COIN MOV
Ref. IDF1062B

RFID MOVEMENT AND ANGLE SENSOR
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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

- Any SCIEL READER with the ETER software

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

\[ NN \text{ Radio reception level} XXX \text{ Tag's ID number} MMM \text{ information about movement} LL \text{ Reader's ID number} \]

- **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 01 with 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: **PPSSSS TT**

**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.

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- 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

```
[NNXXXMMMMLL]
```

- 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 CXXf**

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

Example: **8EA1202501**

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:

- 0°
- 45°
- 90°
- 135°
- 180°
- 270°
- Etc.
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-divider to 01.
2. Set an approaching value of the angle to reach.
3. Set an emission cycle of 1.1 sec.
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

[NNXXXMMMML]

- 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

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