User Guide

COIN **MOV**

Ref. IDF1062B

RFID MOVEMENT AND ANGLE SENSOR

INDEX

1 INTRODUCTION

The COIN **MOV** is a **3-axis movement sensor** by Active RFID. The COIN MOV emits information about the movement or the angle according to a configurable emission cycle (with ELA Read Write Software), from each 220ms to each 12h.

It includes 3 operating modes:

- Movement detection
- Angle crossing
- Angle measure

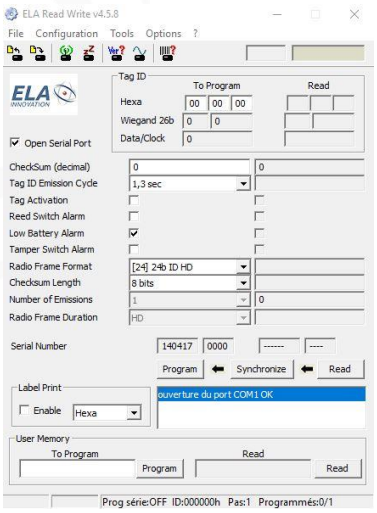
1.1 PURPOSE

This document explains how the COIN **MOV** works and how to set up parameters: operating modes, detection thresholds, emission cycles etc.

1.2 PREREQUISITE

- COIN **MOV** sensor

- SCIEL **PROG IR** Tag programmer – Ref. SCP02B
- **ERW** Configuration software
  Download link: https://elainnovation.com/getFile2.php?erw



- Any SCIEL READER with the **ETER software**
  Download link: https://elainnovation.com/getFile2.php?eter

1.3 COMPLIANCE

all readers of the **SCIEL READER range** are **compliant** with the **COIN MOV.**

2 MOVEMENT DETECTION

2.1 DATA FRAME FORMAT

All the frames are in hexadecimal

[NNXXXMMMLL]

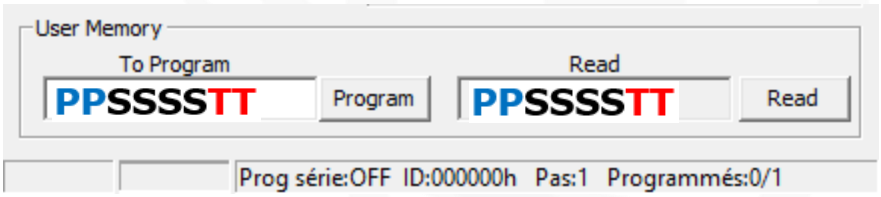
- NN: Radio reception level
- XXX: Tag's ID number.
- MMM: information about movement. MMM = 000: No detected movement.
  MMM = 001: detected movement.
- LL: Reader's ID number.

Example: 8EA1200101: A12 tag's movement detected by reader 01with a radio signal reception level of 8E.

2.2 USER SETTINGS

The radio frame format to set is « **12 bits ID + 12 bits MOVX** ».
The setup is done in ERW in "**User Memory**" field.

Data format : **PPSSSSTT**



PP: Pre-divisor set to 01: emission cycle set according to tag's recurrence and on movement detection if Reception level > Threshold. Do not modify.

2.2.1 SSSS: Threshold

Threshold is the value between 0000 and 0FFF from which the **COIN MOV** will detect a movement.
The default value is 0010.
It corresponds to a **very slight movement**.

2.2.2 TT: Delay

Delay is the amount of time the tag doesn't emit. It prevents burst type emissions from the tag.

Tag's emission cycle must be higher than the delay.

When the sensor's measured value reaches threshold, emissions are made instantly.
When the frame is sent, the tag doesn't emit during the TT time.

TT values

TT	HEX
1s	14
2s	16
4s	18
8s	1A
16s	1C
32s	1E
1m4s	20
2m8s	22
4m16s	24

- If there was any detected movement during TT time, the tag will emit the "**movement**" **frame** once the TT time has elapsed.
- If there wasn't any detected movement during TT time, the tag will **emit** the "**movement**" frame when sensor's measured **value** reaches threshold detection.
- When the **measured value is lower than the threshold**, only one emission "**no movement**" is made, according to the emission cycle set with ERW.

Example:

- Tag's emission cycle: 50 minutes
- TT Delay: 4s

If no movement has been detected, the tag emits the "movement" frame, and will not emit during 4s, even if there are movements.

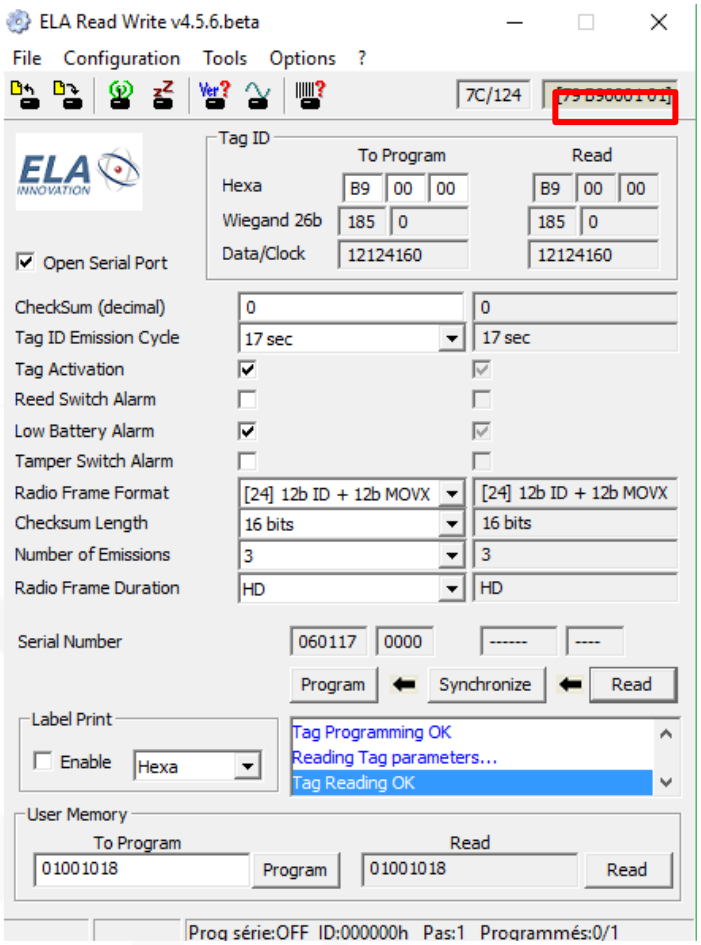
After 4s:

- If there was any detected movement, the tag emits "movement" frame.
- If there wasn't any detected movement, the tag doesn't emit.

After 50 minutes, the tag will emit "movement" frame if a movement is detected at this very moment.

If not, the tag will emit "no movement" frame.

2.2.3 *Threshold setting operating method*



1. Set a low threshold: **0010.**
2. Set a **slow emission cycle**: **17 seconds**.
3. **Set a delay time**: **4 seconds**.
4. Near IR programmer, give the **tag a movement according to the desired behavior** (place the tag in real situation).
5. Visualize **frame reception**. The **movement information** is on the **three last quartets**.

Reminder: movement information is « 001 »

6. The value will be **refreshed instantly at each movement**.

Sensor's characteristics:

- Data is coded on 12 signed bits (3 quartets)
- Measuring range: - 2G to +2G
- Resolution: 1mG/LSB

3 *ANGLE CROSSING*

3.1 *DATA FRAME FORMAT*

All the frames are in hexadecimal

[NNXXXMMMLL]

- NN: Reception level
- XXX: Tag's ID number.
- MMM: crossing information + crossing counter (see below)
- LL: Reader's ID number.

FFF: Hexadecimal to binary conversion is needed to read the information.
The use of the Windows calculator in programmer mode is highly recommended.

Interpretation is made as shown below:

cccc cccc ccxf

- cccc cccc cc: crossing counter.
- x: not used.
- f: equals 1 a crossing is detected, 0 if not.

Example: 8EA12025 01

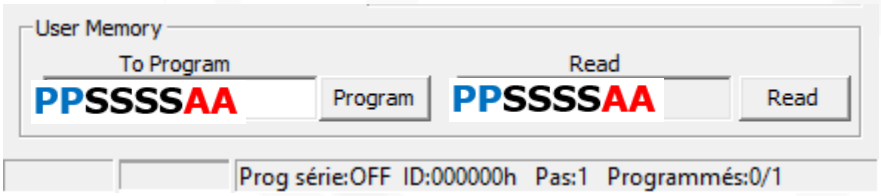
025 in hexadecimal is 0000 0010 0101 in binary

- f = 1: There was at least one crossing.
- cccc cccc cc = 0000 0010 01 = 1001 (we remove useless zeros). This number is 9 in decimal, which means there was 9 crossings.

3.2 USER SETTINGS

The **radio frame format** to set is « **12 bits ID + 12 bits ANG BOOL** ».
The setup is done in **ERW** in "**User Memory**" field.

Format des données : **PPSSSSAA**



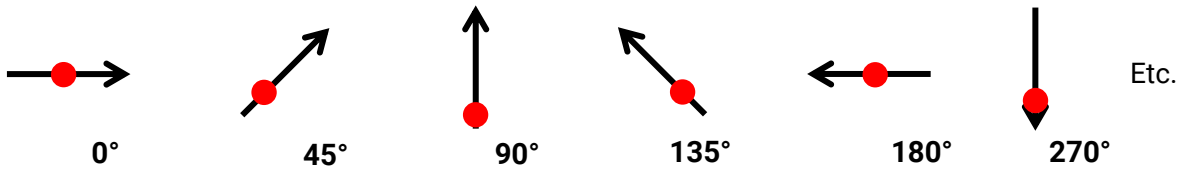
PP: Pre-divisor set to 01 (tag's emission cycle)

3.2.1 SSSS: Threshold

This setting determines the angle to reach to emit crossing frame.

Important
When the tag is making a complete rotation, **thresholds different from 90° and 180° are crossed two times!**
As a matter of fact, the accelerometer measures gravity force applied on it to measure angle.

During a complete rotation, we have:



We notice that the accelerometer will detect the same amount of gravity at 0° and at 180°, at 45° and 135° etc. But at 270° and 90°, the measure will be sign opposed.

Setting values are going from 0400 (90°) to 0C00 (270°). All values between 0400 and 0C00 have two angles: the chosen angle, and the chosen angle + 90°.

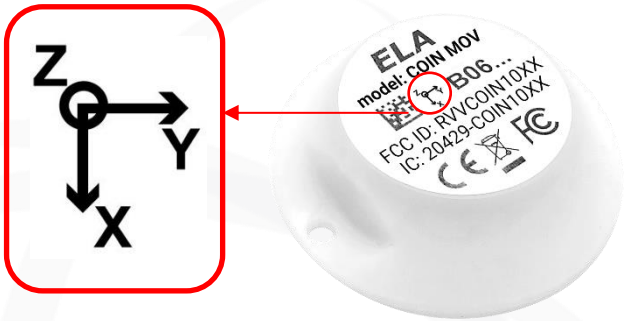
For example: setting a 0600 threshold will correspond to a 0° angle and 180° angle.

3.2.2 AA: Axis

This parameter allows to choose the axis. These axes are designated according to the housing.

- 01 = *X* axis
- 02 = *Y* axis
- 03 = *Z* axis

- 11 = -*X* axis
- 12 = -*Y* axis
- 13 = -*Z* axis



By laying the tag on a flat surface and changing the sign of the chosen axis: we will be able to reach a determined angle following to ways of rotation:

- Clockwise for positive axes
- Anti-Clockwise for negative axis.

3.2.3 THRESHOLD SETTING OPERATING METHOD

1. Set a Pre-divisor to 01.
2. Set an approaching value of the angle to reach.
3. Set an emission cycle of 1.1sec.
4. Lay the tag flat.
5. Give the tag a rotation movement.
6. Read the returned value: If the three last figures before the reader's ID changes, a crossing is detected.

4 ANGLE MEASURE

4.1 FRAMES FORMAT

All the frames are in hexadecimal

[NNXXXMMMLL]

- NN: Reception level
- XXX: Tag's ID number.
- MMM: Angle value
- LL: Reader's ID number.

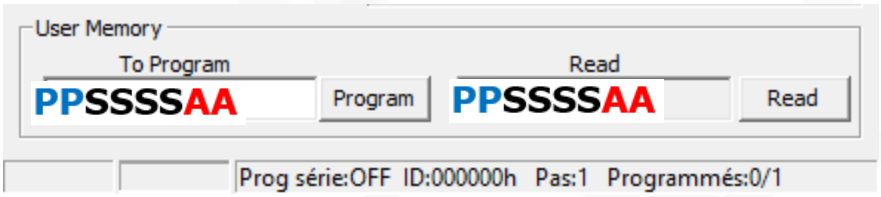
Example: 8EA1260001: angle of 600 of tag A12 detected by reader 01.

A value equal to 600 means an angle of 45° or 135° (see 3.2.1).

4.2 USER SETTINGS

The **radio frame format** to set is « **12 bits ID + 12 bits ANG** ».
The setup is done in ERW in "**User Memory**" field.

DATA FORMAT: **PPSSSSAA**



PP: Pre-divisor set to 01 (tag's emission cycle)
SSSS: Default value : 0800
AA: Axis (see 3.2.2)

4.3 SETTING OPERATING METHOD

1. Set a Pre-divisor of 01
2. Set the default threshold 0800.
3. Set an emission cycle: 1.1sec.
4. Lay the tag flat.
5. Give the tag a rotation movement.
6. Read returned value.

5 DOCUMENT VERSION

VERSION	DATE	AUTHOR	MODIFICATIONS
1	06/03/2018	Benoît Bousquet	Creation

STATUS	DRAFT	CORRECTION	FINAL
			X
DISTRIBUTION LEVEL	CONFIDENTIAL	LIMITED	GENERAL
			X