PRESS'O

USER GUIDE

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Embedded software is based on Nke Watteco proprietary drivers and applicative code and operates on the Contiki kernel from the SICS (Swedish Institute of Computer Science).

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DOCUMENT HISTORY

Date	Revision	Modification Description
March 2016	1.0	First revision
March 2016	1.1	Adding picture and FCC label

CONTENTS

1 INTRODUCTION

This document describes the usage of the Press'o sensor. It is necessary to read the LoRaWAN Sensors Behavior on Public LoRaWAN Networks guide and the Application Layer Description guide in prerequisite for all generic information or to have more details.

1.1 GENERAL DESCRIPTION

The Press'o sensor manages two different power supplies, one is external and energizable in 9-15V the other one is internal on a disposable A 3.6V battery. To use the external power supply, just connect a compatible one on the "Ext power" connector.

For connector, it is preferable to use several single wires with a gauge of 20-26 AWG. As the connectors pluck the wires plugged to their bottom at about 4mm of the wire-end, strip the wires on about 5 to 6 mm of their extremity pluged into the connector.

For watter protection, it is recommended to use moulted cable.

The housing is intended to be installed inside or outside a building but sheltered from rain, splash water and direct sunlight.

Switch on the switch "On/Off" to start-up the device. The buzzer rings until an association.

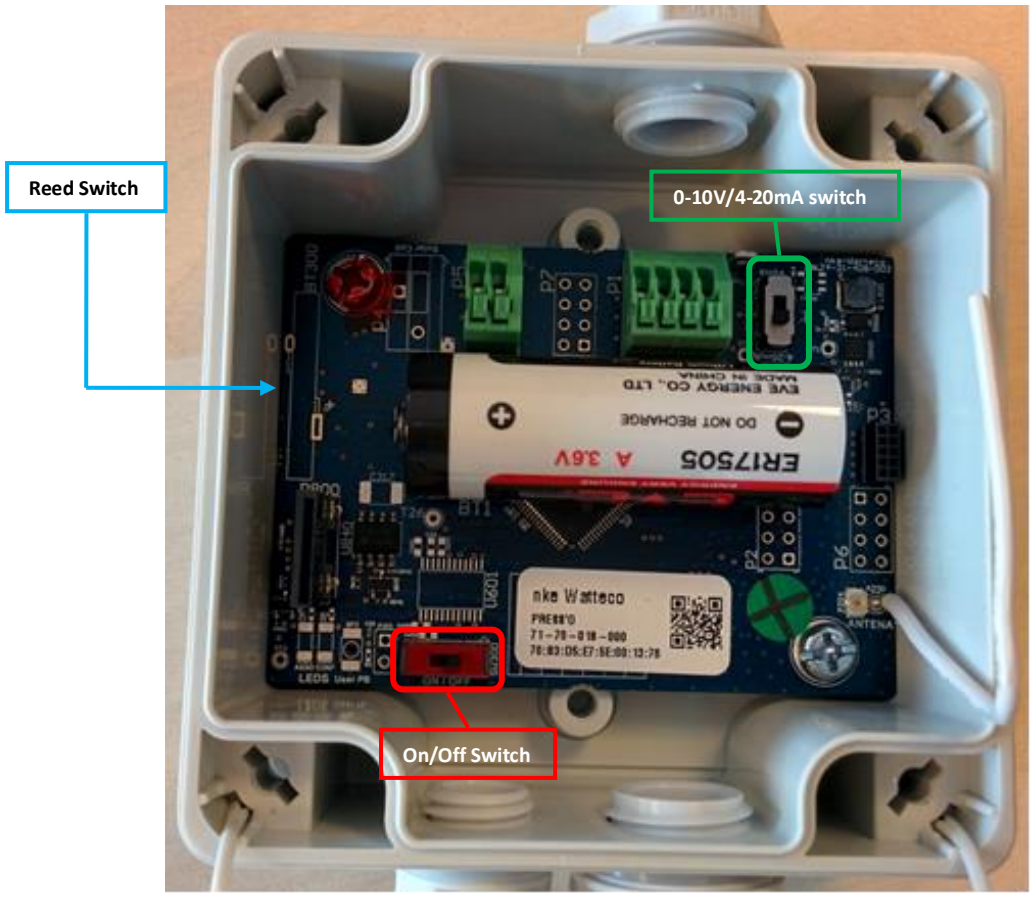


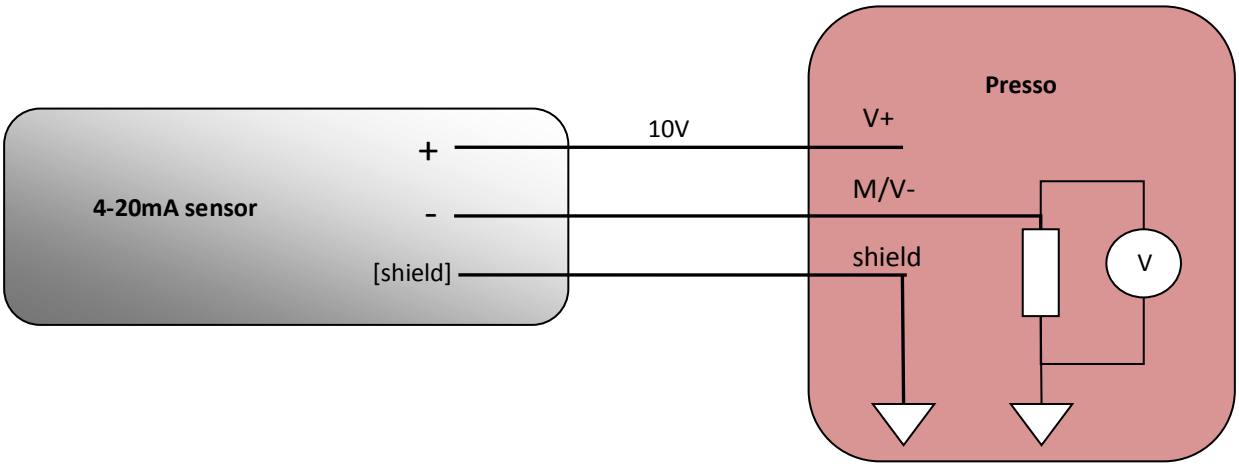
FIGURE 1 - INSIDE THE PRESS'O SENSOR

2 ELECTRONIC

To select the 4-20mA mode or the 0-10V mode, it is necessary to put the switch on the right position.

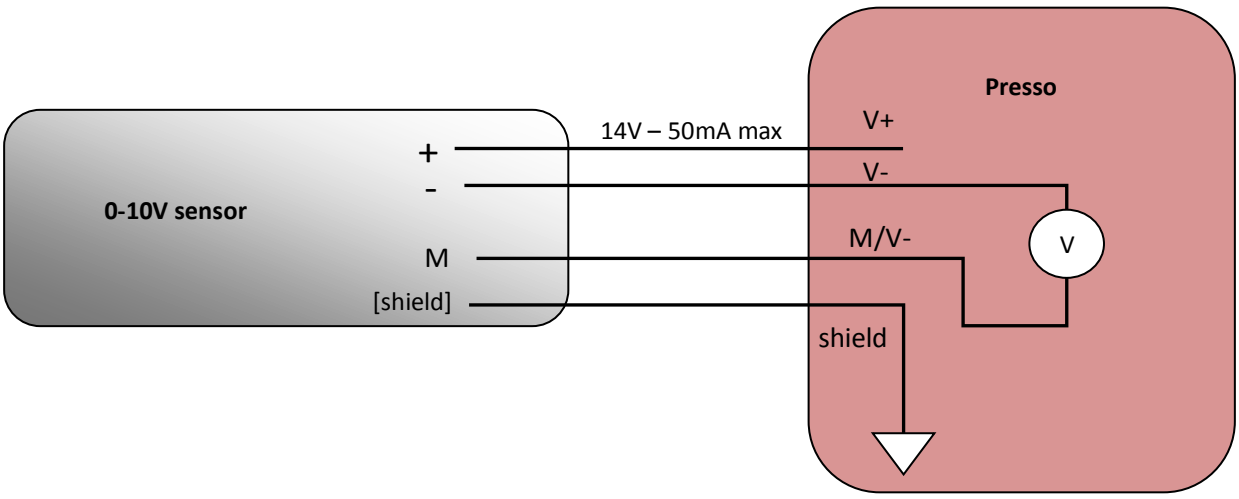
2.1 4-20 MA

In the 4-20 mA mode, the V+ (power supply of the external sensor) is powered on during 120 ms at **10 V**.



2.2 0-10 V

In the 0-10V mode, the V+ (power supply of the external sensor) is powered on during 120 ms at **14V** with a max current of **50mA**.



2.3 KNOWN COMPATIBLE PRODUCT

Press'o sensor is compatible with the set of product: CTE / CTU / CTW8000…CS from First Sensor.

3 CASING

Dimension:	84 * 82 * 55 mm
Combustion behaviour:	UL94HB

4 HUMAN MACHINE INTERFACE

The Press'o has a buzzer that allows it to "communicate" with the end-user. The link between the sounds it makes and the sensor status can be seen in the array here below.

A reed switch (or magnetic switch) is available. It is possible to use a magnet to activate it and makes specific actions on the sensor (Switch off, switch on, Re-associtation…) described in the LoRaWAN Sensors Behavior on Public LoRaWAN Networks guide.

Sound	Sensor status
Bip --- 2sec --- Bip …	Network searching
BipBipBipBip	Association
BipBiiiipp --- 3sec --- BipBiiiip …	Configuration Mode

5 APPLICATIVE LAYER

The Press'o device is a sleepy Class A device. It implements "Analog Input" clusters, associated to their Inputs. The link between the connectors and the EndPoint is done heres below:

Connector	End Point	Cluster	Units
V+ | M/V-	0	Analog Input [4-20mA]	mA
V+ | V- |M/V-	1	Analog Input [0-10V]	mV

Press'o integrates the following clusters:

Cluster	*Cluster name*	*Managed attributes*
0x0000	Basic	All
0x0050	Configuration	All
0x000C	Analog Input	All

The periodicity of the measure is based on the "min" field of the "configure reporting" command.

6 CONSUMPTION

6.1 EUROPE MODE

Lifetime Simulator

PHY Frame Size Tx	75	Bytes
PHY Frame Size Rx (ACK)	15	Bytes
Transmission period	Period	s
Duty cycle	0.10%	
Battery :		
Theoritical capacity	**3600**	mAh
Actual capacity	3060	mAh
Radio Consumption:		
Transmission	40	mA
Reception	10	mA
Measuring (Rx)		
Measuring Period	**3600**	s
Measuring duration	0.12	s
Active measuring consumption	50	mA
Basic consumption (sleeping) :	0.004	mA

Duty cycle Respect

Period(s)/SF	7	8	9	10	11	12
60	No	No	No	No	No	No
120	Yes	No	No	No	No	No
600	Yes	Yes	Yes	No	No	No
3600	Yes	Yes	Yes	Yes	Yes	Yes
7200	Yes	Yes	Yes	Yes	Yes	Yes
14400	Yes	Yes	Yes	Yes	Yes	Yes
86400	Yes	Yes	Yes	Yes	Yes	Yes

Estimated Lifetime (in year)

Period(s)/SF	7	8	9	10	11	12
60	4.24	2.49	1.43	0.80	0.36	0.21
120	7.93	4.79	2.79	1.59	0.72	0.41
600	26.18	18.28	11.83	7.20	3.45	2.01
3600	50.29	44.18	36.22	27.27	16.19	10.38
7200	55.39	51.47	45.63	37.81	25.64	17.76
14400	58.35	56.10	52.44	46.87	36.22	27.58
86400	61.07	60.64	59.89	58.57	55.19	51.12

The estimation is done for a 0-10V sensor which consums 50 mA during 120 ms all the 1 hour.

6.2 US MODE

Battery sensor: life time Estimator

PHY Frame Size Tx	75	Bytes
PHY Frame Size Rx (ACK)	15	Bytes
Transmission period	Period	s
Battery :		
Theoritical capacity	**3600**	mAh
Actual capacity	3060	mAh
Radio Consumption:		
Transmission	40	mA
Reception	10	mA
Measuring (Rx)		
Measuring Period	**3600**	s
Measuring duration	0.12	s
Active measuring consumption	50	mA
Basic consumption (sleeping) :	0.004	mA

Estimated Lifetime (Years)

Period(s)/SF	**7**	**8**	**9**	**10**	**8**
60	4.38	2.58	1.48	0.83	8.90
120	8.18	4.96	2.89	1.65	15.55
600	26.73	18.75	12.18	7.43	38.70
3600	50.62	44.63	36.76	27.82	56.10
7200	55.59	51.78	46.06	38.34	58.74
14400	58.46	56.28	52.72	47.28	60.16
86400	61.09	60.68	59.95	58.67	61.39

The estimation is done for a 0-10V sensor which consums 50 mA during 120 ms all the 1 hour.

7 EXAMPLES

In the following examples, the 6lowpan header has been removed for an easier understanding. See 6LOWPAN LAYER OVER LORAWAN™ in the LoRaWAN Sensors Behavior on Public LoRaWAN Networks guide, for more details.

7.1 CONFIGURE A BATCH REPORT ON ANALOG INPUT, AND VOLTAGE BATTERY

Specification: *Timestamp and record the Voltage of a 0-10V sensor with a resolution of 0.1V, a value has to be saved at least all the 30 minutes or on a rise of 0.5V.* Timestamp and r*ecord the battery voltage with a resolution of 0.1V, a value has to be saved at least all the 24 hours. All data have to be concatenated and sent at maximum all the 24 hours.*

Solution: The solution to concatenate several different physical values in the same frame is to use the batch reporting. For the batch it is necessary to know the number of physical measures that will be sent in order to choose a label for each of them and the size of these labels.

According to the previous paragraph, we will have only two kinds of measure to manage, thus two different labels.

Number of Label	Tag Label	Tag Size
1 or 2	0 / 1	1
3 or 4	00 / 01 / 11 / 10	2
5 or 6 or 7 or 8	000 / 001 / 010 / 011 / 100 / 101 / 110 / 111	3
…		

The tag Size to use for two labels is 1. Label 0 can be used for analog input and label 1 for the level of disposable Battery.

To configure the batch, it is necessary to send a command of "Configure reporting" at each cluster.

For the analog input the delta has to be set to 0.5= 0x3f000000(in single precision), minimum to 0=0x0000 (0 seconds), the maximum to 30=0x801e (30 minutes), the resolution to 0.1= 0x3dcccccd (in single precision) and the tag to 0b00000001=0x01 (size 1 and label 0). The cluster to report is 0x000C and the attribute 0x0055 (PresentValue). The EndPoint of 0-10V is 1, so the first byte has to be set to 0x31.

Request: *3106000c 1d0055000000801e3f0000003dcccccd01*

Response: *3107000c00010055*

For the disposable battery power voltage the delta has to be set to 100=0x0064 (0.1V), minimum to 10=0x800a (10 minutes), the maximum to 24*60=1440=0x85A0 (24 hours), the resolution to 100=0x0064 (0.1V), the tag to 0b00001001=0x09 (size 1 and label 1), the field to 4=0x04. The cluster to report is 0x0050 and the attribut 0x0006 (Node power descriptor).

Request: *1106005015000604800a85a00064006409*

Response: *1107005000010006*

To decode the batch reception, use the br_uncompress. Type for analog input is ST_FL (12) and is U16 (6) for the disposable battery power. Thus, it is necessary to use this command:

```
echo "26150020e06001d71e0000a0650f" | ./br_uncompress -a  1 0,1,12 1,100,6
```

Result:

UNCOMPRESS SERIE
cnt: 5 *# Counter of the batch (from 0 to 7)*
263 *# Timestamp in second of sending of the frame*

 # Format of data is: TimeStamp of Measure | Label | Value

263 0 0.000000	*# TimeStamp: 841 s*	*Label 0: Analog Input*	*Value: 0 V*
263 1 3000	*# TimeStamp: 811 s*	*Label 1: Disposable*	*Value: 3.0 V*

⇨ With the batch only one frame of 14 applicatives bytes is sent, instead of 2 frames representing 24 applicatives bytes. With the MAC and 6lowpan header, 21 bytes for the batch are sent against 38 bytes for a standard report. The gain is around 41% in this very simple case. It could be better as soon as there are more than one value by label in the batch.

7.2 CONFIGURE A STANDARD REPORT ON THE 4-20MA INPUT

Specification: *Report immediately the measure of the 4-20mA Input on variation of 1mA. The measure has to be reported at least each hour, and the measure has to be done all 10 minutes.*

Solution: The 4-20mA is the End Point 0, Cluster "Analog Input" is 0x000c, Attribut "PresentValue" is 0x0055. The maximum field has to be 0x0e10 to have a report all one hour and the minimum field has to be 0x800a to have a measure all 10 minutes. The delta has to be configured to 0x3f800000 for a report all the 1 mA variation.

Applicative payload is: `1106000c00005539800a0e103f800000`

8 APPENDIX

8.1 PRESS'O FCC LABEL

FCC ID: 2AGTV50-70-025

PRESS'O SENSOR

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.

⚠ ***Caution:*** **Changes or modifications not expressly approved by the party responsible for FCC compliance could void the user authority to operate the device. (Cf. FCC Part 15.21).**