

## B-10L : How to decode a payload

When **energy** matters



When **energy** matters

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## PROFILE 4 DECODING

Data	Number of words	Unit	Comments
Type	0.5	-	Always 2 for this profile
Profile number	0.25	-	Always 4 for this profile
Profile version	0.25	-	Always 1 for this profile
Date/Time	2	s	<ul style="list-style-type: none"> <li>Number of seconds elapsed since 01/01/2000 00:00.</li> <li>Remains at 0 as long as the date and time has not been written via the LoRa network.</li> </ul>
Ptot average (+)	2	W	Signed
Ctot average (+)	2	Var	Signed
Stot average	2	VA	Unsigned
PfTot average	1	-	Signed
PfTot Type	1	-	Power Factor Type : 0 : undefined 1 : leading 2 : lagging
I1 average	2	mA	Unsigned
I2 average	2	mA	Unsigned
I3 average	2	mA	Unsigned
Faverage	2	mHz	Unsigned
Digital Inputs and VirtualMonitor (ITR)	1	-	Bit field <ul style="list-style-type: none"> <li>Bit 0: Digital Input 1 (Native)</li> <li>Bit 1: Digital Input 2 (Native)</li> <li>Bit 2: Digital Input 1 (optional module 1)</li> <li>Bit 3: Digital Input 2 (optional module 1)</li> <li>Bit 4: Digital Input 1 (optional module 2)</li> <li>Bit 5: Digital Input 2 (optional module 2)</li> <li>Bit 6: Digital Input 1 (optional module 3)</li> <li>Bit 7: Digital Input 2 (optional module 3)</li> <li>Bit 8: Digital Input 1 (optional module 4)</li> <li>Bit 9: Digital Input 2 (optional module 4)</li> <li>Bit 10: Voltage Detection ITR1</li> <li>Bit 11: Voltage Detection ITR2</li> <li>Bit 12: Voltage Detection ITR3</li> <li>Bit 13: Voltage Detection ITR4</li> </ul>
Temperature Input 1 (optional module)	1	0.01 degC (symbole degrés)	Signed
Temperature Input 2 (optional module)	1	0.01 degC (symbole degrés)	Signed
Temperature Input 3 (optional module)	1	0.01 degC (symbole degrés)	Signed
Status change counter	1	-	Half byte field: <ul style="list-style-type: none"> <li>4 bits: status change counter - Native Input 1</li> <li>4 bits: status change counter - Native Input 2</li> <li>4 bits: status change counter - Digital Input 1 (optional module 1)</li> <li>4 bits: status change counter - Digital Input 2 (optional module 1)</li> <li>4 bits: status change counter - VirtualMonitor ITR 1</li> <li>4 bits: status change counter - VirtualMonitor ITR 2</li> <li>4 bits: status change counter - VirtualMonitor ITR 3</li> <li>4 bits: status change counter - VirtualMonitor ITR 4</li> </ul>
<b>TOTAL</b>	<b>25 (50 bytes)</b>		

This gives for example:

**0241000000000000762F000029CA00007D5A03AE00020000B4EF0000B4EF0000B4EF0000C34B00007FFF7FFF7FFF00000000**

So here I have:

- 30255 W (because 0x762F gives 20255)
- 10698 Var (because 0x29CA gives 10698)
- 32090 VA (because 0x7D5A gives 32090)
- Etc...

## PROFILE 6 DECODING

Data	Number of words	Unit	Comments
Type	0.5	-	Always 2 for this profile
Profile number	0.25	-	Always 6 for this profile
Profile version	0.25	-	Always 1 for this profile
Date and Time of the last point	2	s	<ul style="list-style-type: none"> <li>Number of seconds elapsed since 01/01/2000 00:00.</li> <li>Remains at 0 as long as the date and time has not been written via the LoRa network.</li> </ul>
Ptot (+) – last point	2	W	Unsigned
Ptot (-) – last point	2	W	Unsigned
Qtot (+) – last point	2	Var	Unsigned
Qtot (-) – last point	2	Var	Unsigned
Flag – last point	1	-	<ul style="list-style-type: none"> <li>0: Complete period and date configured</li> <li>1: Incomplete period and date configured</li> <li>2: Complete period and date not configured</li> <li>3: Incomplete period and date not configured</li> </ul>
Date and Time of the point before last	2	s	<ul style="list-style-type: none"> <li>Number of seconds elapsed since 01/01/2000 00:00.</li> <li>Remains at 0 as long as the date and time has not been written via the LoRa network.</li> </ul>
Ptot (+) – point before last	2	W	Unsigned
Ptot (-) – point before last	2	W	Unsigned
Qtot (+) – point before last	2	W	Unsigned
Qtot (-) – point before last	2	W	Unsigned
Flag – point before last			<ul style="list-style-type: none"> <li>0: Complete period and date configured</li> <li>1: Incomplete period and date configured</li> <li>2: Complete period and date not configured</li> <li>3: Incomplete period and date not configured</li> </ul>
Digital Inputs and VirtualMonitor (ITR)	1	-	Bit field: <ul style="list-style-type: none"> <li>Bit 0: Digital Input 1 (Native)</li> <li>Bit 1: Digital Input 2 (Native)</li> <li>Bit 2: Digital Input 1 (optional module 1)</li> <li>Bit 3: Digital Input 2 (optional module 1)</li> <li>Bit 4: Digital Input 1 (optional module 2)</li> <li>Bit 5: Digital Input 2 (optional module 2)</li> <li>Bit 6: Digital Input 1 (optional module 3)</li> <li>Bit 7: Digital Input 2 (optional module 3)</li> <li>Bit 8: Digital Input 1 (optional module 4)</li> <li>Bit 9: Digital Input 2 (optional module 4)</li> <li>Bit 10: Voltage Detection ITR1</li> <li>Bit 11: Voltage Detection ITR2</li> <li>Bit 12: Voltage Detection ITR3</li> <li>Bit 13: Voltage Detection ITR4</li> </ul>
Status change counter	1	-	Half byte field: <ul style="list-style-type: none"> <li>4 bits: status change counter - Native Input 1</li> <li>4 bits: status change counter - Native Input 2</li> <li>4 bits: status change counter - Digital Input 1 (optional module 1)</li> <li>4 bits: status change counter - Digital Input 2 (optional module 1)</li> <li>4 bits: status change counter - VirtualMonitor ITR 1</li> <li>4 bits: status change counter - VirtualMonitor ITR 2</li> <li>4 bits: status change counter - VirtualMonitor ITR 3</li> <li>4 bits: status change counter - VirtualMonitor ITR 4</li> </ul>
<b>TOTAL</b>	<b>25 (50 bytes)</b>		

This gives for example:

0261 00000000 00001505 00000000 00000C23 00000000 0002 00000000 00001505 00000000 00000C23  
00000000 0003 00000000

So here, I have:

- 1505 W for P+ (last point)
- 0 W for P- (last point)
- 3107 Var (0xC23 = 3107) for Q+ (last point)
- 0 Var for Q- (last point)
- Etc...

## CUSTOM PROFILE DECODING

The personalized profile makes it possible to configure the sending of 12 electrical values under a single payload. For example with the following configuration:

LoRa	
Description	Value
▼ LoRa	
▼ Profile Configuration	
Profile	Custom
Uplink Period	10
Acknowledgement	Enabled
▼ Custom Data 1	
Custom Service	U12
Load OR Input	Load 1 OR Input 1
▼ Custom Data 2	
Custom Service	U23
Load OR Input	Load 1 OR Input 1
▼ Custom Data 3	
Custom Service	U31
Load OR Input	Load 1 OR Input 1
▼ Custom Data 4	
Custom Service	I1
Load OR Input	Load 1 OR Input 1
▼ Custom Data 5	
Custom Service	I2
Load OR Input	Load 1 OR Input 1

<b>Custom Data 6</b>	
Custom Service	I3
Load OR Input	Load 1 OR Input 1
<b>Custom Data 7</b>	
Custom Service	Ea+ total
Load OR Input	Load 1 OR Input 1
<b>Custom Data 8</b>	
Custom Service	Er+ total
Load OR Input	Load 1 OR Input 1
<b>Custom Data 9</b>	
Custom Service	P1
Load OR Input	Load 1 OR Input 1
<b>Custom Data 10</b>	
Custom Service	P2
Load OR Input	Load 1 OR Input 1
<b>Custom Data 11</b>	
Custom Service	P3
Load OR Input	Load 1 OR Input 1
<b>Custom Data 12</b>	
Custom Service	Not defined

The B10- L returns a payload similar to the one below

**020100009BAD00009BAE00009BAC00000FC400000FF000000FAA000004A40000049B0000028F000002970000028CFFFFFFF**

Which gives after decoding:

- 00009BAD:  $U_{12} = 39853 \rightarrow 398.53\text{Vac}$
- 00009BAE :  $U_{23} = 39\ 854 \rightarrow 398,54\text{Vac}$
- 00009BAC :  $U_{31} = 39\ 852 \rightarrow 398,52\text{Vac}$
- 00000FC4 :  $I_1 = 4\ 036 \rightarrow 4,036\text{A}$
- 00000FF0 :  $I_2 = 4\ 080 \rightarrow 4,080\text{A}$
- 00000FAA :  $I_3 = 4\ 010 \rightarrow 4,010\text{A}$
- 000004A4 :  $E_{a+} = 1\ 188 \rightarrow 1188\ \text{Wh}^{-1} \rightarrow 118,8\ \text{Wh}$
- 0000049B:  $E_{r+} = 1179 \rightarrow 1179\ \text{VAr h}^{-1} \rightarrow 117.9\ \text{VArh}$
- 0000028F:  $P_1 = 655\text{W}$
- 00000297:  $P_2 = 663\text{W}$
- 0000028C:  $P_3 = 652\text{W}$
- FFFFFFFF: Parameter 12 = Reserved  $\rightarrow$ Data not defined

## ALARM PROFILE DECODING

A specific payload is send when a measurement, protection, logical or system alarm appear

Data	Number of words	Unit	Data type	Comments
Type	0.5	-	U8	Always 11 for this profile
Date/Time	2	s		<ul style="list-style-type: none"> <li>Number of seconds elapsed since 01/01/2000 00:00.</li> <li>Remains at 0 as long as the date and time has not been writtenvia the LoRa network.</li> </ul>
Logical and combination alarms	0.5	-	BitField	Bit field <ul style="list-style-type: none"> <li>Bit 0: Logical#1</li> <li>Bit 1: Logical#2</li> <li>Bit 2: Logical#3</li> <li>Bit 3: Logical#4</li> <li>Bit 4: Combi#1</li> <li>Bit 5: Combi#2</li> <li>Bit 6: Combi#3</li> <li>Bit 7: Combi#4</li> </ul>
Analogical alarms	0.5	-	BitField	Bit field <ul style="list-style-type: none"> <li>Bit 0: Analogical#1</li> <li>Bit 1: Analogical#2</li> <li>Bit 2: Analogical#3</li> <li>Bit 3: Analogical#4</li> <li>Bit 4: Analogical#5</li> <li>Bit 5: Analogical#6</li> <li>Bit 6: Analogical#7</li> <li>Bit 7: Analogical#8</li> </ul>
System alarms	0.5	-	BitField	Bit field <ul style="list-style-type: none"> <li>Bit 0: System#1(Net rotation)</li> <li>Bit 1: System#2(V/I association)</li> <li>Bit 2: System#3(CT disconnected)</li> <li>Bit 3: System#4(Bad CT primary)</li> </ul>
Protection alarms	0.5	-	BitField	Bit field <ul style="list-style-type: none"> <li>Bit 0: Protection#1</li> <li>Bit 1: Protection #2</li> <li>Bit 2: Protection #3</li> <li>Bit 3: Protection #4</li> <li>Bit 4: Protection#5</li> <li>Bit 5: Protection#6</li> </ul>
TOTAL	4.5 (9 bytes)			

It give for example :

**111212900300010200**

Here, the payload give us the information that :

00 : No logical or combinatory alarm

01 : Measurement alarm n°1 ON

02 : Système alarm n°2 ON → Error regarding the Voltage/current association

00 : No protection alarm

## RETRIEVAL OF INFORMATION IN MODBUS TCP/IP

### Case of non-custom profiles

For non-personalized profiles, the communication table is available in the user manual (page 50 to 61). For each load and profile there will be a different address range in the  $\mu$  Wiotys gateway . For example :

- To retrieve the energies of load 1, it is necessary to interrogate registers 4099 to 4111.

Energy meters – Load 1							
<ul style="list-style-type: none"> <li>• Profile 1 (Single-load – Energies)</li> <li>• Profile 2 (Multi-load – Energies)</li> <li>• Profile 3 (Multi-load – Energies production)</li> </ul>							
Dec address	Hex address	Words count	Description	Unit	Data type	Function	Profile
4096	0x1000	1	Load status 0 : Disabled 1 : Enabled	-	U16	READ	1/2/3
4097	0x1001	2	Date of last instance	s	DATETIME	READ	1/2/3
4099	0x1003	4	Ea+	Wh 10 <sup>-1</sup>	U64	READ	1/2/3
4103	0x1007	4	Ea-	Wh 10 <sup>-1</sup>	U64	READ	1/3
4107	0x100B	4	Er+	varh 10 <sup>-1</sup>	U64	READ	1/2
4111	0x100F	4	Er-	varh 10 <sup>-1</sup>	U64	READ	1
4115	0x1013	4	Reserved	-	-		-

- To retrieve the average values of load 2, it is necessary to interrogate registers 8259 to 8273.

Dec address	Hex address	Words count	Description	Unit	Data type	Function	Profil
8256	0x2040	1	Load status 0 : Disabled 1 : Enabled	-	U16	READ	4/5
8257	0x2041	2	Date of last instance	s	DATETIME	READ	4/5
8259	0x2043	2	Average Total Active Power	W	S32	READ	4/5
8261	0x2045	2	Average Total Reactive Power	var	S32	READ	4/5
8263	0x2047	2	Average Total Apparent Power	VA	S32	READ	4
8265	0x2049	1	Average Total Power Factor	-	S16	READ	4
8266	0x204A	1	Average Power Factor Type 0 : N/A 1 : Lagging 2 : Leading	-	U16	READ	4
8267	0x204B	2	Average Current phase 1	mA	S32	READ	4
8269	0x204D	2	Average Current phase 2	mA	S32	READ	4
8271	0x204F	2	Average Current phase 3	mA	S32	READ	4
8273	0x2051	2	Average Frequency	mHz	S32	READ	4

- To retrieve the load curves for load 3, you must interrogate registers 16515 to 16532

Dec address	Hex address	Words count	Description	Unit	Data type	Function	Profil
16512	0x4080	1	Load status 0: Disabled 1: Enabled	-	U16	READ	6/7
16513	0x4081	2	Date (last point)	s	DATETIME	READ	6/7
16515	0x4083	2	Total Positive Active Power - last point	W	U32	READ	6/7
16517	0x4085	2	Total Negative Active Power - last point	W	U32	READ	6
16519	0x4087	2	Total Positive Reactive Power - last point	var	U32	READ	6
16521	0x4089	2	Total Negative Reactive Power - last point	var	U32	READ	6
16523	0x408B	1	Flag - last point 0 : Complete period - date configured 1 : Incomplete period - date not configured 2 : Complete period - date configured 3 : Incomplete period - date not configured	-	U16	READ	6/7
16524	0x408C	2	Date (previous point)	s	DATETIME	READ	6/7
16526	0x408E	2	Total Positive Active Power - previous point	W	U32	READ	6/7
16528	0x4090	2	Total Negative Active Power - previous point	W	U32	READ	6
16530	0x4092	2	Total Positive Reactive Power - previous point	var	U32	READ	6
16532	0x4094	2	Total Negative Reactive Power - previous point	var	U32	READ	6
16534	0x4096	1	Flag - previous point 0 : Complete period - date configured 1 : Incomplete period - date not configured 2 : Complete period - date configured 3 : Incomplete period - date not configured	-	U16	READ	6/7

- To retrieve the alarms status, you must interrogate registers 28672 to 28699

Dec address	Hex address	Words count	Description	Unit	Function	Data type
28672	0x7000	2	Date of last change	s	READ	DATETIME
28674	0x7002	1	Combi #1 0 : N/A 1 : Active	-	READ	U16
28675	0x7003	1	Combi #2 0 : N/A 1 : Active	-	READ	U16
28676	0x7004	1	Combi #3 0 : N/A 1 : Active	-	READ	U16
28677	0x7005	1	Combi #4 0 : N/A 1 : Active	-	READ	U16
28678	0x7006	1	Logical Alarm #1 0 : N/A 1 : Active	-	READ	U16
28679	0x7007	1	Logical Alarm #2 0 : N/A 1 : Active	-	READ	U16
28680	0x7008	1	Logical Alarm #3 0 : N/A 1 : Active	-	READ	U16
28681	0x7009	1	Logical Alarm #4 0 : N/A 1 : Active	-	READ	U16
28682	0x700A	1	Measurement Alarm #1 0 : N/A 1 : Active	-	READ	U16
28683	0x700B	1	Measurement Alarm #2 0 : N/A 1 : Active	-	READ	U16
28684	0x700C	1	Measurement Alarm #3 0 : N/A 1 : Active	-	READ	U16
28685	0x700D	1	Measurement Alarm #4 0 : N/A 1 : Active	-	READ	U16
28686	0x700E	1	Measurement Alarm #5 0 : N/A 1 : Active	-	READ	U16
28687	0x700F	1	Measurement Alarm #6 0 : N/A 1 : Active	-	READ	U16
28688	0x7010	1	Measurement Alarm #7 0 : N/A 1 : Active	-	READ	U16
28689	0x7011	1	Measurement Alarm #8 0 : N/A 1 : Active	-	READ	U16
28690	0x7012	1	Protection Alarm #1 0 : N/A 1 : Active	-	READ	U16
28691	0x7013	1	Protection Alarm #2 0 : N/A 1 : Active	-	READ	U16
28692	0x7014	1	Protection Alarm #3 0 : N/A 1 : Active	-	READ	U16
28693	0x7015	1	Protection Alarm #4 0 : N/A 1 : Active	-	READ	U16

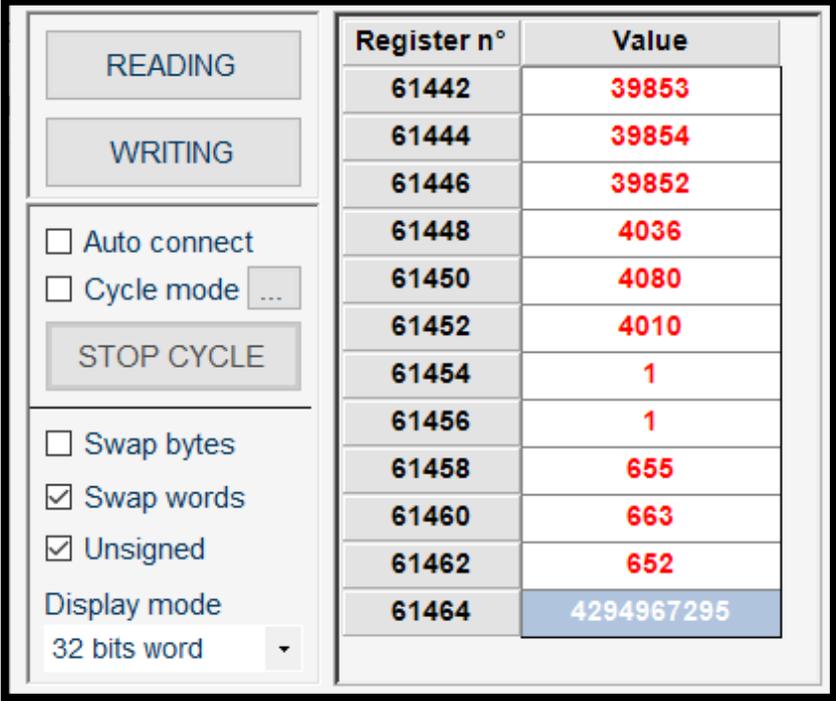
Dec address	Hex address	Words count	Description	Unit	Function	Data type
28694	0x7016	1	Protection Alarm #5 0 : N/A 1 : Active	-	READ	U16
28695	0x7017	1	Protection Alarm #6 0 : N/A 1 : Active	-	READ	U16
28696	0x7018	1	System Alarm #1 (Network rotation) 0 : N/A 1 : Active	-	READ	U16
28697	0x7019	1	System Alarm #2 (V/I association) 0 : N/A 1 : Active	-	READ	U16
28698	0x701A	1	System Alarm #3 (CT disconnected) 0 : N/A 1 : Active	-	READ	U16
28699	0x701B	1	System Alarm #4 (Bad CT primary) 0 : N/A 1 : Active	-	READ	U16

## Case of the custom profile

For the personalized profile, the data can be retrieved from address 61442 to address 61464 of the  $\mu$  Wiotys gateway. Each data is coded on 2 words in U32 type.

Example of simulation carried out with ModbusDoctor :

Note: B-10L configuration is the same as before



The screenshot shows the ModbusDoctor interface. On the left, there are buttons for 'READING' and 'WRITING', and a 'STOP CYCLE' button. Below these are checkboxes for 'Auto connect', 'Cycle mode', 'Swap bytes', 'Swap words', and 'Unsigned'. The 'Display mode' is set to '32 bits word'. On the right, a table displays the following data:

Register n°	Value
61442	39853
61444	39854
61446	39852
61448	4036
61450	4080
61452	4010
61454	1
61456	1
61458	655
61460	663
61462	652
61464	4294967295

We get the same values as obtained during the raw decoding of the payload:

- U12 = 39853 → 398.53Vac
- U23 = 39854 → 398.54Vac
- U31 = 39852 → 398.52Vac
- I1 = 4036 → 4.036A
- I2 = 4080 → 4.080A
- I3 = 4010 → 4.010A
- Ea + = 1 kWh
- Er + = 1 kVar
- P1 = 655W
- P2 = 663W
- P3 = 652W
- Parameter 12 = 2^32 → Data not defined

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