

Eltav Wireless Monitoring System

WKVD
Installation and Operation Manual
(IOM)

Part No. VDY 23016

Revision 2.4

Feb 2012



Misuse of this equipment can cause bodily harm. Operations not performed as per the instructions in this document are done at the user's own risk and liability.



To prevent bodily harm or damage to equipment, only trained, authorized personnel should install, maintain and repair the equipment.



To prevent damage to equipment, through electrostatic charge on plastic surface of the WKVD always wipe the surface with a wet cloth.



Carefully read the safety information contained in this section, and throughout this user guide, before installing, operating, or performing any maintenance task on the equipment.

Warranty

Eltav warrants that the Eltav Wireless Monitoring System is free of defective materials and faulty workmanship. If warranted goods are returned to Eltav during the period of coverage, Eltav will repair or replace, at its option, without charge those items it finds defective. The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Eltav be liable for consequential, special, or indirect damages.



1 Introduction

This chapter provides an overview of the Eltav Wireless Monitoring System, including:

- ✓ **Abbreviations, Acronyms and Terms**
- ✓ **Certification and Approvals**
- ✓ **Principles of Operation**
- ✓ **General Specifications**

1.1 Scope of Manual

This manual includes principles of operation, specifications, installation, setup, configuration, operation, troubleshooting, and maintenance information for the WKVD of the Eltav Wireless Monitoring System.

1.2 Abbreviations, Acronyms and Terms

- ACK – Acknowledgement Message
- Eltav Gateway – An industrial computer running the EMS.
- EMS – Eltav Management System
- EUI – Extended Unique Identifier
- HMI – Human Machine Interface
- OD – Operator's Device
- OPC – OLE for Process Control
- PLC – Programmable Logic Controller
- PLCA – PLC Adapter
- SCADA – Supervisory Control and Data Acquisition
- TVDR – Tunneling Valve Device Router
- WKVD – Valve Device
- WKVDR – Valve Device Router

1.3 System Principles of Operation

Introduction

Eltav Wireless Monitoring Ltd. has developed an innovative concept of monitoring valves in the process automation world using the most advanced, safe and reliable wireless technologies. The Eltav wireless sensor system revolutionizes industrial processing enabling real-time data sharing throughout a facility to increase industrial efficiency and productivity. Moreover, Eltav's

wireless sensor technology offers reliable, autonomous process control to improve product quality, increase yield, and reduce costs.

The Eltav Wireless Valve Monitoring System provides real-time information about the status of valves installed in process plants. The data is fed directly into the customer's control system thereby reducing failure while increasing safety and yield. The Eltav System is based on the ZigBee Pro standard protocol and serves as an add-on layer, over traditional process management systems, providing enhanced monitoring capabilities, with considerably reduced complexity. The Eltav system includes support for a wide range of standard interfaces, physical and logical, that are common in the industry. This makes the Eltav system, from the perspective of connectivity, almost transparent for system designers and integrators, since they can easily integrate the Eltav system into any of the most widely-used system architectures in the process industry.

The Eltav Wireless Valve Monitoring System has the following main functionalities:

- **Manual Valve Operation Monitoring:** Many process valves are activated manually by field operators who receive instructions from the control room. Such manual processes are vulnerable to human error and can result in substantial damage and poor yield. The Eltav system provides the plant with an efficient, cost-effective solution to monitor installed devices.
- **Actuated Valve Operation Monitoring:** Although actuated process valves are activated remotely, many do not have any feedback on the operation and, in cases of actuation failure, a false perception of the valve position may be reported. The Eltav solution complements the actuated operation with a full monitoring feedback.
- **Actuated Valve Maintenance:** Wear and tear of actuated valves can result in a broken shaft (causing an excessively fast response), or in shaft deterioration that slows down the valve's movement. The dynamic profile of actuated valves during transactions must consistently remain within a pre-set range. Whenever these limits are breached, an alarm is generated.
- **Partial Stroke Monitoring:** Static valves that remain in the same position for long periods of time may lose their operational flexibility. To facilitate periodic "instruction" of such a valve to move, the Partial Stroke Test (PST) is initiated, either by the control system or manually. Valve positioning monitoring allows such a PST to be recorded and stored for audit and evidence.

Westlock Valve Device (WKVD)



An Eltav Valve Device (WKVD) is bracket-mounted to any type of valve or actuator and – using the standard wireless 802.15.4/ZigBee Pro, 2.4 GHz protocol – wirelessly transmits and receives messages relevant to the position status of the valve in real time.

The WKVD is powered by two half AA Lithium batteries. In nominal operation, the battery life of the WKVD is above 5 years. A battery pack can be replaced in the field.

The WKVD includes a shaft that is fastened to the valve's stem through a special cylinder. It transfers the angle position of the stem to the WKVD. An internal WKVD sensor measures the circular position of the WKVD shaft thus providing information about the angular position of the stem in degrees relative to the valve.

The WKVD reports the valve position (angle) immediately when motion of the valve lever is sensed or every predefined period (configurable). The WKVD temperature, WKVD battery status, and other WKVD keep-alive information are broadcast with every WKVD message. Each WKVD message is transmitted with a real time stamp. In between transmissions the WKVD is in dormant status to save battery power.

The WKVD also consists of a Low Frequency (LF) receiver for receiving setting commands from the Operator Device and to commission, decommission, calibrate, and setup the unit and to perform diagnostic procedures.

Valve Device Router (R)



Each WKDR collects and routes data from nearby WKDRs and up to 32 associated WKDs, and transmits the information towards the control center by hops from WKDR to WKDR.

The WKDR acts as a relay that retransmits the messages received from a remote WKDR, through the ZigBee wireless network, until they reach a TWKDR (see below for details). Data transfer redundancy is assured by automatic routing of the wireless devices through a mesh topology and providing multiple TWKDRs for each wireless network.

Tunneling Valve Device Router (TVDR)

The Tunneling Valve Device Router (TVDR) is the last-hop VDR that transfers collected data from VDRs to the Eltav Gateway. Several TVDRs can be connected, via TCP/IP, to the Eltav Gateway (thus ensuring full redundancy and avoiding a single point of failure).

EMS Server

The EMS Server is the central software server on the TCP/IP network. It maintains the wireless network, performs data logging, and publishes sensor information to clients and to the customers' monitoring and control systems (PLC, SCADA, etc.)

EMS Clients

- **GUI Client:** Provides a view of sensor data and network status and allows configuration of remote sensors and alarms.
- **Connectivity Client:** Forwards Valve Device data and status to the third party PLC, DCS and SCADA. Supported protocols are MODBUS RTU, MODBUS TCP/IP and OPC DA.

PLC Adapter

The PLC Adapter (PLCA) is a hardened connectivity device that supplies real-time data to PLCs/HMIs that reside on the plants dedicated network. The PLCA transfers relevant data from the Eltav Network and transfers it via MODBUS RTU and/or MODBUS TCP/IP in real time to PLCs/HMIs. The PLCA is seamlessly situated on the Eltav Network between the EMS and TVDRs and extracts the requested device information from the data stream. From this position in the Eltav Network the PLCA also acts as a redundant network manager – keeping the Eltav Network alive in case of Gateway unavailability of any reasons.

Operator Device

The Operator Device (OD) is a hand-held device that enables the field operator to communicate with a selected field device (WKVD/VDR/TVDR) using low frequency and ZigBee. Such one-on-one communication provides the field operator a transportable and effective control panel to independently perform various operation and maintenance tasks. The OD delivers messages to operators, reports on performance, and is used to support installations, configuration, provisioning, and maintenance.

Eltav Management System

The Eltav Management System (EMS) processes collected data, monitors it, and delivers it to various typical clients at the process control management system. Such clients vary in various levels of the process control from the high level HMI and down to the line controllers (PLCs). The Eltav Management System supports such typical clients and data/indication and uses generic interface converters to provide the required interface accordingly.

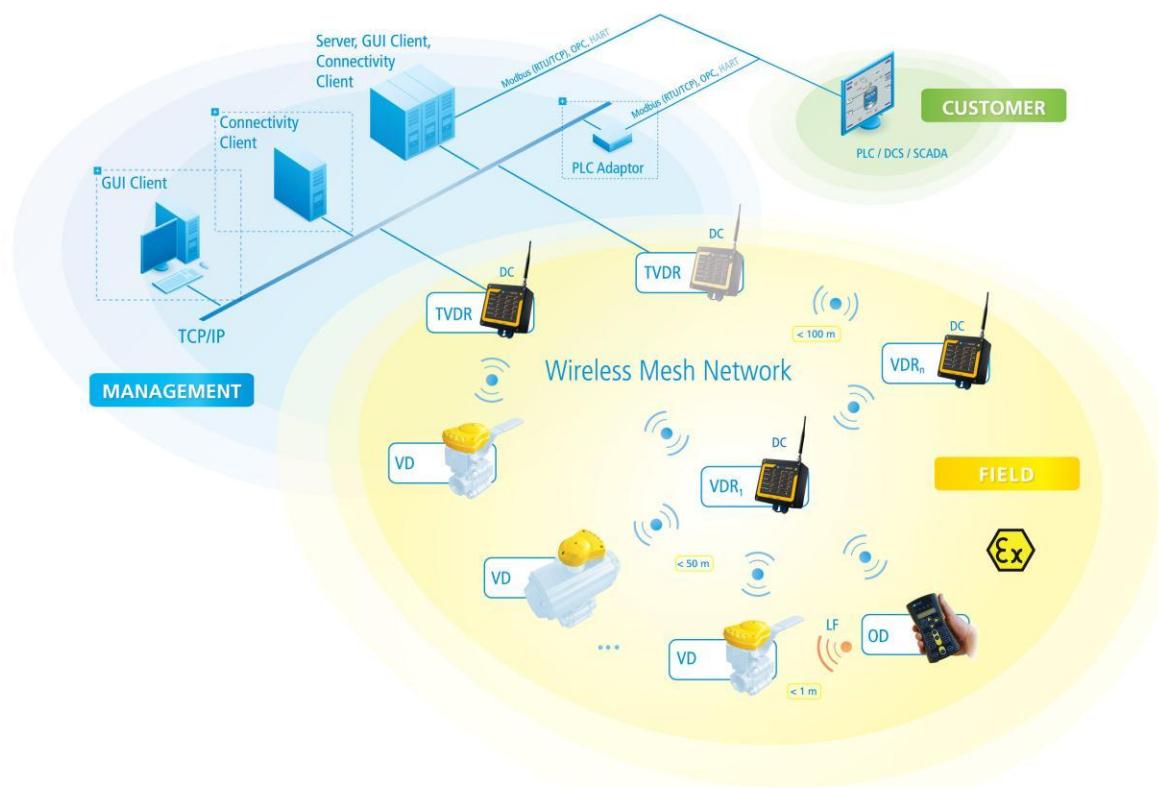


Figure 1: Eltav Wireless Monitoring System – Block Diagram

2 Westlock Valve Device (WKVD)

This chapter provides an overview of the Eltav Valve Device (WKVD) including:

- ✓ Operation
- ✓ Installation
- ✓ Specifications
- ✓ Configuration
- ✓ Troubleshooting
- ✓ Maintenance

2.1 Valve Device Overview

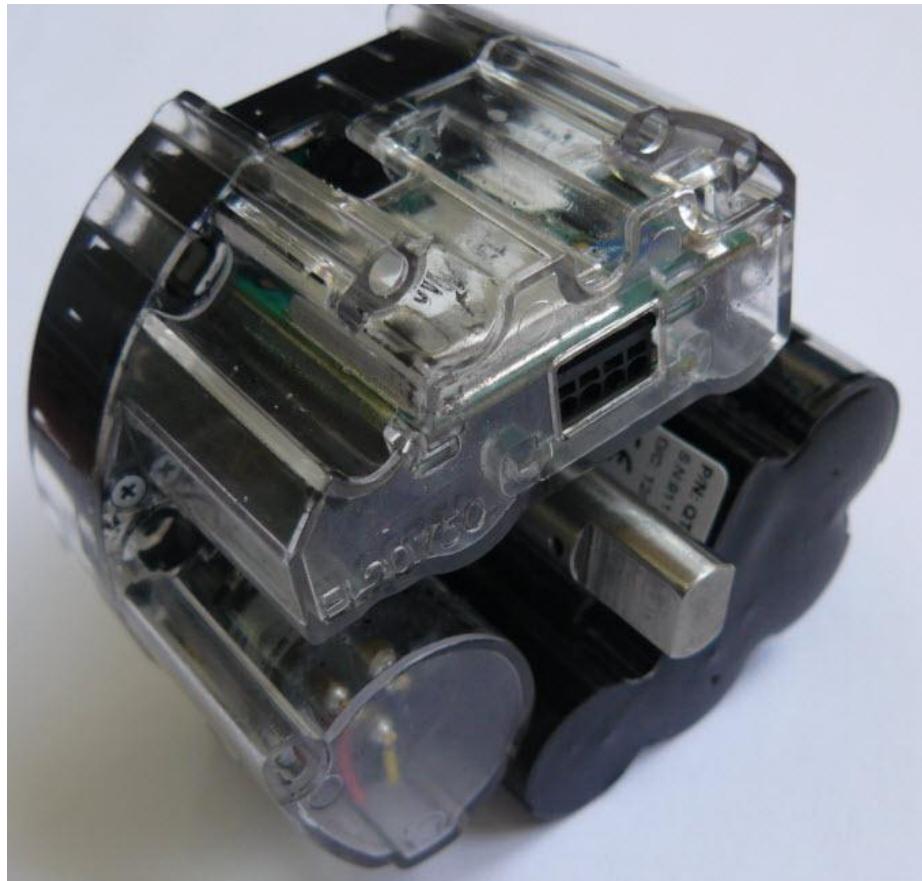


Figure 2: WKVD Module

The Eltav Valve Device (WKVD) is the sensing component of the Eltav Wireless Monitoring System. It is installed on top of a valve or actuator and consists of a stem attached mechanically to the valve or actuator axle. The WKVD includes sensors that measure the angle which corresponds to the opening status of the valve (in degrees and opening percentage). The valve status is transmitted by an internal bi-directional transceiver that is based on the standard ZigBee Pro protocol. A dedicated Low Frequency (LF) receiver, in the WKVD, supports advanced maintenance, calibration, and provisioning procedures using the Operator Device (OD).

The WKVD provides real-time information about a valve's status directly into the control system thereby reducing failure and risk while increasing safety and yield.

2.2 Valve Device LEDs and Indicators

Table 1 and **Error! Reference source not found.** present the colors and functions of the four LEDs on the WKVD.



Table 1: LED Colors and Functions

Description	Color	LED
indicates ZigBee transmission is taking place	Green	TX

Description	Color	LED
Indicates that the valve is closed or not fully open	Red	CLOSE
Indicates that the valve is open or not fully closed	Green	OPEN
indicates that the WKVD is registered on the network and has a TWKVDR recipient address	Yellow	ONLINE

LED activation is as follows. All LED indications are composed of blinking every 30 seconds (configurable between 3 and 100 seconds) and:

- At every change in a valve's position (angle)
- At every transmission by the WKVD

Additional LED indications are as follows:

- For a "partially open" valve both OPEN and CLOSE LEDs blink.
- For an "undefined position" of the valve neither the OPEN nor CLOSE LEDs blinks.

During special operations such as: ON, OFF, calibrate and OD LF commands, a flashing sequence of LEDs is activated. (Online LED → Open LED → Close LED).

Starting from firmware version 2.26, additional LED indications are available as follows:

- While WKVD is offline, the ONLINE LED blinks twice every 7 seconds.
- While WKVD is online and performing handshake, the OPEN LED blink followed by the CLOSE and ONLINE LEDs, every 7 seconds.

2.3 WKVD Specifications

The specifications for the WKVD are provided in the following table.

Table 2: WKVD Specifications

Explanation	Feature
Wireless Communication (RF)	
Two way Radio – IEEE 802.15.4 – 2006 at 2.4 GHz.	Mode
ZigBee Pro version	Communication Protocol
+3dBm	WKVD max Transmitted Power
Internal +2 dBi peak. Optional external antenna F-SMA connector (WKVD mounted or remote)	WKVD Antenna

Explanation	Feature
Open space: about 70m Indoors at non obstructed environment: about 25 m.	Communication range WKVD to WKVDR
Less than 0.1 sec in average (assuming one hop)	Latency
Approach	
Angle of measurement of valve stem position.	Measurement
Transmits its status immediately when valve has moved more than 1.50 degrees or every 15 minutes (configurable).	Update Rate
Between 30 milliseconds to 10 minutes (user selectable in discrete steps)	Sense Movement Duration
Quarter turn: -10.0 to +100.0 degrees	Sector
0.10 degrees	Resolution
±1.0 degrees	Accuracy
Each message is sent by the WKVD with a real time stamp.	Message timing
Low Frequency (LF)	
125kHz (3 channels): Short range receiver continuously open, even when WKVD is turned OFF: WKVD on/off, calibration, identification, commissioning, test, etc.	Characteristics
~3 mV each channel	Sensitivity
1,366 bps	Data Rate
OOK Manchester	Modulation
~1 meter	LF Range (with OD)
General	
WKVD internal temperature, battery voltage and unit's house-keeping parameters.	Additional WKVD Data
WKVD can queue up to 753 events (movements) while connection to the network is offline	Internal buffers
A battery pack containing 2 Lithium Tadiran ½ AA TLL5902. Field replaceable.	Battery
5 years under nominal conditions: four valve position changes per	Battery Life

Explanation	Feature
hour and 20 milliseconds sampling rate.	
After 1.50 degree move of valve, WKVD collects up to 64 readings of valve position every 5 ms up to 9.8 sec (user selectable in discrete steps) and all readings transmitted as a packet.	Valve Transition Measurement (optional)
Both ZigBee Pro stack and MCU application can be upgraded through the ZigBee link (Download Over Radio).	WKVD software upgrade
Nylon 12 with 50% glass beads, UV stable	Case Material
-40°C to +80°C	Operating Temperature
IP65 grade	Sealing
FCC ID: X2VQTR000X4 IC: 8876A-QTR000X4	FCC / IC
Category 2 / Class 1 / Division 1 Ex II 1 G Ex ia IIC T4 -40C < Ta < +80C Intrinsic safety Zone 1/21	ATEX

2.4 Installation

The WKVD is a module which should be installed in a compatible box.

The WKVD has an effective valve position (angle) measurement range of about 110°. On the stem of the WKVD, an axle spline indicates the position of the stem (valve). On the bottom of each WKVD there are two etched marks indicating a range of 90°. This is the effective motion zone of the WKVD's stem to measure the position of the quarter turn valves (**Error! Reference source not found.**).



To avoid erroneous behavior, when installing the WKVD on a quarter turn valve or on an actuator verify that the axle spline is always positioned between the two etched lines (the motion zone).



All WKVDs are factory calibrated such that the motion zone of the position measurement range is centered. Do not remove the lower PCB from its casing, or factory calibration might be damaged.

1. When installing the WKVD on a quarter turn valve or actuator, verify that the axle spline is always positioned in the range between the two etched marks indicating the motion zone.
2. Perform the calibration procedures as presented in Section 0 in order to ensure that the relative positions of the WKVD and the valve are correct.
3. After mounting the WKVD on a valve or an actuator, calibrate the WKVD to set the open and closed boundaries of the valve/actuator. Calibration is performed by the OD communicating with the WKVD (refer to Section 0). This process **must** be performed locally using the OD via LF. This ensures the accuracy of the configuration.

If installation is performed on an active line, partial calibration can also be implemented. When either the OPEN or CLOSED angle is set, the WKVD will automatically suggest the corresponding other angle as 90 degrees away. To achieve partial calibration, reset previous calibration angles prior to setting the current angle (RESET CAL – by OD).

The WKVD can also report a custom valve angle which has been preset in the process line to facilitate a position report which is defined as **CUSTOM**. This third state provides the user with the ability to return to a predefined setting for a particular valve. For example, the user sets the valve to a capacity setting which will be reported upon by the WKVD to the OD and/or EMS when the WKVD is within the tolerance values of the Custom state. This angle is always measured from the 0 angle, regardless of valve angle notation (open or closed). The CUSTOM angle can be set either on the OD (CAL>Set Custom) or the EMS.



WKVD must be powered on before calibration can take effect.

2.5 Powering Up and Shutting Down the WKVD

The WKVD is delivered in a shutdown state. While in this state, the motion sensing capabilities and the wireless radio are shutdown, and the device is ready to receive the LF command to power up and join a wireless ZigBee network.

1. To power up and join the device to a wireless network, use the OD and send the **JOIN** (or **JOIN ALL**) command to the WKVD.

When the WKVD powers-up, a distinct flashing sequence of the LEDs is visible. The operation normally takes a few seconds. During this sequence, the WKVD validates that the battery has sufficient power for the initial process. If this is not the case, the power-up sequence might take longer (during which the LEDs are still flashing), until the power levels are high and stable.



If this sequence takes longer than 4 minutes, replace the battery. If power up does not complete, contact your local distributor.

Once powered up, the WKVD will automatically join the network that the OD is joined to. If the network does not exist (or the OD is not joined to a network) the WKVD will look for any other ZigBee Pro network that conforms to the set of configuration (passed by the OD). If no such network exists, the WKVD will keep trying to join the same network at slower intervals until the network is found / formed or until the WKVD is shutdown.



Starting from firmware version 2.26, the WKVD will indicate the sequence of joining to the network with blinking the ONLINE LED twice every 7 seconds.

2. To shut down the WKVD, use the OD and send the **LEAVE** (or **LEAVE ALL**) command. Once the WKVD receives the **LEAVE** command, it will flash its LEDs send an acknowledgement to the OD and shutdown.

The shutdown sequence normally takes a few seconds. However, if the WKVD has messages to send, it will keep sending these messages until completed or until 60 seconds have passed. Then a second sequence of LED flashing will occur and the WKVD will leave the network and shutdown.

When shutdown, movement of the WKVD stem is not sensed by the WKVD and the LEDs do not blink as a consequence to the movement.

The EMS and PLCA are aware of these events and reflect the change in the WKVD state. When the WKVD powers up and joins the network, it also appears in the EMS tabular display (if not already present) and becomes **ONLINE**.

When shutdown, the WKVD informs the EMS (and PLCA) of this event prior to shutting down, and the EMS presents the WKVD as offline and **SHUTDOWN**.

2.6 Configuration

Introduction

As part of the installation process, the Valve Devices are configured using either the EMS (remotely) or the OD (locally). The following information is stored inside the WKVD:

- Extended ID information
- Thresholds
- Setting operational parameters
- Calibration

Extended ID information

A Network Name (an alias of eight alphanumeric characters) is set via the OD. The WKVD and T/WKVDR remember this name and this prevents a device from accidentally joining another network in the vicinity.

Each WKVD has a unique factory set ID (the MAC address) allowing the management system to uniquely identify it and manage its data stream.

In addition to that, user friendly IDs – more easily remembered and understood by technicians – such as the valve Tag and serial number can be used.

To manually select a specific device, for a one-on-one session with the OD, perform the following options:

1. On the back side of a WKVD locate the label with its unique 6-characters ZigBee MAC address.
2. On the OD, in the Default mode, key in the MAC address by using the **Up/Down** keys to select the character and the **Tab** key to select the character location.
3. When done, press **Enter**. The selected device will open a one-on-one communication session with the OD.

This is also discussed in Section **Error! Reference source not found..**

Thresholds

The WKVD continuously measures various status parameters such as the dynamic movement of the valve, ambient temperature and battery voltage. These measurable parameters are normally limited to a threshold or range.

Exceeding a threshold generates an alarm in the WKVD which is delivered with the normal status message to the EMS (and from there to the HMI/PLC). These thresholds and/or ranges are configurable as part of the system configuration. This is discussed in Section **Error! Reference source not found..**

Setting Operational Parameters

Operational parameters define the behavior of the WKVD. For example:

- How often the WKVD should send a keep-alive signal.
- How often the WKVD should poll for pending messages (from the EMS).
- How often the WKVD should cause the LEDs to blink.
- How fast the WKVD stem should be sampled.

This is discussed in Section **Error! Reference source not found..**



Changing operational parameters can affect the battery life of the WKVD and/or the sensing capabilities of the motion sensor.

Calibration

After mounting the WKVD on a valve or an actuator, the WKVD should be calibrated to set the open and closed boundaries of the valve/actuator. This process **must** be performed locally using the OD via LF. This ensures the accuracy of the configuration. Calibration, from the OD point of view, is discussed in Section **Error! Reference source not found.**

In order to achieve a successful calibration of the WKVD on the installed valve/actuator, follow these simple steps:

1. Verify that the WKVD is powered and joined to the same network of the OD.
2. Open an LF session between the WKVD and the OD
3. Navigate to the **CAL** menu in the OD and key in the following commands. Make sure that each command is acknowledged before moving to the next one.
 - o Remove previous calibration using **RESET CAL**.
 - o Where applicable make sure the valve is completely open and set the open angle using **SET OPEN**.
 - o Where applicable make sure the valve is completely closed and set the closed angle using **SET CLOSE**.
 - o If required set the custom angle using **SET CUSTOM**.
 - o Apply the new settings using **APPLY**.



The order of calibration **SET OPEN** before **SET CLOSED** or vice versa is not important. Perform the above steps at your convenience.

The WKVD can also be run from default values or partial calibration. This is pertinent when an installation is performed on a "hot line". A complete calibration process can be completed at a later time (after the valve has changed its state).



Partial calibration – only one state (OPEN or CLOSED) has been calibrated. The WKVD will assume that the remaining state is 90 degrees away.

Complete calibration – both OPEN and CLOSED states have been calibrated using the OD.



When completing a partial calibration, do not send **RESET CAL**, otherwise the previous calibrated angle will be erased.

2.7 Troubleshooting

Device Does not Power Up

1. Verify that the device has an installed battery pack.
2. Using the OD, send a **Join/Join All** command to the WKVD(s) from a distance of 10 to 70 cm (refer to Section **Error! Reference source not found.**).



Sending a signal when the OD is too close to the WKVD (a few centimeters distance) will saturate the WKVD receivers and the transaction will be aborted.

3. When a successful transaction occurs, the LEDS flash in sequence for a few seconds (refer to Section 2.2).

Device Is not Presented in the EMS

1. Verify that the EMS is active.
2. Verify that at least one TWKVDR is online (refer to Section **Error! Reference source not found.**).
3. Verify that the TWKVDR is connected to a wireless network (refer to Section **Error! Reference source not found.**).
4. Verify that the WKVD and TWKVDR are in the same network.
5. If the NET LED does not flash during valve movement or LED flashing intervals:
 - o Verify that the OD is in the same wireless network as the TWKVDR and then shut down the WKVD and join it again to the active wireless network (refer to Section **Error! Reference source not found.**).
 - o The WKVD has not completed handshake with the TWKVDR. Wait 2 minutes for the action to be completed or reset the TWKVDR (refer to Section **Error! Reference source not found.**).
 - o The WKVD is not in the same Connectivity Group as the TWKVDR and therefore cannot perform a handshake with the TWKVDR. Using the OD, open a session and set the Connectivity Group of the WKVD to 0. Alternatively, using the OD, open a session, read the Connectivity Group on the WKVD, and set it to the same Connectivity Group as that of the TWKVDR (or the opposite).



Starting from firmware version 2.26, the WKVD will clearly indicate the following states:

WKVD is not joined to the wireless network – the ONLINE LED blinks twice every 7 seconds.

WKVD performs handshake – the OPEN LED blinks once followed by the CLOSE and ONLINE LEDs. The sequence repeats every 7 seconds.

Device Presents Invalid Angle Readings

If valve angle readings are erratic or non-continuous (from 0 to -10 and then 110 to 50 (refer to Section 2.4).



If the valve has not been properly installed, the stem might be outside the valid range of the motion zone indications resulting in this inconsistent angle report.

Device Performs Continuous Resets (LEDs Constantly Flashing in Sequence)

1. The WKVD battery pack usage may be momentarily overextended. Allow it to refresh for up to 4 minutes before continuing.
2. The fuse on the battery pack is blown. Verify and replace the battery pack.



The WKVD LEDs continue to flash even if the fuse is blown.

3. The WKVD battery may be run down. In such a case, replace the battery.
4. The WKVD configuration may be corrupted. In such a case, replace the WKVD and return the faulty unit to your local representative.

OD/WKVD Communication Is Temporarily Suspended

If communications are suspended and acknowledgements are not received by the OD, or the WKVD does not react (LEDs flashing), reopen the session between the WKVD and the OD (refer to Section **Error! Reference source not found.**).

Representation on the WKVD Is Unusually Slow

This is usually caused by a temporary impediment to the wireless signal caused by an obstacle blocking the signal (e.g. a parked vehicle). If the obstacle cannot be identified or moved, add another WKVDR. The TX LED of the WKVD flashes more frequently than usual in such cases.

WKVD Reacts but Does not Return an Acknowledgement to OD

1. Verify that the OD is in ONLINE as presented in Section **Error! Reference source not found.** and in the same network.

2. Verify that the ZigBee network is properly functioning as presented in Section **Error! Reference source not found..**



Without ZigBee network support, the OD can use only one way communications on the Low Frequency (LF) channel (from OD to WKVD). Thus no acknowledgement from the valve device can be received. Only an OD operating in the same wireless network as the WKVD can receive acknowledgements from the designated WKVD.

The WKVD Tag or Setting Is not Displayed on the EMS

If a WKVD has migrated to the current network from a shutdown or out-of-reach network, the WKVD will only send its settings and will not update its Tag.

In order to update the Tag of the WKVD in the EMS (or PLCA), perform the following steps:

1. If the EMS was restarted on a new computer or the EMS database was erased or corrupted, send a Group Report from the EMS to request all WKVDs and T/WKVDRs to report their configurations (refer to Section **Error! Reference source not found..**).
2. If the previous step was unsuccessful or not applicable, power down (LEAVE) the WKVD and power it up again (JOIN).

WKVD Does not Answer to IDENT Signal from OD

Refer to Section 0.

Valve Dynamics are not Shown in the EMS

1. In the EMS **Settings** tab, verify that WKVD configuration is as follows:
 - o Valve Type is **ACTUATED**
 - o Operation Mode is set to **DYNAMICS**.
2. If the reported configuration is different, change to the above, and click **SEND** on the EMS.
3. Verify that the valve has changed its configuration by moving it a few times and click **REFRESH**.
4. After performing the above, move the valve again and the dynamics should be displayed on the EMS **Services** tab.

WKVD Returns to EMS after Deletion from Table

1. Deleting the WKVD from the table only clears it from the EMS database but does not turn the device off.
2. To turn off the WKVD, open a session between the WKVD and OD, then press **LEAVE** on the OD.

Faulty WKVD Calibration Results

If, during a Calibration session on the OD, steps are not performed in sequence, or a WKVD does not receive some of the commands, the resulting calibration may be faulty.

1. In general, if an Acknowledge is not received for a desired command and the "+" is not displayed, resend the same command again.
2. To perform partial calibration (only open or only closed), send a **Reset Cal** command prior to sending the **Set Open** or **Set Close** commands. Calibration will be applied only after sending the **Apply** command. In any step of the process, failure to receive the "+" acknowledgement might indicate that the WKVD has not received the desired command, in which case the command should be resent.
3. If a "partial calibration" was performed and you wish to complete it, do not send **Reset Cal**, otherwise the previous stored angle settings will be erased. Refer to Section 0.



There is no harm in sending the same command twice as long as the WKVD does not move.

WKVD Information is not Presented in HMI/PLC

Refer to the Chapter **Error! Reference source not found.** for a detailed explanation about system connectivity. Following are a few common instances in which WKVD information does not reach the HMI/PLC.

2.7.1.1 EMS Connectivity

1. If using EMS for connectivity (rather than PLCA), verify that connectivity is enabled (**File>Connect**).
2. Perform a reconnection by choosing **File > Disconnect** and then **File > Connect**.
3. On the WKVD Services tab, press **Refresh Connectivity** (refer to section **Error! Reference source not found.**).

2.7.1.2 In All Connectivity Cases

1. Verify that Valve Tag in the System tab in the EMS is correct (case sensitive).
2. Verify that the HMI/PLC is physically connected and/or properly configured, by checking the WATCHDOG signal.



The WATCHDOG signal is a signal from the application side of the EMS/PLCA to the HMI/PLC. When this signal stops changing, the communication state is offline (refer to Section **Error! Reference source not found..**)



ATEX (in Europe) approves replacement of the battery pack in the field (Zone 1). North America standards do not permit this.

2.8 FCC Compliance

WKVD Certifications

The Eltav Wireless Monitoring WKVD complies with Part 15 of FCC Rules and Regulations. 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.

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 in a commercial installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with these instructions, 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/her own expense.

Intentional or unintentional changes or modifications must not be made to the VD or other components unless under the express consent of the party responsible for compliance. Any such modifications could void the user's authority to operate the equipment and will void the manufacturer's warranty.

FCC FCC ID: X2VQTR000X4

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.

IC: Industry Canada 8876A-QTR000X4

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.



Conforms to ANSI/UL std XXX

Certified to CAN/CSA std CXX No.XX

Appendix - Warranty Information



Eltav reserves the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to Eltav's terms and conditions of sale supplied at the time of order acknowledgment.

Eltav warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with Eltav's standard warranty. Testing and other quality control techniques are used to the extent Eltav deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

Eltav assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using Eltav components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

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Appendix - Warranty Information



IMPORTANT

The equipment contains communication devices. Any changes or modifications made to the equipment without the written consent of ELTAV, and its resellers or distributors, can nullify the user's authority to operate this equipment.

The user assumes all risks associated with the use and handling of the equipment, and specifically acknowledges that ELTAV, and its resellers or distributors, will not be liable for any damages of any kind, including personal injury or property damages resulting from use of the equipment.