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Operating and installation instructions

Neutron12-CT Energy Monitor

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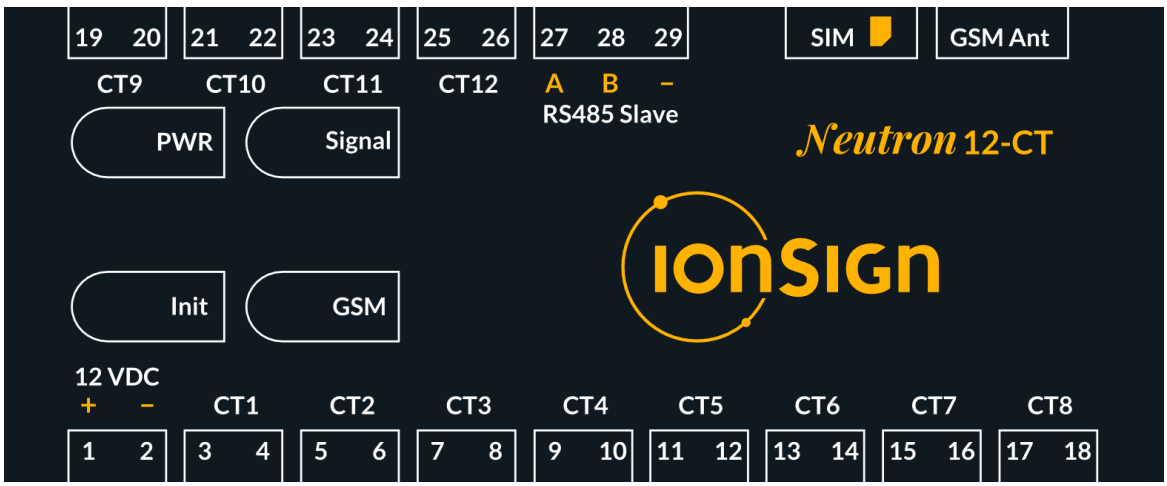
NEUTRON12-CT ENERGY MONITOR

1 General

Neutron12-CT is designed to measure and collect electric energy consumptions without a separate energy meter. Neutron12-CT measures the effective (RMS) current and generates the pulse data based on measurements. One pulse equals one watt-hour. Saved hourly pulse data is sent to the server once per day. Neutron12-CT is not a MID certified energy meter for fiscal metrology.

2 Introduction

1. Disable PIN query from the SIM card for example with a cell phone.
2. Insert the SIM card to its slot, on top of the enclosure, next to the antenna.
3. Connect the power supply, one or more current transformers (CT) and the antenna to the device as seen in picture 2.
4. Connect the device to the power supply, PWR, Signal and Init leds flash quickly and then the PWR led lights up. In a while, the Signal led starts blinking.
5. In 15 seconds the device starts to search a GSM/3G network. The GSM led blinks twice with a three second interval to indicate this. When the network is found, the GSM led blinks once with a three second interval. If the Signal led is not lit or it's blinking, try to find a better place for the antenna. The device measures the GSM signal for a period of five minutes. If a good place for the antenna is not found during this time, power off the device and then set power back on. After this procedure the device starts once more to search a network and measure the GSM signal.
6. Send the SMS command SETTINGS to the device. The received command and a connection to the server are indicated by a solid light of the Init led. If the Init led is blinking the command is received but a connection to the server is not established.



Picture 1: Device front panel.

3 Commands

The device is controlled with the following text message commands. The device doesn't send reply messages to commands (except the STATUS message). Commands and parameters are separated by one space character.

SETTINGS␣<*Device identifier*>␣<*Server address*>␣<*Server port*>␣<*APN*>␣<*Input count*>␣<*Transmission delay*>␣<*Server path*>

All required settings are given with the SETTINGS command and pulse generation is started.
Device identifier parameter is a unique ID for each device.
Value range is 1-1000000.
Server address parameter is the IP address of the HTTP server. Alternatively a domain name server name can be used. Maximum length is 30 characters.
Server port parameter is the port number where server application waits for transmissions. Value range is 1-65535.
APN parameter is the APN (Access Point Name) of GPRS/3G connection. Maximum length is 30 characters.
Input count parameter is the number of connected current transformers to the device. Range is 1-12(-24 [*1])..
Transmission delay parameter is the time delay after midnight for transmitting the pulse data. The delay prevents server jamming due to a large number of devices sending pulse data at the same time. Range is 0-1000 minutes. With parameter value 0 the data is sent at midnight 00:00.
Server path parameter is the path in the server where data is saved. Maximum length is 30 characters.

An example command, where the device identifier is 101, server address is services.ionsign.fi, server port is 80, APN is internet, input count 12, transmission delay is 1 minute and server path is /neutrondata/.

```
SETTINGS 101 services.ionsign.fi 80 internet 12 1 /neutrondata/
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[*1]) By connecting the second Neutron 12-CT device to the RS485 connector, input amount can be expanded to 24.

INTERVAL␣<*Time*>

With the INTERVAL command the device can be set to send pulse data to the server with a defined interval.

Time parameter determines the interval between consecutive transmissions. Range is 0 or 60-86400 seconds. With parameter value 0 data sending by interval is stopped. The hourly pulse data is however always sent to the server once per day.

SENDNOW

With the SENDNOW command the device sends incomplete daily pulse data to the defined server immediately. This command has no parameters.

FACTORY

With the FACTORY command the device resets all its settings and pulse data. This command has no parameters.

STATUS

With the STATUS command the device replies the general status information of the device with SMS. This command has no parameters.

Status information includes the following information:

- Device settings validity: [Yes | No].
  (If device has valid settings, also the device ID is included).
- Data sending to server initialized: [Yes | No].
- Most recent device IP connection initialized: [Yes | No].
- Most recent TCP/IP connection to server: [Yes | No].
- Most recent server reply to device data: [No | Success | Error].
- GSM operator name: [<operator name> | No]
- GSM signal strength: [<value> dBm | Unknown].

Signal strength value -113 dBm indicates a value of -113 dBm or less.

Signal strength value -51 dBm indicates a value of -51 dBm or greater.

4 Neutron12-CT specifications

- Inputs: 12 inputs for 3000:1 current transformers.
- Measure range: 4 W … 6,4 kW (28 A).
- Operating voltage: 11…13 VDC.
- Current consumption: 80 mA (peak 250 mA).
- Real-time clock: 4 days backup.
- Size: WxHxD 105 x 90 x 52 mm (6 module wide DIN rail enclosure).
- Protection class: IP20.
- Operating temperature: -25 °C...+55 °C.
- RH: 5% - 95% non-condensing.
- Data storage capacity: 16 days for each hour and each input channel.
- Data communication: Integrated GSM/GPRS/3G module conforming the following directives and standards:

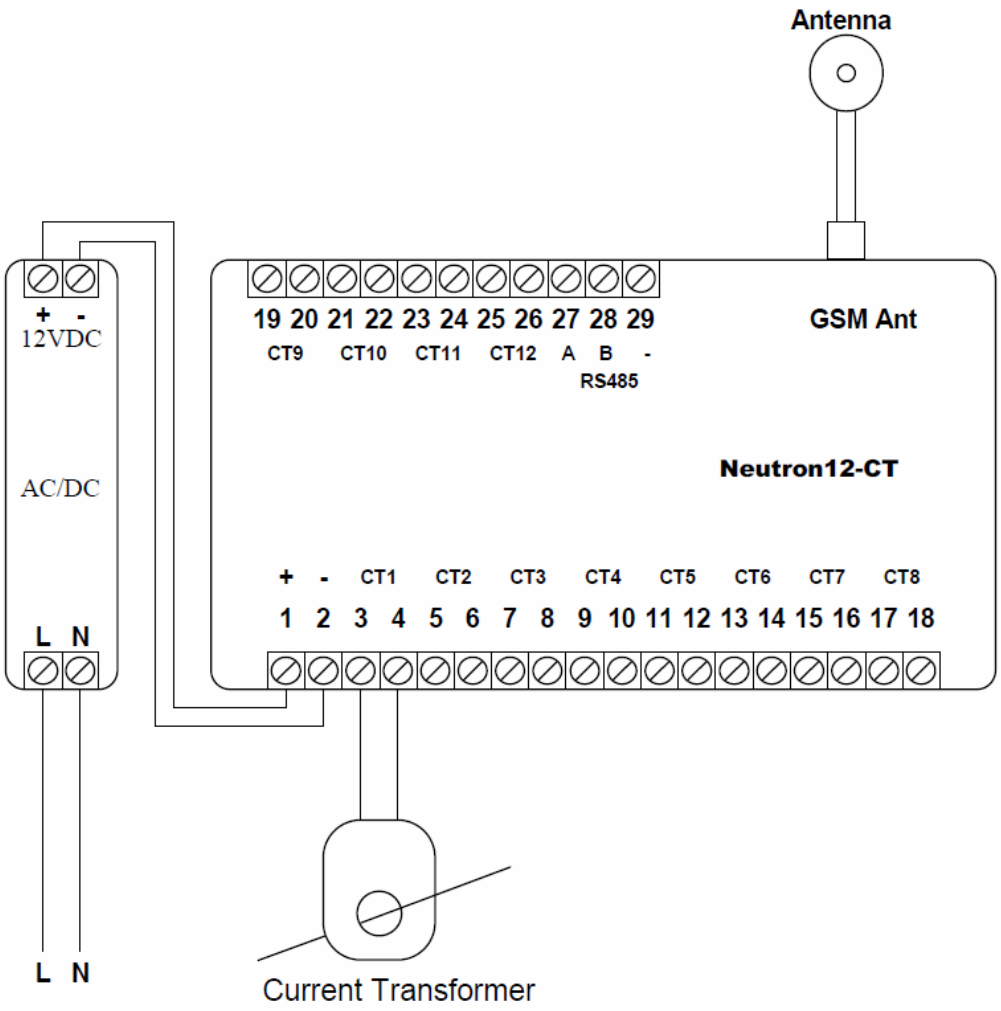
    - R&TTE Directive 1999/5/EC (Radio Equipment & Telecommunications terminal Equipment)
    - Low Voltage Directive 73/23/EEC and product safety Directive 89/336/EEC for conformity for EMC
    - GSM (Radio Spectrum). Standard: EN 301 511 and 3GPP 51.010-1
    - EMC (Electromagnetic Compatibility). Standards: EN 301 489-1 and EN 301 489-7
    - LVD (Low Voltage Directive) Standards: EN 60 950

- Antenna: External, SMA connector.

5 Warranty

ionSign Oy agrees the warranty of two (2) years for Neutron devices. Warranty starts from the day when the customer has received the device and it concerns material and production defects. Warranty is not agreed for devices which are used or wired incorrectly. It is not also agreed for situations where defect is related to 3rd party actions. Things like this can be service changes by mobile network operator or changes in mobile network itself.

For devices which are broken during warranty time ionSign Oy delivers a new device for free. Alternatively device can be corrected. Broken device should be returned to supplier if required. The cost of delivery is paid by supplier. ionSign Oy is not responsible for indirect or implicit damage or possible work or travel expenses related to broken device. For warranty issues please contact to ionSign Oy by e-mail: ionsign@ionsign.fi or by tel: +358 (0)2 822 0097.



Picture 2: Device's circuit diagram.