



Troubleshooting for energy measurement units in use in Trains.

Background.

This document is made for describing how to detect similar failures for the energy measurement unit. The document contains a checklist that can be used by technical personnel to verify the installation on an EMU on a train.

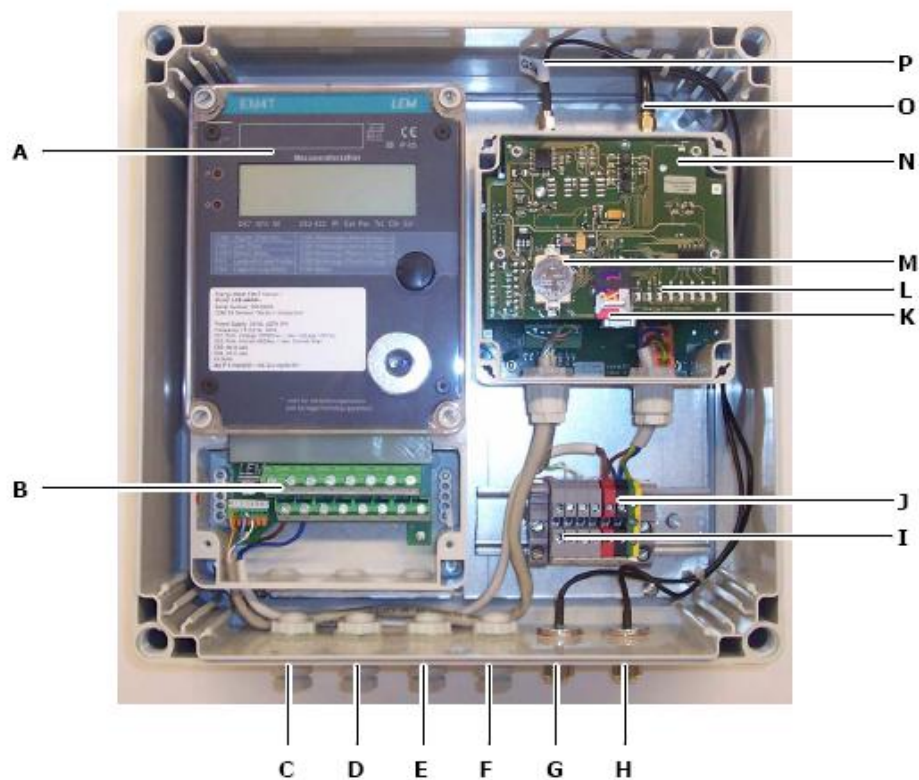
The document is made in cooperation with the manufacturer EnergyICT in Belgium and the system operator of the ERESS (European Railway Settlement System).

The goal of this document is to check the general function and cabling of the device.

For further information, send an e-mail to the system operator of the ERESS system on emu@jbv.no

Overview:

This is an overview of the connections of the Energy Measurement Unit.



- | | |
|--|---|
| <i>A. Energy meter for traction</i> | <i>B. Energy meter for traction connector</i> |
| <i>C. Nipple for current transformer</i> | <i>D. Nipple for voltage transformer</i> |
| <i>E. Nipple for power supply cable</i> | <i>F. Nipple for input signal cable</i> |
| <i>G. GSM/GPRS antenna nipple</i> | <i>H. GPS antenna nipple</i> |
| <i>I. Input signal cable connector</i> | <i>J. Power supply connector</i> |
| <i>K. SIM card holder</i> | <i>L. LEDs</i> |
| <i>M. Memory backup battery</i> | <i>N. Main board with GSM/GPRS modem and GPS module</i> |
| <i>O. GPS antenna connector</i> | <i>P. GSM/GPRS antenna connector</i> |

Troubleshooting:

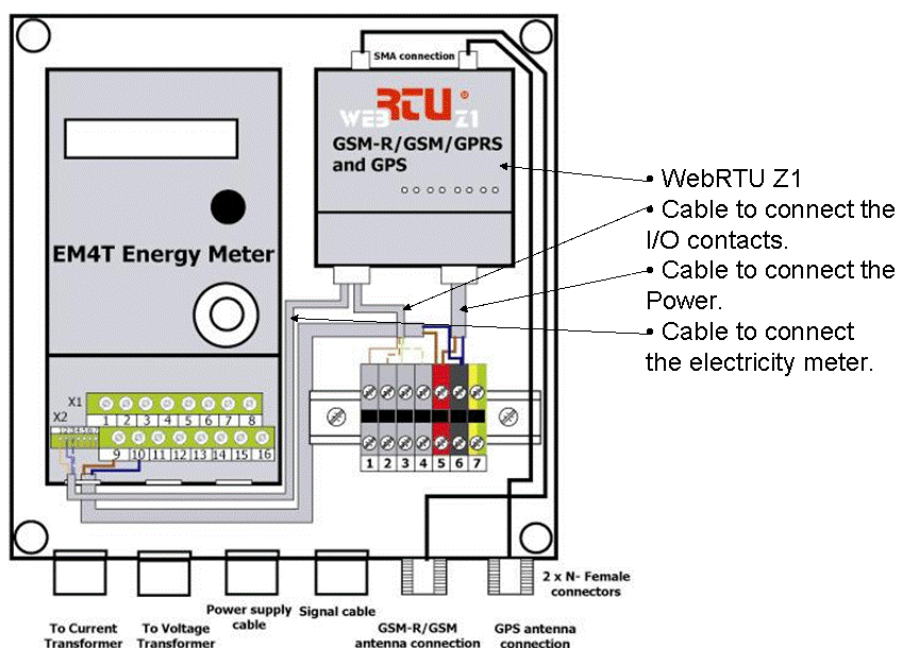
Visual test:

Goal: To verify if the energy measurement unit is powered up.

Check if the digits are shown in the display of the Energy Meter, if not go further in the description.

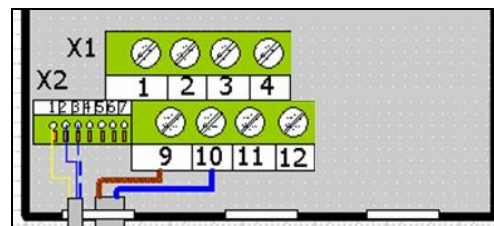


Check of the wirings



CT/VT Connections:

Open the cover under the LEM meter and check visually that the Current Transducer / Voltage Transformer outputs are connected to the device, according to the following description:



Connector Description

X 1.1	U1 High	VT – Output train
X 1.2	U1 Low	
X 1.3	I1 High	CT – Output train
X 1.4	I1 Low	
X 1.9	U_Batt + (pre-wired)	
X 1.10	U_Batt - (pre-wired)	
X 1.11	Shield GND	
X 1.12	Shield GND	
X 2.1	Rs232 - TxD (connected to Rx + of Web-RTU pre-wired)	
X 2.2	Rs232 - RxD (connected to Tx + of WebRTU pre-wired)	
X 2.3	GND (connected to Tx - of Web-RTU pre-wired)	

1. If there is no power supply for list X1 and X2, you need to check if its power supply for the measuring circuit outside the EMU box. Sometimes we see that the voltage converter for 110Vdc/ 24 Vdc could be a problem.

Check of the Web-RTU

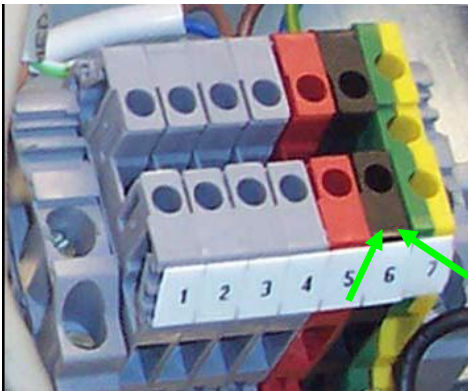
The Web-RTU is responsible for the communication between the Energy meter and the collecting system. The status of the Web-RTU can be indicated by the blinking of the diodes. The Web-RTU unit assumes that the EMU have 24V power supply.

Power Supply:

Check visually that the power supply is connected.

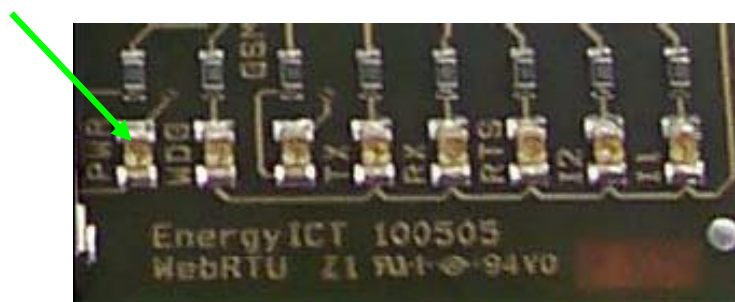
The device works on 24 Vdc that needs to be connected to pin 5 (+24 Vdc) and pin 3.6 (-).

And check that the 'Protective Earth' is connected to connector I – Pin 3.7.

	<table> <thead> <tr> <th>Connector</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>X 3.1</td> <td>Digital Input 2</td> </tr> <tr> <td>X 3.2</td> <td>Digital Input 2</td> </tr> <tr> <td>X 3.3</td> <td>Digital Input 1</td> </tr> <tr> <td>X 3.4</td> <td>Digital Input 1</td> </tr> <tr> <td>X 3.5</td> <td>Voltage +24 Vdc</td> </tr> <tr> <td>X 3.6</td> <td>Voltage -</td> </tr> <tr> <td>X 3.7</td> <td>Protective earth</td> </tr> </tbody> </table>	Connector	Description	X 3.1	Digital Input 2	X 3.2	Digital Input 2	X 3.3	Digital Input 1	X 3.4	Digital Input 1	X 3.5	Voltage +24 Vdc	X 3.6	Voltage -	X 3.7	Protective earth
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<p>Pin 5= + 24 V DC Pin 6 = -</p>																	

Is the power supply connected correctly?

If the 24V dc is connected to the EMU it should be indicated on one of the LEDS on the WebRTU. The first LED should be **ON** when the power is connected.



If the LED isn't ON and the 24Vdc is connected:

Please be sure that 24Vdc is supplied.

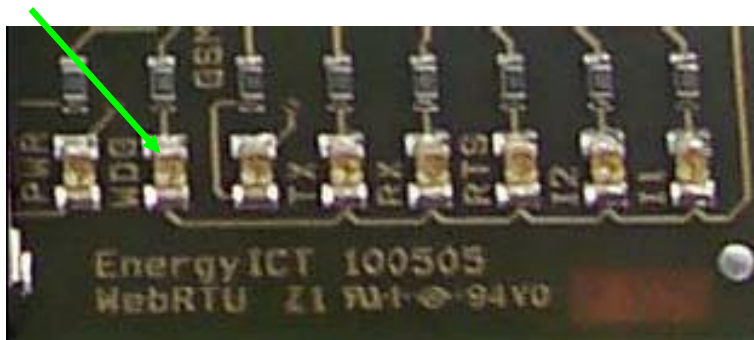
Check this by measuring the voltage between pin 3.5 and pin 3.6 with a 'Voltage Meter'. If 24Vdc is supplied and the LED isn't ON then probably the 'fuse' in the device is broken. If the fuse needs to be changed please contact ERESS system operator, on e-mail:

emu@jbv.no

Check of the LED's on the Web-RTU device.

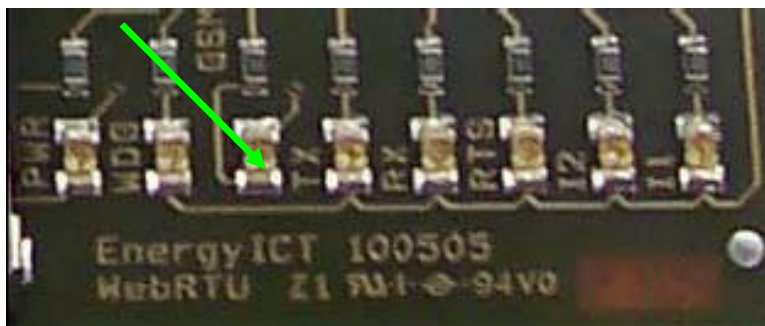
For this check the device needs to have 24 V power supply.

Watchdog LED, nb. 2.



When the device is in operation, the watchdog LED should blink, with Frequency of 2.5 Hz
If the LED is not blinking (always ON or always OFF), please contact ERESS system operator, on e-mail: emu@jbv.no

GSM-LED, nb. 3.



GSM-LED description:

LED mode	Operating status
Permanently off	Modem is in one of the following modes: <ul style="list-style-type: none"> • Power down mode • Alarm mode • Charge-only mode • Sleep mode with no wake up event in progress • No modem installed
600 ms on/600 ms off	Limited network service: <ul style="list-style-type: none"> • No SIM card inserted • No PIN entered • Network search in progress • Ongoing user authentication • Network login in progress.
75 ms on/3 s off	Idle mode: <ul style="list-style-type: none"> • The mobile is logged to the network (monitoring control channels and user interactions) • No call in progress.
75 ms on/75 ms off/ 75 ms on/ 3 s off	One or more GPRS contexts activated.
0.5 s on/off depending on transmission activity	Packet switched data transfer in progress. LED goes on within 1 second after data packets were exchanged. Flash duration is approximately 0.5 s
Permanently on	Depending on type of call: <ul style="list-style-type: none"> • Voice call: Connected to remote party • CSD call: Connected to remote party or exchange of parameters while setting up or disconnecting a call.

When the device has been powered up there are 2 possible ways the GSM-LED can flash:

1. Idle mode: 75 ms on / 3 s off. In **idle mode** the device is connected to the network but no GPRS connections are currently active.

This can be the case just after powering on the device. If the device is configured to send its data every hour then the device will try to establish a GPRS connection only every hour.

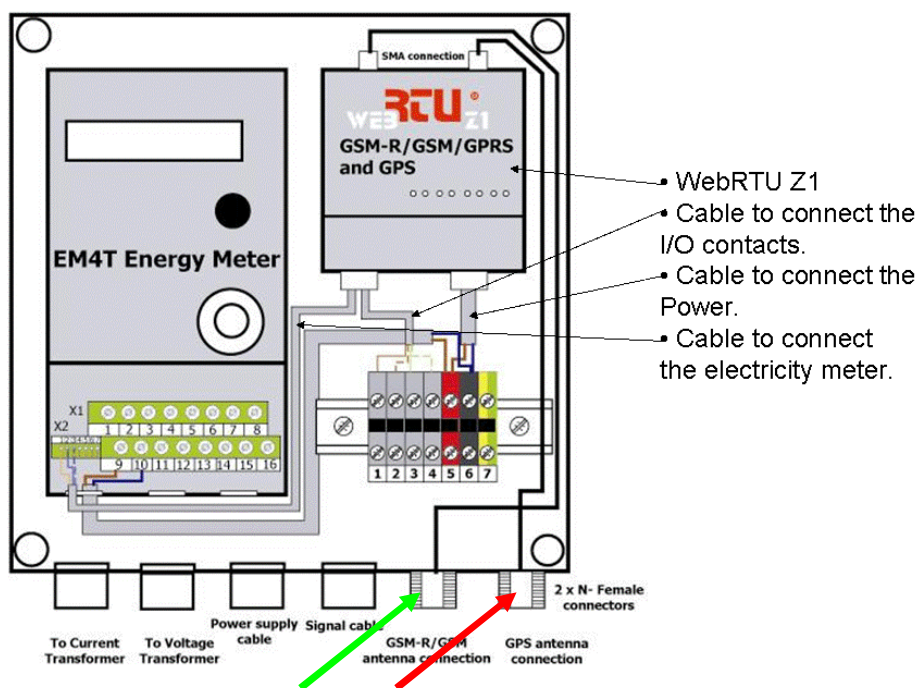
2. (GPRS context active)

Or 75ms on / 75 ms off / 3 sec off. If the GPRS connection is setup the device will blink differently.

Antenna:

Antennas:

Check visually that the GSM/GPRS antenna is connected to connector G (green arrow).
 Check visually that the GPS antenna is connected to connector H (red arrow).
 For the GPS antenna a power has to be supplied from the EMU to the antenna connector.
 If a voltmeter is available a DC voltage of 4.1 V DC should be measured on the antenna connector. (Disconnect antenna to measure the voltage.)



For questions, please contact ERESS system operator, on e-mail: emu@jbv.no