kamstrup

Interface specification

HAN-NVE module

Contents

1. Revision history

Rev.	Description	Meter software revision (from and including)
2.0	First draft release of document.	OMNIPOWER® direct meters firmware number: • 50981173 rev. S1 • 50981165 rev. S1 • 50981251 rev. k1
3.0	Update of the DLMS fixed header (byte “09” is removed). New examples added at the end of the document. First official release.	OMNIPOWER® direct meters firmware number: • 50981173 rev. U1 • 50981165 rev. U1 • 50981251 rev. M1
3.1	Small corrections in the supported meter list in Chapter 2.2 “Supported meter types”.	OMNIPOWER® direct meters firmware number: • 50981173 rev. X1 • 50981165 rev. X1 • 50981251 rev. N1
A1	Document published.	OMNIPOWER® direct meters firmware number: • 50981173 rev. X1 • 50981165 rev. X1 • 50981251 rev. N1
B1	Encryption implemented.	OMNIPOWER® direct meters firmware number: • 50981173 rev. AE6 • 50981165 rev. AE6 • 50981251 rev. V6
C1	Delay description added in Chapter 2.7.2 “Time trigger setup”.	OMNIPOWER® direct meters firmware number: • 50981173 rev. AE6 • 50981165 rev. AE6 • 50981251 rev. V6

2. General specification

This interface specification describes the interface of the HAN-NVE module developed for OMNIPOWER® electricity meter used in OMNIA® Suite AMR systems.

Figure 1. OMNIPOWER® meter with a HAN-NVE module

Target group

This interface specification is mainly intended for persons that are developing reading solutions for connection to OMNIPOWER® meters installed at Norwegian electricity consumers.

2.1 General data push functionality

The main principle is that a specific set of meter data is pushed via the interface, when the interface is enabled from the OMNIA® AMR system.

2.2 Supported meter types

The supported OMNIPOWER® meter types for this specification are shown in the following list, together with their respective type numbers. These type numbers are also used as the identification in the push data.

OMNIPOWER® meter type	Type number
Single-phase direct meter	686-11-11x-Nxx-3101-040
Three-phase direct meter	
• Three-wire	684-11-21x-Nxx-x101-040
• Four-wire	684-11-31x-Nxx-x101-040
Three-phase CT meter	
• Three-wire	685-11-21x-Nxx-1101-040
• Four-wire	685-11-31x-Nxx-1101-040

The meter type can deviate with respect to the list of meter data that are pushed on the interface. For example, single-phase meters only push phase-voltage data for phase 1, not for phase 2 and 3.

2.3 System support

The OMNIPOWER® meter exposes a HAN enable/disable configuration to OMNIA® Suite. As default, the interface is disabled. Enabling of the HAN-NVE push functionality must be done from the OMNIA® Suite AMR system.

Note When the HAN-NVE push functionality is enabled, the consumer communication channel (CCC) port is exclusively used for pushing data. Consequently, the port works as transmit (Tx) only, i.e. no receive requests (Rx) of any protocol are supported.

2.4 Hardware specification

The physical interface must be MBUS (EN 13757-2) and a RJ45 connector must be used to connect to the bus.

2.4.1 Environmental and reliability specification

The operational temperature range is the same as for the OMNIPOWER® meter:

Temperature range	-40°C to 70°C with a	
Relative humidity	20%RH to 70%RH.	
Maximum operating altitude	2000 m above sea level.	
Maximum load		
• **Maximum power to Home Energy Management System (HEMS)**	144mW	4 unit loads according to EN 13757-2
• **Maximum current to Home Energy Management System (HEMS)**	6mA	4 unit loads according to EN 13757-2

2.4.2 Interconnect

The external device is connected to the meter via a RJ45 connector. The pins 1 and 2 are used for the MBUS connection.

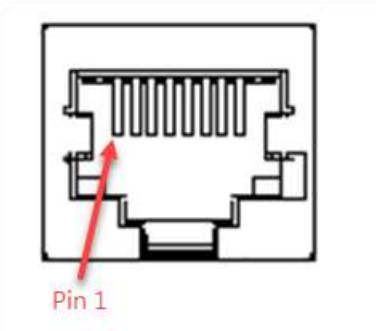

Figure 2. Drawing of the RJ45 socket showing pin 1

Pin	Functionality
1	Communication
2	Ground (GND)
3-8	Not connected

The module is designed for a cable length shorter than 3 meters from the meter to the external device.

2.5 Communication specification

2.5.1 Data notification

Long-Invoke-Id-And-Priority	
• Long-invoke-id	0
• Reserved	0
• Self-descriptive	0
• Processing-option	0
• Service-class	0 (unconfirmed)
• Priority	0 (low)
Date-time	trigger time

2.5.2 HDLC parameters

Segmentation	Not supported
Source address	
• Type	1 byte addressing
• Logical address	16
Destination address	
• Client address	21
Frame type	
• UI-frame	

2.5.3 HDLC setup

Comm_speed	2400 baud

Window_size_transmit	1
Window_size_receive	N/A
Max_info_length_transmit	1010
Max_info_length_receive	N/A
Inter_octet_timeout	N/A
Inactivity_time_out	0 (not operational)

2.6 List of attributes to be pushed

The two lists of data that are sent out can be modelled as attribute 2 (**push_object_list**) of a DLMS interface class 40 (push setup).

Although, the values of the other attributes are set, they are not exposed on the interface. The attributes are only added to illustrate the inner workings.

2.7 Push data list 1 (10 seconds interval)

The first list of data is pushed out every 10 seconds.

2.7.1 Push data setup 1

- **Logical_name**: 0.1.25.9.0.255 (internal objId:)
- **push_obj_list**: (for three-phase/four-quadrant meters)

Class	Logical name	Object name	Attrib.	Unit	Scaler
1	1.1.0.2.129.255	OBIS List version identifier	2	-	-
1	1.1.0.0.5.255	GS1 number	1	-	-
			2	-	-
1	1.1.96.1.1.255	Meter type	1	-	-
			2	-	-
3	1.1.1.7.0.255	P14	1	-	-
			2	W	0
3	1.1.2.7.0.255	P23	1	-	-
			2	W	0
3	1.1.3.7.0.255	Q12	1	-	-
			2	var	0
3	1.1.4.7.0.255	Q34	1	-	-
			2	var	0

Class	Logical name	Object name	Attrib.	Unit	Scaler
3	1.1.31.7.0.255	IL1	1	-	-
			2	A	-2 (-3*)
3	1.1.51.7.0.255	IL2	1	-	-
			2	A	-2 (-3*)
3	1.1.71.7.0.255	IL3	1	-	-
			2	A	-2 (-3*)l
3	1.1.32.7.0.255	UL1	1	-	-
			2	V	0
3	1.1.52.7.0.255	UL2	1	-	-
			2	V	0
3	1.1.72.7.0.255	UL3	1	-	-
			2	V	0

* For OMNIPOWER® CT meters

Send_destination_and_method	
• Transport_service	5 (HDLC)
• Destination	Client address 21
• Message	0 (A-XDR)
Communication_window	array[0] (always possible)
Randomisation_start_interval	0
Number_of_retries	0
Repetition_delay	0

2.7.2 Time trigger setup

- Push interval: fixed at 10s, sent at xx:xx:x0 (hh:mm:ss).
- Priority: is pushed first (before list 2)

2.8 Push data list 2 (1 hour interval)

The second list of data is pushed out every hour. It consists of the same data as list 1 plus some extra registers.

2.8.1 Push data setup 2

- **Logical_name**: 0.2.25.9.0.255 (internal objId:)
- **push_obj_list**: (for three-phase/four-quadrant meters)

Class	Logical name	Object name	Attrib.	Unit	Scaler
1	1.1.0.2.129.255	OBIS List version identifier	2	-	-
1	1.1.0.0.5.255	GS1 number	1	-	-
			2	-	-
1	1.1.96.1.1.255	Meter type	1	-	-
			2	-	-
3	1.1.1.7.0.255	P14	1	-	-
			2	W	0
3	1.1.2.7.0.255	P23	1	-	-
			2	W	0
3	1.1.3.7.0.255	Q12	1	-	-
			2	var	0
3	1.1.4.7.0.255	Q34	1	-	-
			2	var	0
3	1.1.31.7.0.255	IL1	1	-	-
			2	A	-2 (-3*)
3	1.1.51.7.0.255	IL2	1	-	-
			2	A	-2 (-3*)
3	1.1.71.7.0.255	IL3	1	-	-
			2	A	-2 (-3*)
3	1.1.32.7.0.255	UL1	1	-	-
			2	V	0
3	1.1.52.7.0.255	UL2	1	-	-
			2	V	0
3	1.1.72.7.0.255	UL3	1	-	-
			2	V	0
8	0.1.1.0.0.255	RTC	1	-	-

Class	Logical name	Object name	Attrib.	Unit	Scaler
			2	-	-
1	1.1.1.8.0.255	A14	1	-	-
			2	Wh	1
1	1.1.2.8.0.255	A23	1	-	-
			2	Wh	1
1	1.1.3.8.0.255	R12	1	-	-
			2	varh	1
1	1.1.4.8.0.255	R34	1	-	-
			2	varh	1

* For OMNIPOWER® CT meters

Send_destination_and_method	
• Transport_service	5 (HDLC)
• Destination	Client address 21
• Message	0 (A-XDR)
Communication_window	array[0] (always possible)
Randomisation_start_interval	0
Number_of_retries	0
Repetition_delay	0

2.8.2 Time trigger setup

Push interval: Fixed at 3600 seconds. The 10 seconds timer and the 1 hour timer must not collide as one of the lists will then not be pushed. Therefore, the 10 seconds timer is sent at xx:xx:x0 (hh:mm:ss) and the 1 hour timer is offset 5 seconds after every whole hour and is sent at xx:00:05 (hh:mm:ss). Further delay is possible in increments of 10 seconds. The hour timer will, in most cases, be sent within 60 seconds. The time stamp will indicate the delay.

2.9 Variant handling

Objects that do not exist for a specific meter variant, e.g. a single-phase meter or a one- or two-quadrant meter, are not pushed.

2.9.1 Example

In a single-phase meter measuring in one quadrant only, list 2 will look like this:

Class	Logical name	Object name	Attrib.	Unit	Scaler
1	1.1.0.2.129.255	OBIS List version identifier	2	-	-
1	1.1.0.0.5.255	GS1 number	1	-	-
			2	-	-
1	1.1.96.1.1.255	Meter type	1	-	-
			2	-	-
3	1.1.1.7.0.255	P14	1	-	-
			2	W	0
3	1.1.31.7.0.255	IL1	1	-	-
			2	A	-2
3	1.1.32.7.0.255	UL1	1	-	-
			2	V	0
8	0.1.1.0.0.255	RTC	1	-	-
			2	-	-
1	1.1.1.8.0.255	A14	1	-	-
			2	Wh	1

2.10 Encryption

OMNIPOWER® supports full encryption on all communication interfaces, including the HAN-NVE interface. The encryption method used is AES 128-bit; it covers readout of all consumption/production data listed in Chapter 2.7 and Chapter 2.8 above.

Each meter holds a number of keys, called general purpose keys (GPK), used for role-based access. OMNIPOWER® has a customer role intended for use with the HAN-interface, as only read-access to a predefined set of registers is permitted. The customer role is implemented for use of two keys, one used for authorization and one used for authentication.

For more details about encryption, please contact Kamstrup A/S.

3. Examples of pushed frames

3.1 Example 1: 10 seconds list, three-phases, four-quadrants

```
7E A0E2 2B 21 13 239A E6E700
 0F 00000000 0C07D0010106162100FF800001
 0219
  0A0E 4B616D73747275705F5630303031
  0906 0101000005FF 0A10 35373036353637303030303030303030
  0906 0101600101FF 0A12 3030303030303030303030303030303030303030
  0906 0101010700FF 0600000000
  0906 0101020700FF 0600000000
  0906 0101030700FF 0600000000
  0906 0101040700FF 0600000000
  0906 01011F0700FF 0600000000
  0906 0101330700FF 0600000000
  0906 0101470700FF 0600000000
  0906 0101200700FF 120000
  0906 0101340700FF 120000
  0906 0101480700FF 120000
5BE57E
```

3.2 Example 2: 1 hour list, three-phases, four-quadrants

```
7E A12C 2B 21 13 FC04 E6E700
 0F 00000000 0C07E1081003100005FF800000
  0223
   0A0E 4B616D73747275705F5630303031
   0906 0101000005FF 0A10 35373036353637303030303030303030
   0906 0101600101FF 0A12 3030303030303030303030303030303030303030
   0906 0101010700FF 0600000000
   0906 0101020700FF 0600000000
   0906 0101030700FF 0600000000
   0906 0101040700FF 0600000000
   0906 01011F0700FF 0600000000
   0906 0101330700FF 0600000000
   0906 0101470700FF 0600000000
   0906 0101200700FF 120000
   0906 0101340700FF 120000
   0906 0101480700FF 120000
   0906 0001010000FF 090C 07E1081003100005FF800000
   0906 0101010800FF 0600000000
   0906 0101020800FF 0600000000
   0906 0101030800FF 0600000000
   0906 0101040800FF 0600000000
C8867E
```

3.3 Example 3: 1 hour list, single-phase, one-quadrant

```
7E A0AE 2B 21 13 A01B E6E700
 0F 00000000 0C07E1081003100005FF800000
 020F
  0A0E 4B616D73747275705F5630303031
  0906 0101000005FF 0A10 35373036353637303030303030303030
  0906 0101600101FF 0A12 3030303030303030303030303030303030
  0906 0101010700FF 0600000000
  0906 01011F0700FF 0600000000
  0906 0101200700FF 120000
  0906 0001010000FF 090C 07E1081003100005FF800000
  0906 0101010800FF 0600000000
05217E
```