Stable-Sky-Node

Manual

Contents

Introduction

Stable-Sky-Node is a data receiver and repeater for Nokeval Sky 433 MHz wireless data transmission technology. It receives and buffers the data packets that Nokeval Sky transmitters have sent.

Stable-Sky-Node is housed in a watertight (IP 66) and impact resistant plastic enclosure. The receiver requires 12..24 VDC power supply and is connected to a computer or PLC via RS-485.

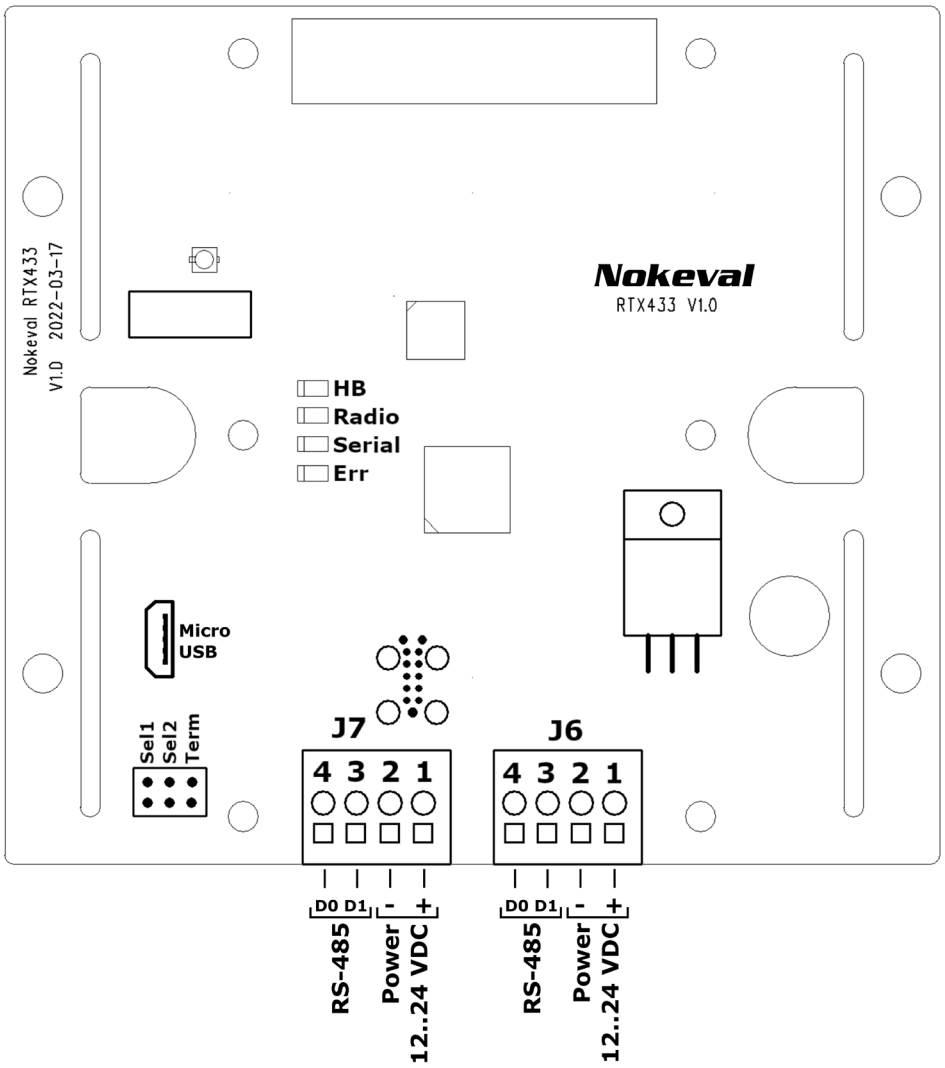
Nokeval SCL or Modbus RTU protocol is used for data transmission between the receiver and the computer. Stable-Sky-Node has four diagnostic LEDs.

Installation

Mounting

The best range for the transmitter is achieved when there is a line-of-sight from the receiver to the transmitter. Avoid vertical metal surfaces near the receiver. Walls and objects between the transmitter and receiver attenuate the signal and thereby shorten the range. On the other hand, metal surfaces cause reflections which might lengthen the range.

Connections



The circuit board has two 4-pin terminal blocks for power supply and RS-485 connections. Terminal blocks are internally connected so second terminal block can be used to extends the bus to another device.

Power supply

The supply voltage range is 10...28 VDC and is connected to terminals 1 (+) and 2 (-). Power demand is 50 mA. Stable-Sky-Node is protected against wrong polarity of the supply voltage.

RS-485 serial bus

RS-485 is used when the device operates as a receiver. RS-485 interface can easily be added to a computer by using Nokeval DCS770 or DC771B USB - RS-485 converter or RCS770 USB/RS-232-RS-485 converter. If you use DC771B converter, no external power supply needed (DC771B's power supply should be set to 10V). RS-485 bus is connected to terminals 3 (A, D1) and 4 (B, D0). The supply voltage's negative terminal 2 (-) can also be used as the ground for RS-485.

The RS-485 bus consists of a bidirectional half-duplex twisted data pair and a common wire. The cable should be shielded, the shield earthed at one point. The nominal impedance should be approx. 100-120 Ω.

The length of an RS-485 bus can be up to 1 km and it can be connected to a maximum of 32 devices, more can be connected via bus repeaters. If the bus is long (say more than 100 m), it is recommended to terminate the first and last device on the bus (set the ”term” jumper on).

The polarity of the data pair is important. When no data is transmitted on the bus, there is a constant idling voltage. Modbus specifications call the positive idling line D1, but it is also commonly known as +, B, and A. Correspondingly the negative idling line is -, A, or B.

The bus needs one device that gives a small voltage between the data wires when no device is transmitting on the bus. This is called biasing or fail-safing. The master device is usually the natural choice for biasing.

USB connector

The device can be set up with a windows computer and Mekuwin software via a USB connection.

Jumpers

Stable-Sky-Node has three jumpers in the serial module:

Sel1:	When the jumper is in place, serial settings for RS-485 are Modbus, 9600 bd, 8E1, Adr 1.
Sel2:	Reserved.
Term:	RS-485 termination jumper

If the device is the last device on the RS485 bus and the bus is long (say more than 100 m), it is recommended to set the ”term” jumper to ”on” position. When this jumper is set, AC termination is used which means that 1 nF capacitor and 110 ohm resistor are connected in series between the bus wires.

Maintenance

Cleaning

The plastic parts can be cleaned with a soft cloth and soap water. Cleaning with isopropyl alcohol is also allowed.

Firmware settings

The Stable-Sky-Node can store the data packets in two ways: Internal buffer and channels.

All the received data is stored into an internal buffer. Data packets from the buffer can be read by Nopsa protocol (encapsulated to Modbus RTU or Nokeval SCL).

Data is also stored to those channels which have been set to the corresponding Ovanet address and channel. Channels can be read by Modbus RTU or Nokeval SCL protocol.

Mekuwin

MekuWin can be used to change settings on various Nokeval products. It has a unique feature: it loads the structure and the contents of the configuration menu from the target device, so the same MekuWin version can be used with past and forthcoming products. There is no need to update this software every time a new product or product version is released. You can download Mekuwin from Nokevals web site for free. Mekuwin has its own instruction manual.

It is also possible to change the configuration settings remotely by writing to the appropriate Modbus Holding registers.

With a USB

The communications parameters for USB are:

Protocol	Modbus RTU
Baud	Any
Parity	8E1
Address	1

Over the RS-485 serial bus

The Mekuwin communications parameters must match the selections made in the device (Serial menu).

Resetting RS-485 serial communication settings

In case RS-485 serial settings are for some reason not known; they can be temporarily set to defaults by the “Sel1” jumper (shown in the figure on page 3) when the device is powered up.

Default communication parameter settings:

Protocol	Modbus RTU
Baud	9600
Parity	8E1
Address	1

Configuration settings

The configuration settings are arranged as a hierarchical tree: The Conf menu has submenus, and these contain settings and possibly more submenus, etc.

Serial submenu

Serial communication settings.

Protocol

- SCL. Nokeval SCL protocol.
- Modbus RTU. Modbus RTU protocol. Default.

Baud rate

Baud rate selection: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 128000, 230400.
Default 9600.

Bits

8N1, 8N2, 8E1, 8O1
Note: SCL protocol uses always 8N1 (this item does not appear when the protocol is SCL). Modbus RTU uses commonly 8E1.

Address

Serial communications address selection. Since several devices can be attached to the same bus, each device needs to be configured to a different Address. Valid SCL-addresses are 0...123. Valid Modbus RTU-addresses are 1...247. Default address is 1.

Sky submenu

The network address, effort, channel and authorization key must be the same for all devices on the same network

Network

Network address 0..255.

Effort

1..7, Custom.
Small value: Less power consumption, faster data rate, shorter radio range.
Large value: More power consumption, slower data rate, longer radio range.
Custom: Expert settings for frequency, bandwidth and spreading factor.

Power

0..10 dBm. Output power range .

Channel

1..7. Disabled if effort “custom” is selected.

Enable Acknowledgement

Reserved for future use.

Auth. key

Key for Message Integrity Check and data encryption.

Enable beacon

Enable beacon for coverage mapping.

Relay RX margin

Received signal margin can be stored in the buffer as its own channel. The reading should be a positive value. If the reading is close to zero, the strength of the received signal is at the reception limits.

RX margin channel

Select channel for the received signal margin.

Channels submenu

Up to 100 channels can be set up in the receiver. These channels can be set up to contain measuring data received from the Sky transmitters. The values of these channels can then be queried over the serial interface with standard Modbus RTU or SCL protocol. This menu contains settings for configuring these channels.

Timeout

If the measurement is older than the value entered here (in seconds), then the measurement is considered obsolete, and the result is read NaN (not a number). For example, if Timeout = 600 (10 min) then channel value is set to NaN when more than 10 minutes have passed since last reception. A good value usually is 3.5 times the transmission interval. Timeout is disabled by setting the value to zero.

Ch count

0..100. Number of channels.

Ch1 ... Ch100

Submenus for channel-specific settings.

Value

Defines where the contents (reading) of the channel comes from:

- **Meas. value**: Measurement result from the Sky transmitter.
- **Age**: The time in seconds from the last measurement.
- **Batt level**: Battery level (%) in the Sky transmitter.
- **Ext power**: 1 if the Sky transmitter is currently gets power from the external power source. 0 if not.

  In the Sky network, data of “Batt level” and “Ext power” are in separate data packet than measurement data and therefore arrives at the receiver at different time and less frequently than “Meas value”.

Address

Node address of the Sky transmitter (1...16777213).

Channel.

Measuring channel of the Sky transmitter (1…255).

Factor.

The measurement result can be multiplied or divided by decades. This can be helpful, for example when measurement value is very large or small. This makes it possible to change numerical values to fit in Modbus integer register.

Reading

Channel reading.

Repeater submenu

Back-off time

If the received packet has the same sequence number as the previous one, the packet will not be repeated if less than “back-off time” has elapsed.

Rep count

Number of repeatable transmitters.

Device 1 ... Device 100

Address

Node address of the Sky transmitter (1...16777213).

Age

The time in seconds from the last received packet.

Seq

Sky sequence number of last received packet.

Margin

Signal quality of last received packet.

Monitor menu

Monitor menu contains some information that can be useful during installation and which may facilitate the monitoring of system's operating condition.

Uptime

Time the device has been running.

Rssi

Current Rssi value when no packets are received.

RX duty

Received data packets duty cycle.

TX duty

Transmitted data packets duty cycle.

Unid duty cycle

Received (and rejected) unidentified data packets duty cycle.

Switches

Displays the jumper settings (except not “Term”). 0 if no jumpers. 2 or 3 if default serial settings jumper is in place.

Operation

Stable-Sky-Node has four diagnostic LEDs.

HB: Flashes when the device is powered and operating.
Radio: Flashes when the device is receiving or sending radio packet.
Serial: Flashes when the serial bus is active.
Err: Lights up when an internal error has occurred in the device.

Receiver operation

Serial commands

Following protocols can be used to read data from the device:

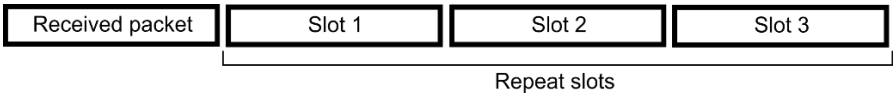
- Nokeval SCL protocol (page 10).
  - Reading with SCL commands.
  - Reading with Nopsa commands over SCL protocol (page 16).
- Modbus RTU protocol (page 11).
  - Reading Modbus registers.
  - Reading with Nopsa commands over Modbus protocol (page 16).

Repeater operation

When the device receives a radio packet with an address that matches one in the repeater menu, it sends an identical copy of the packet if these conditions are met:

- The sequence number of the received Sky packet has changed compared to the previous one, or the time interval from the previous received packet is at least "back-off" time.
- The Sky packet does not contain an acknowledgment request.
- The transmitter duty limit has not been exceeded

After receiving the packet, it is repeated from one of three randomly selected time windows “slots”. The locations and lengths of the slots depend on the length of the packet.



Three different random repeat slots reduce the likelihood that two repeaters will send a packet simultaneously.

SCL protocol

A full specification of the Nokeval SCL protocol can be downloaded from Nokeval WWW site. In short, the command frame consists of an address byte (bus address+128), a human-readable command, an ETX character (ASCII 3) and an XOR checksum of all bytes excluding the address byte. A normal response consists of an ACK (ASCII 6), a human-readable response, an ETX and an XOR checksum of all the bytes including the ACK. An error response is similar, but the ACK is replaced by a NAK (ASCII 21).

Nokeval SCL always uses 8N1 parity.

SCL Commands

This device supports the following SCL commands:

TYPE ?

Returns the model name and software version of the device.

SN ?

Returns the device's serial number, for example ”A123456”.

MEA CH <ch> ?

Returns the last received value from the channel <ch>. The response may contain digits 0-9, minus sign, and a decimal point. The scientific representation 1.00E-3 is not used. If the channels result is NaN (Not A Number), device returns ------.

MEA SCAN <first> <last>

Returns the last received values of channels <first> to <last> separated with a space. E.g. MEA SCAN 1 3 will return the values of channels 1, 2, and 3. An example response: 25.6 29.1 0. If the channels result is NaN (Not A Number), device returns ------

N <hexadecimal data>

Encapsulating a Nopsa command in SCL. The Nopsa command is converted to hexadecimal characters without spaces. E.g. querying the serial number: N 0102. The device responds with hexadecimal characters carrying a Nopsa response. See section “Nopsa commands”.

MN <hexadecimal data>

A legacy command for encapsulating Meku configuration commands in SCL protocol. Using Nopsa is recommended.

Modbus protocol

Supported Modbus RTU commands:

- 3 Read Holding Registers: Read settings.
- 4 Read Input Registers: Read result values.
- 6 Write Single Register: Change settings.
- 16 Write Multiple registers: Change multiple settings at once.
- 17 Report Slave ID: Device type information.
- 109 Meku: This is used by Mekuwin configuration software.
- 110 Nopsa: This is used to transport Nopsa protocol on Modbus.

Command 17 returns 0x11 <byte count> 0x00 0xFF, followed by for example “FT20 V1.0 A123456”

Maximum Modbus packet length is 240 bytes. This affects the maximum possible register count that can be accessed simultaneously with commands 3, 4 and 16.

When settings are changed, the device will save the settings instantly into the configuration EEPROM memory. If serial settings are changed, new settings will take effect only after cycling the device power, it works this way so that all serial settings can be done at once without breaking the serial connection.

Data types:

- BOOL: On/off value. 0=off, 1=on, in lower (right hand side) byte.
- BYTE: 8-bit value. Only lower (right hand side) byte used.
- WORD: 16-bit value.
- ENUM: List of alternatives.
- FLOAT: 32-bit float IEEE 754. Least significant word first, inside word most significant byte first.
- STRINGZ: Zero terminated string. In one Modbus register data is presented as most significant byte first.

Input registers

0..1	Ch1\Reading	FLOAT (LSW, MSB)	Signed
2..3	Ch2\Reading	FLOAT (LSW, MSB)	Signed
…	…		
198..199	Ch100\Reading	FLOAT (LSW, MSB)	Signed
200..201	Ch1\Reading	FLOAT (MSW, MSB)	Signed
202..203	Ch2\Reading	FLOAT (MSW, MSB)	Signed
…	…		
398..399	Ch100\Reading	FLOAT (MSW, MSB)	Signed
400..401	Ch1\Reading	FLOAT (LSW, LSB)	Signed
402..403	Ch2\Reading	FLOAT (LSW, LSB)	Signed
…	…		
598..599	Ch100\Reading	FLOAT (LSW, LSB)	Signed
600..601	Ch1\Reading	FLOAT (MSW, LSB)	Signed
602..603	Ch2\Reading	FLOAT (MSW, LSB)	Signed
…	…		
798..799	Ch100\Reading	FLOAT (MSW, LSB)	Signed
1000	Ch1\Reading	WORD	Signed
1001	Ch2\Reading	WORD	Signed
…	…		
1099	Ch100\Reading	WORD	Signed
1200..1201	Ch1\Reading	LONG (LSW)	Signed
1202..1203	Ch2\Reading	LONG (LSW)	Signed
…	…		
1398..1399	Ch100\Reading	LONG (LSW)	Signed
1400..1401	Ch1\Reading	LONG (MSW)	Signed
1402..1403	Ch2\Reading	LONG (MSW)	Signed
…	…		
1598..1599	Ch100\Reading	LONG (MSW)	Signed
2000	Ch1\NW1 datatype	ENUM	See Table D1
2001	Ch1\Ext power	BOOL	
2002	Ch1\Battery level	BYTE	0..100 [%]
2003	Ch1\RX margin	WORD	dB*10, Signed
2004	Ch1\Utility flags	WORD	See Table D2
2005	Ch1\Data flags	WORD	See Table D2
2010	Ch2\ NW1 datatype	ENUM	See Table D1
…	…		
2995	Ch100\Data flags	WORD	See Table D2
3000..3001	Ch1\Node address	LONG (LSW)	Unsigned
3002	Ch1\Channel	WORD	Unsigned
3003	Ch1\Device type	ENUM	See Table D3
3004	Ch1\Firmware ver.	WORD	

Table D1

Value	Type
0	Fault
1	Bit
2	8-bit unsigned integer
3	8-bit signed integer
4	16-bit unsigned integer
5	16-bit signed integer
6	32-bit unsigned integer
7	32-bit signed integer
8	64-bit unsigned integer
9	32-bit floating point
10	64-bit floating point
11	String
12	Struct
13	Data is not yet received

Table D2

Bits	Bits
0..14	Age counter [sec]
15	Data changed

Table D3

Value	Type
258	Core-Node-…
259	Beat-…
260	Scout
261	Flex-T
262	Flex-T-RH
263	Flex-ES -CS
265	Flex-Router

3005	Ch1\Cal date	WORD	
3006..3009	Ch1\Serial	STRINGZ	
3010..3011	Ch2\Node address	LONG (LSW)	Unsigned
…	…		
3996..3999	Ch100\Serial	STRINGZ	
4000	Ch1\Age in minutes	WORD	Unsigned
4001	Ch2\Age in minutes	WORD	Unsigned
…	…		
4099	Ch100\Age in minutes	WORD	Unsigned
4200..4201	Ch1\Age in seconds	LONG (LSW)	Unsigned
4202..4203	Ch2\Age in seconds	LONG (LSW)	Unsigned
…	…		
4398..4399	Ch100\Age in seconds	LONG (LSW)	Unsigned
4400..4401	Ch1\Age in seconds	LONG (MSW)	Unsigned
4402..4403	Ch2\Age in seconds	LONG (MSW)	Unsigned
…	…		
4598..4599	Ch100\Age in seconds	LONG (MSW)	Unsigned

In the Sky network, utility data (Ext power, battery level, device type, firmware ver. and cal. date) are in separate data packet than the measuring data and therefore arrives at the receiver at different time and less frequently.

Measured values are available in 4 different word/byte order formats in registers below 1000.
All floats are 32-bit floating point numbers according to IEEE 754.

- In registers 0...199: Least significant word first, inside word most significant byte first.
- In registers 200…399: Most significant word first, inside word most significant byte first.
- In registers 400...599: Least significant word first, inside word least significant byte first.
- In registers 600...799: Most significant word first, inside word least significant byte first.
- In registers 1000...1099: A 16-bit signed integer. Channel setting "factor" can be used to define a fixed point. For example, factor 10 changes the original measurement value from 15.2 to register value 152.
- In registers 1200...1399: A 32-bit signed integer. Least significant word first. Channel setting "factor" can be used to define a fixed point. For example, factor 10 changes the original measurement value from 15.2 to register value 152.
- In registers 1400...1599: A 32-bit signed integer. Most significant word first. Channel setting "factor" can be used to define a fixed point. For example, factor 10 changes the original measurement value from 15.2 to register value 152.

Note! In case the reading is too old (older than the timeout parameter configured in the menu specifies) or there is no reading for a channel then float value is Quiet NaN (0x7FC00000), word value is 0x7FFF and long value is 0x7FFFFFFF.

Holding registers

Address	Name	Type	Values
0..1	Ch1\Reading	FLOAT (LSW, MSB)	Signed
2..3	Ch2\Reading	FLOAT (LSW, MSB)	Signed
…	…		
198..199	Ch100\Reading	FLOAT (LSW, MSB)	Signed
200..201	Ch1\Reading	FLOAT (MSW, MSB)	Signed
202..203	Ch2\Reading	FLOAT (MSW, MSB)	Signed
…	…		
398..399	Ch100\Reading	FLOAT (MSW, MSB)	Signed
400..401	Ch1\Reading	FLOAT (LSW, LSB)	Signed
402..403	Ch2\Reading	FLOAT (LSW, LSB)	Signed
…	…		
598..599	Ch100\Reading	FLOAT (LSW, LSB)	Signed
600..601	Ch1\Reading	FLOAT (MSW, LSB)	Signed
602..603	Ch2\Reading	FLOAT (MSW, LSB)	Signed
…	…		
798..799	Ch100\Reading	FLOAT (MSW, LSB)	Signed
1000	Ch1\Reading	WORD	Signed
1001	Ch2\Reading	WORD	Signed
…	…		
1099	Ch100\Reading	WORD	Signed
1200..1201	Ch1\Reading	LONG (LSW)	Signed
1202..1203	Ch2\Reading	LONG (LSW)	Signed
…	…		
1398..1399	Ch100\Reading	LONG (LSW)	Signed
1400..1401	Ch1\Reading	LONG (MSW)	Signed
1402..1403	Ch2\Reading	LONG (MSW)	Signed
…	…		
1598..1599	Ch100\Reading	LONG (MSW)	Signed
2000	Serial\Protocol	ENUM	See table E1
2001	Serial\Baud rate	ENUM	See table E2
2002	Serial\Bits	ENUM	See table E3
2003	Serial\Address	BYTE	Unsigned 0...247
2021	Sky\Enable beacon	BOOL	
2030	Sky\Network	BYTE	Unsigned 0...255
2031...2032	Sky\Frequency	FLOAT	MHz
2033	Sky\SF	BYTE	7..12

2034	Sky\BW	BYTE	0..9
2035	Sky\Key	STRINGZ	max 16 char.
2090	Conf\Channels\Ch count	BYTE	Unsigned 1…100
2091	Conf\Channels\Timeout[s]	LONG	Unsigned 0... 4294967295
2093	Conf\Repeater\Rep count	BYTE	Unsigned 0...100
2094	Conf\Repeater\Back-off time	BYTE	Unsigned 0...255
2100	Conf\Channels\CH 1\Value	ENUM	See table E4
2101...2102	Conf\Channels\CH 1\Node address	LONG	Unsigned 1...16777213
2103	Conf\Channels\CH 1\Channel	BYTE	Unsigned 1...255
2104	Conf\Channels\CH 1\Factor	ENUM	See table E5
2110	Conf\Channels\CH 2\Value	ENUM	See table E4
2111...2112	Conf\Channels\CH 2\Node address	LONG	Unsigned 1...16777213
2113	Conf\Channels\CH 2\Channel	BYTE	Unsigned 1...255
2114	Conf\Channels\CH 2\Factor	ENUM	See table E5
…	…		
3090	Conf\Channels\CH 100\Value	ENUM	See table E4
3091...3092	Conf\Channels\CH 100\Node address	LONG	Unsigned 1...16777213
3093	Conf\Channels\CH 100\Channel	BYTE	Unsigned 1...255
3094	Conf\Channels\CH 100\Factor	ENUM	See table E5
3100	Conf\Repeater\Device 1\Address	LONG	Unsigned 1...16777213
3110	Conf\Repeater\Device 2\Address	LONG	Unsigned 1...16777213
3120	Conf\Repeater\Device 3\Address	LONG	Unsigned 1...16777213
…	…		

Enum values

Table E1

Value	Protocol
0	SCL
1	ModbusRTU

Table E2

Value	Baud rate
0	300
1	600
2	1200
3	2400
4	4800
5	9600
6	19200
7	38400
8	57600
9	115200
10	128000
11	230400

Table E3

Value	Bits
0	8N1
1	8N2
2	8E1
3	8O1

Table E4

Value	Value
0	Meas. value
1	Age
2	Batt level
3	Ext power

Table E5

Value	Factor
0	0.000001
1	0.00001
2	0.0001
3	0.001
4	0.01
5	0.1
6	1
7	10
8	100
9	1000
10	10000
11	100000
12	1000000

Nopsa commands

Nopsa is a command language which enables measurement data and configuration data transfer. Nopsa can be used to transfer data between devices or from host to device. Nopsa needs some transfer layer protocol, which takes care of addresses, transfer error management and packet length. This device supports Nopsa commands over either Nokeval SCL or Modbus RTU protocols.

Supported Nopsa commands

- 1/0 (Type) Read device type
- 1/1 (Version) Read device version
- 1/2 (Serial number) Read serial number of the device
- 1/3 (Description) Read short description of the device
- 1/4 (Command set) Read command set number for the device
- 1/5 (Serial buffer size) Read serial buffer size
- 1/7 (Radio ID) Read radio ID
- 1/16 (Reset) Reset device
- 1/32 (Meku) Pass Meku configuration commands to device
- 2/0 (Out value request) Read channel reading
- 2/1 (Out resource request) Read channel metadata (name, data type)
- 4/4 (Read next from buffer) Read data entry from buffer and move read position to next
- 4/5 (Reread last) Returns last read operation contents

Transport protocol SCL

When Nopsa packets are transported on SCL data is converted to hexadecimal notation (0-9 and A-F). One Nopsa byte will become 2 bytes. No spaces between characters. Packet starts with SCL command N and a space.

```
ID 'N' ' ' Nopsa-packet in hexadecimal ETX BCC
```

Response is transferred also same way in hexadecimal, but N command is not appended.

```
ACK Nopsa-response in hexadecimal ETX BCC
```

Transport protocol Modbus RTU

Command function 110 (0x6E) is reserved for Nopsa commands in Modbus free command area. After function code there is one byte which informs Nopsa packet length.

```
ID 0x6E Length Nopsa-packet CRC
```

Response is in same format.

```
0x6E Length Nopsa-packet CRC
```

Nopsa response

Each response contains first status byte.

Bit	Description
.7	Internal error. Device has detected some internal malfunction. In example flash memory don't respond. More detailed error information need to be request by Meku Diag.
.6	External error. Device has detected some external error. More detailed error information need to be requested by Meku Diag.
.2-.0	Command progress: * 0 = OK * 1 = Command is not supported * 2 = Parameter error * 3 = Device is unable to process the command at the moment (busy) * 4 = Command is legal, but some error caused it to fail

If response is not OK, then the response data is not response for the command. Command specific data begins immediately after status byte.

Nopsa command group 1 – Basic commands

	Command	Response
1/0 (Type)	0x01 | 0x00	status | string
string: Device type as string -> FT20		

	Command	Response
1/1 (Version)	0x01 | 0x01	status | string
string: Device version as string -> V1.0		

	Command	Response
1/2 (Serial number)	0x01 | 0x02	status | string
string: Device serial number as string -> A123456		

	Command	Response
1/3 (Description)	0x01 | 0x03	status | string
string: Device description as string -> “Wireless data receiver and repeater”		

	Command	Response
1/4 (Command set)	0x01 | 0x04	status | set*4 *(*4 means 4 bytes)
Set: Informs which Nopsa command set device implements. Command sets are described in another document.		

	Command	Response
1/5 (Serial buffer size)	0x01 | 0x05	status | size
size: Informs serial buffer size of the device		

	Command	Response
1/16 (Reset)	0x01 | 0x10	No response
Device resets immediately after command and don’t response for it.		

	Command	Response
1/32 (Meku)	0x01 | 0x20 | Meku command	status | Meku response
Command used by Mekuwin configuration software		

Nopsa command group 2 – Data commands

	Command	Response
2/0 (value request)	0x02 | 0x00 | number	status | type | data*4
number: Channel number 0..99, type: 4 (FLOAT), data: float IEEE754		

	Command	Response
2/1 (resource request)	0x02 | 0x01 | number	status | types | flags | name*n
number: Channel number 0..99, types: 4 (FLOAT), flags:0, name: Ch1..Ch100		

Nopsa command group 4 – Logger commands

Real-time data buffer commands

	Command	Response
4/4 (Read next)	0x04 | 0x04	status | index*2 | lap counter | timestamp*4 | id*2 | type | data*n
Index, lap counter and id are always zero. In case of no new data return only status byte.		

	Command	Response
4/5 (Reread last)	0x04 | 0x05	As in command 4/4
Return data which was read last. This has its uses when serial communication error happens.		

	Command	Response
4/6 (Erase buffer)	0x04 | 0x06	status
Clears the buffer		

Data structure

Data structure in buffer is following

Data type STRUCT (32)		
Struct type	1 byte	2: Ovanet struct
Subtype	1 byte	0
Source node address	4 bytes	1 … 16 777 213
Source endpoint	1 byte	0 … 239: NW1 data 240 … 255: Diagnostics data
Destination endpoint	1 byte	0 … 239: NW1 data 240 … 255: Diagnostics data
Data		NW1 or diagnostics data.

Example

A simple example of one Sky transmitter and Stable-Sky-Node.

Sky transmitter	
Network	160
Effort	4
Channel	7
Auth key	Empty
Node address (not settable)	10020
Measuring channel	1

Stable-Sky-Node	
Conf/Sky/Network	160
Conf/Sky/Effort	4
Conf/Sky/Channel	7
Conf/Sky/Auth key	Empty
Conf/Channels/Timeout	300
Conf/Channels/Ch count	1
Conf/Channels/Ch 1/Value	Meas. value
Conf/Channels/Ch 1/Node address	10020
Conf/Channels/Ch 1/Channel	1
Conf/Channels/Ch 1/Factor	1

When the Stable-Sky-Node receives a data packet from the transmitter 10020, which includes measuring value of the channel 1, it stores the value to the channel 1.

The value from channel 1 can be read by SCL protocol:

Command: ID `'MEA CH 1 ? '` ETX BCC

Response: ACK `'25.5'` ETX BCC

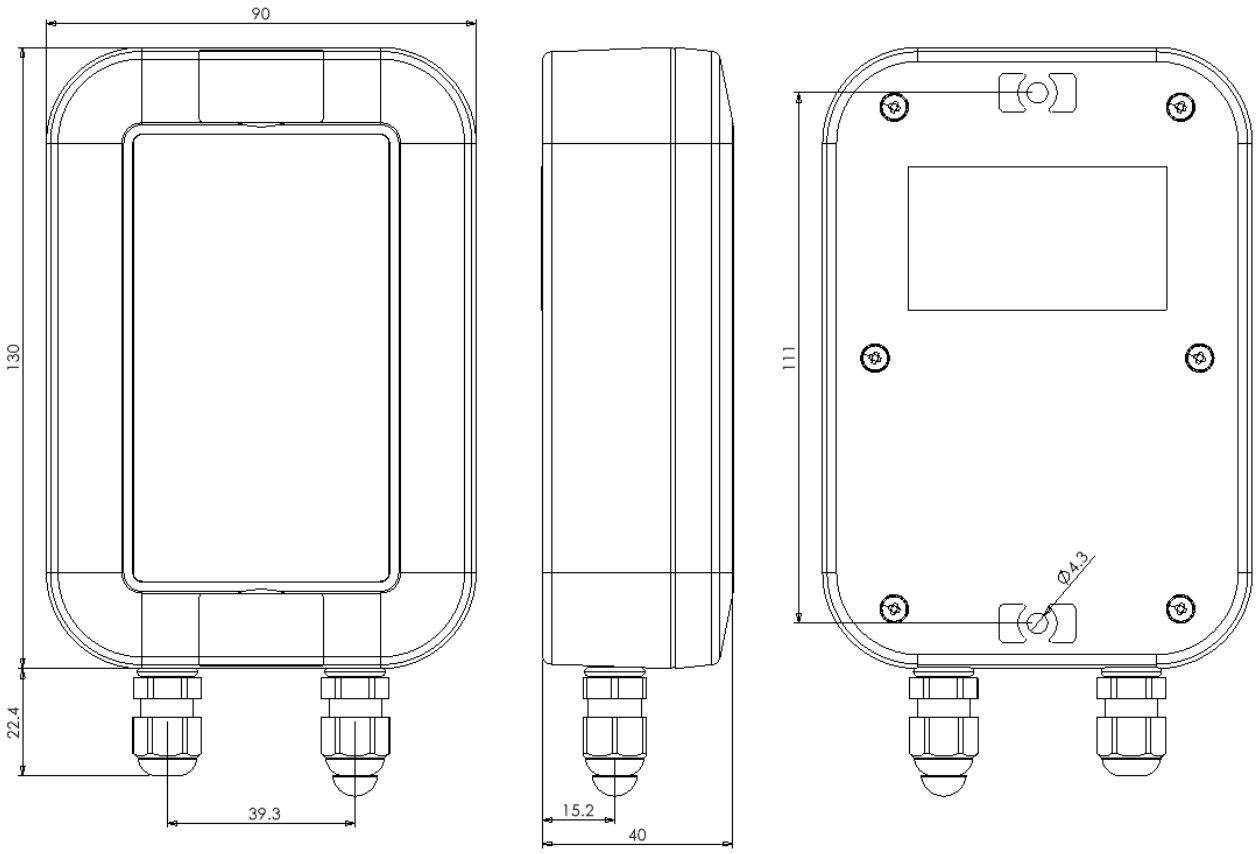
Or by Modbus protocol in which case the value can be read, for example, from the input registers 0-3.

Specifications

Environment

Storage temperature	-40...+70 °C
Operation temperature	-30...+60 °C
Operation humidity	0...100 %RH
Protection class	IP 66
Enclosure material	Plastic (PC+ABS)
Compatibility	Sky series devices

Dimensions



Radio

Antenna	Internal
Frequency	433 MHz
Transmitting power	max 10 dBm E.R.P.

RS-485 serial connection

Connector	4-pin terminal block combined with power supply, terminal 3 D1, terminal 4 D0. Maximum cable length is 1000 m
Protocol	Nokeval SCL, Modbus RTU, Nopsa
Baud rates	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 128000, 230400 bits/s
Modbus parity	8N1, 8N2, 8E1, 8O1

Power supply

Connector	4-pin terminal block combined with RS 485, terminal 1 +, terminal 2 -.
Voltage	12…24 VDC
Current requirement	50 mA

Settings

Connection	RS-485 or USB
Protocol	Nokeval Meku
Software	Mekuwin for Windows

Manufacturer

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