perform the same application (SF 7649 activator) at the base of the sensor that will be fixed to the asset.

#### Step 3: Applying the glue to the sensor

• After applying the activator, apply AA 319 glue to the base of the sensor (a thin layer surrounding the base that will be in contact with the active ingredient).

#### Step 4: Hold the sensor in the asset

- After the application of the activator and glue, Position the sensor in the final position of monitoring in the asset.
- The glue is fast-acting: after 20 to 40 seconds the Spectra will be fixed in place on the vertical position, and from 1 to 2 minutes, in the horizontal position.

Attention: Pay attention to the position of the axles. After Glued it is not possible to reposition the sensor.

#### Step 5: Final Inspection of the Facility

Perform a visual inspection of Spectra in the asset, to ensure that all the fastening It went according to plan.

#### 3) Magnet installation

**Step 1:** Swap the Spectra 1.0 Base to the Magnetized Base.

**Step 2:** Attach the device to the chosen location as indicated.

#### Examples of installation on some equipment

#### **Electric Motors**

• 2 Spectra 1.0 per Electric Motor monitored is recommended. One sensor positioned on the LA Bearing and the other positioned on the LOA Bearing. Remember to prioritize installation by screw. Position the sensor

vertically or horizontally. Keep the Z-Axis aligned with the motor shaft as referenced in Spectra 1.0



#### Bearings

- 1 Spectra per bearing is recommended. Preferably position vertically on the bearing or on the bushing.
- If there is a shaft with other in-line housings, 1 Spectra is recommended in each housing to detect both wear of the housing and its components, as well as wear or warping of the shaft.





#### Pumps / Motorcycle Pumps

• In the Motor Pump set, it is generally recommended, when the shaft length is less than 250 mm, only 1 Spectra in the center between the bearings. Preferably position it vertically on the bearing. 2 sensors are recommended in each pump bearing when the distance between the bearings is greater than 250 mm (shaft length), in addition to the 2 Spectras in the electric motor.



#### Reducers

• In the case of Gearboxes, it is recommended to install a Spectra 1.0 sensor at each bearing point from the Input Shaft, through the Intermediate Shafts, to the Output Shaft, on both sides.



#### Compressors

• In the case of Compressors, it is recommended to install Spectra 1.0 sensors at the points where there are Bearings in the motor and in the compressor unit. It is a complex piece of equipment that needs to be technically analyzed before installation. Request the drawing to understand where the Bearings are.





# Chapter 3

# **Application Examples**

#### **3.1 Electric Motor Monitoring**

IBBX was approached by a client who was facing difficulties in monitoring electric motors in real time, which resulted in unexpected failures and high maintenance costs. After analyzing the situation, IBBX's technical team verified that the installation of the *Spectra 1.0 device* would be the ideal solution, since it allows predictive monitoring of vibration and temperature of the motors, critical factors to avoid failures.

The *Spectra 1.0* was installed quickly and conveniently, directly on the engines, without the need to stop the system. Its ability to communicate with the IBBX Retina platform made it possible to transmit data in real time to the cloud, where the customer began to continuously monitor the following parameters:

- RMS acceleration
- FFT Peak Acceleration
- RMS Speed
- Envelope Pico from FFT
- Temperature
- Global Acceleration
- Global Speed
- Envelope Global



Figure: Spectra 1.0 in electric motor

With the solution implemented, the customer was able to anticipate preventive maintenance, avoiding serious failures, reducing downtime and optimizing energy consumption, ensuring system efficiency and eliminating unnecessary costs.







Figure: Data being collected on the Retina Platform



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Figure: Data Projection Analysis in Retina

Figure: Occurrence History recorded



Figure: Gallery of registered images of the monitored asset

#### 3.2 Agitator Motor Monitoring

IBBX was approached by a client who was struggling to monitor an agitator's motor in real time, which resulted in operational inefficiencies and increased maintenance costs. After a detailed analysis, IBBX's technical team identified that the installation of the *Spectra 1.0* device would be the ideal solution, as it allows predictive monitoring of vibration and temperature, essential indicators to avoid agitator failures.

The Spectra 1.0 was installed quickly and efficiently on the agitator motor, with no interruption of operations required. Its integration with the IBBX Retina platform made it possible to transmit data in real time to the cloud, where the customer started to monitor the following parameters continuously:

- RMS Acceleration
- FFT Peak Acceleration
- RMS Speed
- Pico Envelope from FFT
- Temperature
- Global Acceleration
- Global Speed
- Envelope Global



With the implementation of this solution, the customer was able to anticipate preventive maintenance, avoiding agitator failures, optimizing operation and significantly reducing maintenance and energy costs.





Figure: Data being collected on the Retina Platform



Figure: Data Projection Analysis in Retina



Figure: Spectra Analysis



Figure: Occurrence History recorded



Figure: Resource Gallery



Figure: Resource Gallery

#### 3.3 Bearing Monitoring

IBBX was approached by a client who was facing difficulties in real-time monitoring of bearings, which led to unexpected failures and high maintenance costs. After a technical analysis, the IBBX team recommended the installation of the *Spectra 1.0* device, which offers predictive monitoring of vibration and temperature, critical factors to prevent bearing failures.

The *Spectra 1.0* was quickly and efficiently installed directly on the bearings, without the need to interrupt the operation of the system. The device's communication with the IBBX Retina platform allowed the transmission of data in real time to the cloud, where the customer began to continuously monitor the following parameters:

- RMS Acceleration
- FFT Peak Acceleration
- RMS Speed
- Pico Envelope from FFT
- Temperature
- Global Acceleration
- Global Speed
- Envelope Global



With the solution implemented, the customer was able to predict necessary maintenance, avoiding serious bearing failures, optimizing system performance and reducing costs related to maintenance and unexpected downtime.







Figure: Data being collected on the Retina Platform



Figure: Data Projection Analysis in Retina

Figure: Spectra Analysis

0



Figure: Occurrence History recorded



Figure: ESG Panel



Figure: Resource Gallery

#### 3.4 Compressor Monitoring

IBBX was approached by a customer who was facing difficulties in real-time monitoring of compressors, which resulted in unexpected failures and high maintenance costs. After a detailed technical analysis, the IBBX team recommended the installation of the *Spectra 1.0* device, which offers predictive monitoring of vibration and temperature, essential factors to prevent compressor failures.

The *Spectra 1.0* was installed quickly and efficiently in the compressors, without the need to interrupt operations. Integrated with the IBBX Retina platform, the device allowed the continuous transmission of data in real time to the cloud, where the customer started to monitor the following parameters:

- RMS Acceleration
- FFT Peak Acceleration
- RMS Speed
- Pico Envelope from FFT
- Temperature
- Global Acceleration
- Global Speed
- Envelope Global

With the solution implemented, the customer was able to predict necessary maintenance, avoiding serious failures in



the

compressors, optimizing the performance of the system and significantly reducing maintenance costs and unexpected stoppages, in addition to ensuring greater reliability in the production process.









Figure: Spectra Analysis



Figure: Frequency Analysis between two points



Figure: Occurrence History recorded



#### Figure: Resource Gallery



Figure: ESG Panel

#### 3.5 Water Pump Monitoring

IBBX was approached by a client who was experiencing difficulties in real-time monitoring of water pumps, which resulted in unexpected failures and increased operating costs due to outages and repairs. After a technical analysis, the IBBX team recommended the installation of the *Spectra 1.0* device, which provides predictive monitoring of vibration and temperature, essential to avoid failures in water pumps.

The *Spectra 1.0* was conveniently and quickly installed directly on the pumps, without the need to interrupt the operation of the system. Integration with the IBBX Retina platform enabled real-time data transmission to the cloud, allowing the customer to continuously monitor the following parameters:

- RMS Acceleration
- FFT Peak Acceleration
- RMS Speed
- Pico Envelope from FFT
- Temperature
- Global Acceleration
- Global Speed
- Envelope Global



With the solution implemented, the customer started to anticipate preventive maintenance, avoiding failures in the water pumps, optimizing the efficiency of the system and reducing costs related to maintenance and unexpected stops, ensuring a continuous and reliable supply of water.







Figure: Data being collected on the Retina Platform



Figure: Spectra Analysis



Figure: Frequency Analysis between two points

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Figure: Occurrence History recorded



Figure: ESG Panel

#### **ILLUSTRATIONS AND PRODUCT SPECIFICATIONS**

The illustrations contained in this document are for demonstration purposes only. Images may vary by hardware and software version and market region. To report any errors or omissions in this document, please send an email to: <u>comercial@ibbx.tech</u>

#### **Disposal and Recycling Information**

Batteries should not be disposed of in household waste. When you decide to dispose of this product and/or its battery, do so in accordance with local environmental laws and guidelines. For information on IBBX's recycling program, collection points and information phone, please visit <u>https://ibbx.tech/</u>.

#### LEARN MORE

To learn more about this strategy and all the measures we are taking to protect the environment, visit https://ibbx.tech/.

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