

# ENERGYMID|EM

LON Interface for Energy Meters EM228X-W1, EM238X-W1

3-349-908-03  
2/7.16



LONWORKS®

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## 1 General Information Regarding the LON Bus

The LON (local operating network) is a multi-network compatible communication system for distributed applications.

Central control tasks are broken down into subtasks which are then executed in a decentralized fashion. The subtasks are executed at so-called nodes without placing any load on the bus system. Functional units are assigned to the nodes, for example those required for ascertaining measured quantities.

The system can be centrally controlled, operated and configured via the LON interface by means of an LNS plug-in for a Windows application.

The LON is used primarily in building automation applications.

## 2 Overview

Series U228x-W1 and U238x-W1 energy meters consist of 5 objects:

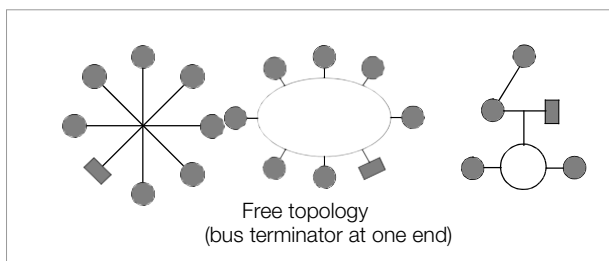
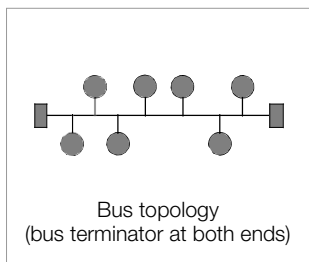
Node	nodeObject
Voltmeter	voltMeter
Ammeter	amMeter
Energy meter	energyMeter
Power meter	powerMeter

## 3 Wiring

The most commonly used transmission medium for industrial and building management applications is twisted pair copper cable, which is used together with the electrically isolated FTT-10A transceiver. Both of the conductors can be connected to either pole, and installation is thus reverse polarity protected.

Maximum transmission distances are influenced by the electrical characteristics of the cable and the network topology. Utilized cables should comply with the stipulated specifications in order to prevent interference during communication. Due to the possibility of reflections, only one cable type may be used in any given bus segment.

### 3.1 Network Topologies



Where bus topologies are used, the individual devices are connected in parallel one after the other. A bus terminating resistor must be used at each end. Only one bus terminator is required with free topologies, but transmission distances are limited in this case.

The energy meters are not equipped with internal bus terminating resistors (see section 3.6 on page 3).

### 3.2 Recommendation

The following recommendation is based upon experience gained by GMC-I Messtechnik GmbH during installation and start-up of LON systems. The environment within which the cable is laid has a decisive influence on correct cable selection, and must therefore be taken into consideration during the planning stage. All generally applicable directives for laying control and telecommunications cables must be adhered to during installation.

### 3.3 Use of Repeaters

If repeaters are used the bus signal can be refreshed, thus increasing maximum possible transmission distance. Due to response characteristics, only one passive repeater may be included in any given bus segment. The transition to other physical transmission media, and/or targeted forwarding of data packets to individual bus segments, is accomplished by means of routers.

### 3.4 Maximum Cable Lengths

Cable Type/ Designation	Bus Topology (bus terminator at both ends)	Free Topology (bus terminator at one end)
JY (ST) Y 2 x 2 x 0.8 mm	900 m	500 m Max. 320 m device – device
UNITRONIC bus cable	900 m	500 m Max. 320 m device – device
Level IV, 22AWG	1400 m	500 m Max. 400 m device – device
Belden 8471	2700 m	500 m Max. 400 m device – device
Belden 85102	2700 m	500 m

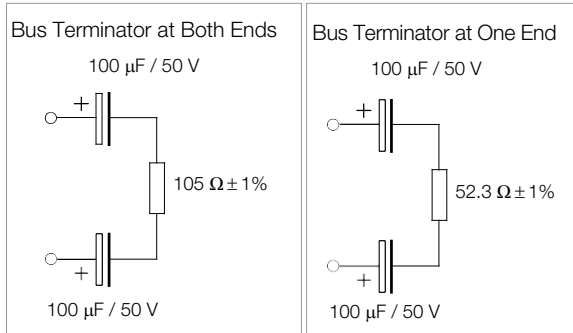
Specified values apply to total cable length and are only valid for the FTT-10A transceiver.

### 3.5 Cable Type

Inexpensive wiring is possible for applications in environments with minimal interference using the following cable type: JY (ST) Y 2 ea. 2 x 0.8 mm with twisted wire pairs. The above specified dimension of 0.8 mm refers to the diameter of the wire, which results in a wire cross-section of 0.5 square mm.

In most cases no shielding is required. It may be possible to eliminate communications problems occurring in environments with excessive interference by connecting the shield at one end. If cables are used which contain several wire pairs, it may be advantageous if the individual pairs are shielded. Special LON bus cable can be used for highly demanding requirements.

### 3.6 Bus Termination



An adjustable bus terminator is frequently included in master stations which must be set in accordance with the utilized topology. Additional bus terminators are required for bus topologies, and where repeaters are used. These can be purchased as auxiliary LON component U1664 in top-hat rail mount housing. Each unit includes a one-ended and a two-ended bus terminator.

## 4 Network Interface

### 4.1 Network Variables

Measured quantities and energy meter status information available within the network are defined as standard network variable types (SNVT).

The software tools can be furnished with all information necessary for integration by accessing the website of GMC-I Messtechnik GmbH at [www.gossenmetrawatt.com](http://www.gossenmetrawatt.com).

#### Node – nodeObject ObjectId: 0

Index	Network Variable	Data Type	Description
0	nviRequest	SNVT_obj_reque st	Query object status
1	nviTimeSet	SNVT_time_stam p	Set date and time
2	nvoStatus	SNVT_obj_status	Read out object status
3	nvoFileDirectory	SNVT_address	Start address of the configuration files
4	nvoOemType	SNVT_str_asc	Device type and features
5	nvoSerialNumber	SNVT_str_asc	Serial number and firmware version of the main program
6	nvoPowerUpHours	SNVT_time_hour	Operating hours since the last time operating voltage was switched on
7	nvoActTime	SNVT_time_stam p	Current time (updated once a minute).
<b>Refe- rence</b>	<b>Configuration Structure</b>	<b>Data Type</b>	<b>Description</b>
Nv 2	cpMaxStsSendT	SCPTmaxSendTi me	Maximum time until transmission of nvoStatus
Device	cpDevMajVer	SCPTdevMajVer	LON firmware version, read-only
Device	cpDevMinVer	SCPTdevMinVer	LON firmware version, read-only
Device	cpLocation	SCPTlocation	Installation location and meter number

## Voltmeter – voltMeter ObjectId: 2

Index	Network Variable	Data Type	Description
Phase voltages			
44	nvoU12	SNVT_volt_f	Phase-to-phase voltage, L1 and L2
45	nvoU23	SNVT_volt_f	Phase-to-phase voltage, L2 and L3
46	nvoU31	SNVT_volt_f	Phase-to-phase voltage, L3 and L1
47	nvoU1N	SNVT_volt_f	Phase-to-neutral voltage, L1 and N
48	nvoU2N	SNVT_volt_f	Phase-to-neutral voltage, L2 and N
49	nvoU3N	SNVT_volt_f	Phase-to-neutral voltage, L3 and N
50	nvoUAvg	SNVT_volt_f	Mean value of line-to-line voltage
51	nvoFreq	SNVT_freq_hz	Fundamental voltage frequency
52	nvoThdU1	SNVT_lev_percent	THD voltage L1
53	nvoThdU2	SNVT_lev_percent	THD voltage L2
54	nvoThdU3	SNVT_lev_percent	THD voltage L3
<b>Reference</b>	<b>Configuration Structure</b>	<b>Data Type</b>	<b>Description</b>
Object	cpVoltMaxSndT	SCPTmaxSendTime	Send condition: maximum time until transmission of network variables
Nv 44...50	cpVoltSndDelta	UCPTvoltSendDelta	Send condition: delta voltage
Nv 51	cpFreqSndDelta	UCPTfreqSendDelta	Send condition: delta frequency
Object	cpPTConnType	UCPTconnType	Voltage transformer connection type
Object	cpPTPrimary	UCPTptVoltagePrim	Nominal primary voltage of the voltage transformer
Object	cpPTSecondary	UCPTptVoltageSec	Nominal secondary voltage of the voltage transformer

## Ammeter – amMeter ObjectId: 3

Index	Network Variable	Data Type	Description
Phase current			
55	nvol1	SNVT_amp_f	Current in phase L1
56	nvol2	SNVT_amp_f	Current in phase L2
57	nvol3	SNVT_amp_f	Current in phase L3
58	nvolAvg	SNVT_amp_f	Phase current mean value
59	nvolIN	SNVT_amp_f	Calculated neutral conductor current
60	nvoThdI1	SNVT_lev_percent	THD current I1
61	nvoThdI2	SNVT_lev_percent	THD current I2
62	nvoThdI3	SNVT_lev_percent	THD current I3
<b>Reference</b>	<b>Configuration Structure</b>	<b>Data Type</b>	<b>Description</b>
Object	cpAmpMaxSndT	SCPTmaxSendTime	Send condition: maximum time until transmission of network variables
Nv 55...59	cpAmpSndDelta	UCPTampSendDelta	Send condition: delta current
Objekt	cpCTConnType	UCPTconnType	Current transformer connection type, read only
Objekt	cpCTPrimary	UCPTctCurrentPrim	Nominal primary current transformer current
Objekt	cpCTSecondary	UCPTctCurrentSec	Nominal secondary current transformer current

**Power Meter powerMeter ObjectId: 4**

Index	Network Variable	Data Type	Description
Active power			
63	nvoWatTot	SNVT_power_f	Total active power, all 3 phases
64	nvoWat1	SNVT_power_f	Active power in phase L1
65	nvoWat2	SNVT_power_f	Active power in phase L2
66	nvoWat3	SNVT_power_f	Active power in phase L3
Reactive power			
67	nvoVarTot	SNVT_power_f	Total reactive power, all 3 phases
68	nvoVar1	SNVT_power_f	Reactive power in phase L1
69	nvoVar2	SNVT_power_f	Reactive power in phase L2
70	nvoVar3	SNVT_power_f	Reactive power in phase L3
Power factor			
71	nvoPwrFactrTot	SNVT_pwr_fact	Overall power factor
72	nvoPwrFactr1	SNVT_pwr_fact	Power factor in phase L1
73	nvoPwrFactr2	SNVT_pwr_fact	Power factor in phase L2
74	nvoPwrFactr3	SNVT_pwr_fact	Power factor in phase L3
<b>Reference</b>	<b>Configuration Structure</b>	<b>Data Type</b>	<b>Description</b>
Object	cpPwrMaxSndT	SCPTmaxSendTime	Send condition: maximum time until transmission of network variables
Nv 63...70	cpPwrSndDelta	UCPTpwrSendDelta	Send condition: delta power (active and reactive power)
Nv 71...74	cpPwrFacSndDelta	UCPTpwrFactSendDelta	Send condition: delta power factor

## Energy Meter – energyMeter ObjectID: 5

Index	Network Variable	Data Type	Description	OBIS
75	nviActiveTariff	UNVT_tariff	Tariff selection setting 1-8, 0 = hardware selection	
76	nvoActiveTariff	UNVT_tariff	Display of active tariff 1-8	
77	nvokWhPosT1	SNVT_reg_val	Active energy import, all phases, tariff no. 1	1.8.1
78	nvokWhPosT2	SNVT_reg_val	Active energy import, all phases, tariff no. 2	1.8.2
79	nvokWhPosT3	SNVT_reg_val	Active energy import, all phases, tariff no. 3	1.8.3
80	nvokWhPosT4	SNVT_reg_val	Active energy import, all phases, tariff no. 4	1.8.4
81	nvokWhPosT5	SNVT_reg_val	Active energy import, all phases, tariff no. 5	1.8.5
82	nvokWhPosT6	SNVT_reg_val	Active energy import, all phases, tariff no. 6	1.8.6
83	nvokWhPosT7	SNVT_reg_val	Active energy import, all phases, tariff no. 7	1.8.7
84	nvokWhPosT8	SNVT_reg_val	Active energy import, all phases, tariff no. 8	1.8.8
85	nvokWhNegT1	SNVT_reg_val	Active energy supply, all phases, tariff no. 1	2.8.1
86	nvokWhNegT2	SNVT_reg_val	Active energy supply, all phases, tariff no. 2	2.8.2
87	nvokWhNegT3	SNVT_reg_val	Active energy supply, all phases, tariff no. 3	2.8.3
88	nvokWhNegT4	SNVT_reg_val	Active energy supply, all phases, tariff no. 4	2.8.4
89	nvokWhNegT5	SNVT_reg_val	Active energy supply, all phases, tariff no. 5	2.8.5
90	nvokWhNegT6	SNVT_reg_val	Active energy supply, all phases, tariff no. 6	2.8.6
91	nvokWhNegT7	SNVT_reg_val	Active energy supply, all phases, tariff no. 7	2.8.7
92	nvokWhNegT8	SNVT_reg_val	Active energy supply, all phases, tariff no. 8	2.8.8
93	nvokVArhPosT1	SNVT_reg_val	Reactive energy import, all phases, tariff no. 1	3.8.1
94	nvokVArhPosT2	SNVT_reg_val	Reactive energy import, all phases, tariff no. 2	3.8.2
95	nvokVArhPosT3	SNVT_reg_val	Reactive energy import, all phases, tariff no. 3	3.8.3
96	nvokVArhPosT4	SNVT_reg_val	Reactive energy import, all phases, tariff no. 4	3.8.4
97	nvokVArhPosT5	SNVT_reg_val	Reactive energy import, all phases, tariff no. 5	3.8.5
98	nvokVArhPosT6	SNVT_reg_val	Reactive energy import, all phases, tariff no. 6	3.8.6
99	nvokVArhPosT7	SNVT_reg_val	Reactive energy import, all phases, tariff no. 7	3.8.7
100	nvokVArhPosT8	SNVT_reg_val	Reactive energy import, all phases, tariff no. 8	3.8.8
101	nvokVArhNegT1	SNVT_reg_val	Reactive energy supply, all phases, tariff no. 1	4.8.1
102	nvokVArhNegT2	SNVT_reg_val	Reactive energy supply, all phases, tariff no. 2	4.8.2
103	nvokVArhNegT3	SNVT_reg_val	Reactive energy supply, all phases, tariff no. 3	4.8.3
104	nvokVArhNegT4	SNVT_reg_val	Reactive energy supply, all phases, tariff no. 4	4.8.4
105	nvokVArhNegT5	SNVT_reg_val	Reactive energy supply, all phases, tariff no. 5	4.8.5
106	nvokVArhNegT6	SNVT_reg_val	Reactive energy supply, all phases, tariff no. 6	4.8.6
107	nvokVArhNegT7	SNVT_reg_val	Reactive energy supply, all phases, tariff no. 7	4.8.7
108	nvokVArhNegT8	SNVT_reg_val	Reactive energy supply, all phases, tariff no. 8	4.8.8
109	nvoValWhTotPos	SNVT_reg_val	Total active energy import, not resettable	1.8.0
110	nvoValWhTotNeg	SNVT_reg_val	Total active energy export, not resettable	2.8.0
111	nvoValVArhTotPos	SNVT_reg_val	Total reactive energy import, not resettable	3.8.0
112	nvoValVArhTotNeg	SNVT_reg_val	Total reactive energy export, not resettable	4.8.0
113	nvoEnergyType	UNVT_energyType	Energy value is primary or secondary	
114	nvoEnergyFlowHrs	SNVT_time_hour	Operating hours (exceeded with the meter's start-up threshold)	
<b>Reference</b>	<b>Configuration Structure</b>	<b>Data Type</b>	<b>Description</b>	
Object	cpEnergyMaxSndT	SCPTmaxSendTime	Send condition: maximum time until transmission of network variables	
Object	cpEngyAccumMode	UCPTenergyAccumMode	Energy meter operating mode, read only	



## Energy for U160x Summators – energyForU160x ObjectId: 1

Index	Network Variable	Data Type	Description	OBIS
8	nvokWhPosT1Pri	UNVT_energy_U160x	Primary active energy import, all phases, tariff no. 1	1.8.1
9	nvokWhPosT2Pri	UNVT_energy_U160x	Primary active energy import, all phases, tariff no. 2	1.8.2
10	nvokWhPosT3Pri	UNVT_energy_U160x	Primary active energy import, all phases, tariff no. 3	1.8.3
11	nvokWhPosT4Pri	UNVT_energy_U160x	Primary active energy import, all phases, tariff no. 4	1.8.4
12	nvokWhPosT5Pri	UNVT_energy_U160x	Primary active energy import, all phases, tariff no. 5	1.8.5
13	nvokWhPosT6Pri	UNVT_energy_U160x	Primary active energy import, all phases, tariff no. 6	1.8.6
14	nvokWhPosT7Pri	UNVT_energy_U160x	Primary active energy import, all phases, tariff no. 7	1.8.7
15	nvokWhPosT8Pri	UNVT_energy_U160x	Primary active energy import, all phases, tariff no. 8	1.8.8
16	nvokWhNegT1Pri	UNVT_energy_U160x	Primary active energy supply, all phases, tariff no. 1	2.8.1
17	nvokWhNegT2Pri	UNVT_energy_U160x	Primary active energy supply, all phases, tariff no. 2	2.8.2
18	nvokWhNegT3Pri	UNVT_energy_U160x	Primary active energy supply, all phases, tariff no. 3	2.8.3
19	nvokWhNegT4Pri	UNVT_energy_U160x	Primary active energy supply, all phases, tariff no. 4	2.8.4
20	nvokWhNegT5Pri	UNVT_energy_U160x	Primary active energy supply, all phases, tariff no. 5	2.8.5
21	nvokWhNegT6Pri	UNVT_energy_U160x	Primary active energy supply, all phases, tariff no. 6	2.8.6
22	nvokWhNegT7Pri	UNVT_energy_U160x	Primary active energy supply, all phases, tariff no. 7	2.8.7
23	nvokWhNegT8Pri	UNVT_energy_U160x	Primary active energy supply, all phases, tariff no. 8	2.8.8
24	nvokVArhPosT1Pri	UNVT_energy_U160x	Primary reactive energy import, all phases, tariff no. 1	3.8.1
25	nvokVArhPosT2Pri	UNVT_energy_U160x	Primary reactive energy import, all phases, tariff no. 2	3.8.2
26	nvokVArhPosT3Pri	UNVT_energy_U160x	Primary reactive energy import, all phases, tariff no. 3	3.8.3
27	nvokVArhPosT4Pri	UNVT_energy_U160x	Primary reactive energy import, all phases, tariff no. 4	3.8.4
28	nvokVArhPosT5Pri	UNVT_energy_U160x	Primary reactive energy import, all phases, tariff no. 5	3.8.5
29	nvokVArhPosT6Pri	UNVT_energy_U160x	Primary reactive energy import, all phases, tariff no. 6	3.8.6
30	nvokVArhPosT7Pri	UNVT_energy_U160x	Primary reactive energy import, all phases, tariff no. 7	3.8.7
31	nvokVArhPosT8Pri	UNVT_energy_U160x	Primary reactive energy import, all phases, tariff no. 8	3.8.8
32	nvokVArhNegT1Pri	UNVT_energy_U160x	Primary reactive energy supply, all phases, tariff no. 1	4.8.1
33	nvokVArhNegT2Pri	UNVT_energy_U160x	Primary reactive energy supply, all phases, tariff no. 2	4.8.2
34	nvokVArhNegT3Pri	UNVT_energy_U160x	Primary reactive energy supply, all phases, tariff no. 3	4.8.3
35	nvokVArhNegT4Pri	UNVT_energy_U160x	Primary reactive energy supply, all phases, tariff no. 4	4.8.4
36	nvokVArhNegT5Pri	UNVT_energy_U160x	Primary reactive energy supply, all phases, tariff no. 5	4.8.5
37	nvokVArhNegT6Pri	UNVT_energy_U160x	Primary reactive energy supply, all phases, tariff no. 6	4.8.6
38	nvokVArhNegT7Pri	UNVT_energy_U160x	Primary reactive energy supply, all phases, tariff no. 7	4.8.7
39	nvokVArhNegT8Pri	UNVT_energy_U160x	Primary reactive energy supply, all phases, tariff no. 8	4.8.8
40	nvokWhPosPri	UNVT_energy_U160x	Primary active energy import, all tariffs	1.8.0
41	nvokWhNegPri	UNVT_energy_U160x	Primary active energy supply, all tariffs	2.8.0
42	nvokVArhPosPri	UNVT_energy_U160x	Primary reactive energy import, all tariffs	3.8.0
43	nvokVArhNegPri	UNVT_energy_U160x	Primary reactive energy supply, all tariffs	4.8.0

The object includes processed energy values with corresponding power value and error status for series U160x summators.

```
typedef struct {
    SNVT_reg_val Energy;
    SNVT_power_f Power;
    unsigned long Error
}UNVT_energy_U160x
```

Variable	Meaning
Power	Primary value
Error	The EnergyValUncalib bit indicates whether the queried value is calibrated (0) or un-calibrated (1).

```
typedef struct{           // for U160x
    // Hi-Byte
    unsigned Dummy1      : 5;
    unsigned Analog      : 1; // error in analog part           x04
    unsigned Calibration : 1; // no calibration                 x02
    unsigned Energy      : 1; // EEPROM defective           x01
    // Lo-Byte
    unsigned Dummy1      : 1;
    unsigned EnergyValUncalib : 1; // energy value cannot be calibrated x40
    unsigned NoSync      : 1; // no synchronization         x20
    unsigned HiVoltage   : 1; // voltage too high           x10
    unsigned CurrentDir  : 1; // incorrect current direction x08
    unsigned RotationDir : 1; // incorrect phase rotation direction x04
    unsigned LoVoltage   : 1; // phase failure               x02
    unsigned HiCurrent   : 1; // current too high            x01
} error_struct Error;
```

## Cutoff Date Function – energyFreeze ObjectId: 6

Index	Network Variable	Data Type	Description
115	nviEnergyFrzTs	SNVT_time_stamp	Cutoff date schedule, date/time – use placeholder for repeat logging
116	nvoEnergyFrzTs	SNVT_time_stamp	Read cutoff date meter reading with date and time
117	nvokWhPosT1Frz	SNVT_reg_val	Active energy import, all phases, tariff no. 1
118	nvokWhPosT2Frz	SNVT_reg_val	Active energy import, all phases, tariff no. 2
119	nvokWhPosT3Frz	SNVT_reg_val	Active energy import, all phases, tariff no. 3
120	nvokWhPosT4Frz	SNVT_reg_val	Active energy import, all phases, tariff no. 4
121	nvokWhPosT5Frz	SNVT_reg_val	Active energy import, all phases, tariff no. 5
122	nvokWhPosT6Frz	SNVT_reg_val	Active energy import, all phases, tariff no. 6
123	nvokWhPosT7Frz	SNVT_reg_val	Active energy import, all phases, tariff no. 7
124	nvokWhPosT8Frz	SNVT_reg_val	Active energy import, all phases, tariff no. 8
125	nvokWhNegT1Frz	SNVT_reg_val	Active energy supply, all phases, tariff no. 1
126	nvokWhNegT2Frz	SNVT_reg_val	Active energy supply, all phases, tariff no. 2
127	nvokWhNegT3Frz	SNVT_reg_val	Active energy supply, all phases, tariff no. 3
128	nvokWhNegT4Frz	SNVT_reg_val	Active energy supply, all phases, tariff no. 4
129	nvokWhNegT5Frz	SNVT_reg_val	Active energy supply, all phases, tariff no. 5
130	nvokWhNegT6Frz	SNVT_reg_val	Active energy supply, all phases, tariff no. 6
131	nvokWhNegT7Frz	SNVT_reg_val	Active energy supply, all phases, tariff no. 7
132	nvokWhNegT8Frz	SNVT_reg_val	Active energy supply, all phases, tariff no. 8
133	nvokVArhPosT1Frz	SNVT_reg_val	Reactive energy import, all phases, tariff no. 1
134	nvokVArhPosT2Frz	SNVT_reg_val	Reactive energy import, all phases, tariff no. 2
135	nvokVArhPosT3Frz	SNVT_reg_val	Reactive energy import, all phases, tariff no. 3
136	nvokVArhPosT4Frz	SNVT_reg_val	Reactive energy import, all phases, tariff no. 4
137	nvokVArhPosT5Frz	SNVT_reg_val	Reactive energy import, all phases, tariff no. 5
138	nvokVArhPosT6Frz	SNVT_reg_val	Reactive energy import, all phases, tariff no. 6
139	nvokVArhPosT7Frz	SNVT_reg_val	Reactive energy import, all phases, tariff no. 7
140	nvokVArhPosT8Frz	SNVT_reg_val	Reactive energy import, all phases, tariff no. 8
141	nvokVArhNegT1Frz	SNVT_reg_val	Reactive energy supply, all phases, tariff no. 1
142	nvokVArhNegT2Frz	SNVT_reg_val	Reactive energy supply, all phases, tariff no. 2
143	nvokVArhNegT3Frz	SNVT_reg_val	Reactive energy supply, all phases, tariff no. 3
144	nvokVArhNegT4Frz	SNVT_reg_val	Reactive energy supply, all phases, tariff no. 4
145	nvokVArhNegT5Frz	SNVT_reg_val	Reactive energy supply, all phases, tariff no. 5
146	nvokVArhNegT6Frz	SNVT_reg_val	Reactive energy supply, all phases, tariff no. 6
147	nvokVArhNegT7Frz	SNVT_reg_val	Reactive energy supply, all phases, tariff no. 7
148	nvokVArhNegT8Frz	SNVT_reg_val	Reactive energy supply, all phases, tariff no. 8

Network variables 116 ... 148 are transmitted via LON when the cutoff date event occurs (nviEnergyFrzTs == nvoActTime).

For cutoff date logging at regular intervals ...

nviEnergyFrzTs.year or

nviEnergyFrzTs.month or

nviEnergyFrzTs.day

... is set to 0 (placeholder or wildcard method)

All of the cutoff date function's NVs are saved to non-volatile memory so that mains power interruptions do not result in data loss.

## Load Profile Function - demandLogger ObjectId: 7

Index	Network Variable	Data Type	Description
149	nviDmdPeriodMins	SNVT_time_min	Set the load profile interval (only the following values are accepted: 1, 2, 3, 5, 10, 15, 20, 30 or 60 minutes) (The value is saved to non-volatile memory.)
150	nviDmdHistChoice	SNVT_count	Set the consecutive number of the load profile entry (0 ... 16,063)
151	nvoDmdPeriodMins	SNVT_time_min	Query load profile interval (minutes)
152	nvoDmdHistChoice	SNVT_count	Query the consecutive number of the load profile entry (0 ... 16,063)
153	nvoDmdHistWhPos	SNVT_reg_val_ts	Load profile, active energy import, unit of measure, time stamp
154	nvoDmdHistWhNeg	SNVT_reg_val_ts	Load profile, active energy export, unit of measure, time stamp
155	nvoDmdHistVArhPo	SNVT_reg_val_ts	Load profile, reactive energy import, unit of measure, time stamp
156	nvoDmdHistVArhNe	SNVT_reg_val_ts	Load profile, reactive energy export, unit of measure, time stamp
157	nvoDmdHistTariff	UNVT_tariff_status_ts	Tariff, StatusFlags1, StatusFlags2, time stamp

```
typedef struct {
    unsigned short Tariff;
    unsigned short DemandInterval;
    unsigned long DemandStatus1;
    unsigned long DemandStatus2;
    unsigned status : 4;
    unsigned reg_state : 1;
    unsigned long year;
    unsigned short month;
    unsigned short day;
    unsigned short hour;
    unsigned short minute;
    unsigned short second;
} UNVT_tariff_status_ts;
```

### DemandStatus1 Flags [hex]:

0001 – current too high, phase 1  
 0002 – current too high, phase 2  
 0004 – current too high, phase 3  
 0008 – voltage too high, phase 1  
 0010 – voltage too high, phase 2  
 0020 – voltage too high, phase 3  
 0040 – line frequency not found  
 0080 – frequency too low  
 0100 – frequency too high  
 0200 – incorrect phase sequence  
 0400 – phase sequence not detected  
 0800 – device is not calibrated  
 1000 – analog error: DC offset too large  
 2000 – energy error: defective energy status  
 4000 – internal communication error  
 8000 – energy value reconstructed from cyclical backups

### DemandStatus2 Flags [hex]:

0001 – shortened logging period (not started/ended synchronous to clock time)  
 0002 – started after a reset  
 0004 – end of the period due tariff change  
 0008 – end of the period due clock time change

## Operating Logbook - eventLogger ObjectId: 8

Index	Network Variable	Data Type	Description
158	nviLogHistChoice	SNVT_count	Set number of chronological entries in the operating logbook (0 ... 255) 0 means: last saved event, 255 means: oldest saved event
159	nvoLogHistChoice	SNVT_count	Read number of chronological entries in the operating logbook (0 ... 255)
160	nvoLogHistEvent	UNVT_event_log_val_ts	Event, parameter, operating hours, time stamp

```
typedef struct {  
    unsigned short event;  
    unsigned short parameter[7];  
    unsigned long operating_hours;  
    unsigned status : 4;  
    unsigned reg_state : 1;  
    unsigned long year;  
    unsigned short month;  
    unsigned short day;  
    unsigned short hour;  
    unsigned short minute;  
    unsigned short second;  
} UNVT_event_log_val_ts;
```

### Event codes:

00 – status OK  
01/81 – current too high  
02/82 – voltage too high  
03/83 – line frequency not found  
04/84 – frequency too low  
05/85 – frequency too high  
06/86 – incorrect phase sequence  
07/87 – phase sequence not detected  
08/88 – device is not calibrated  
09/89 – phase voltage too low  
0A/8A – analog error: DC offset too large  
0B/8B – energy error: defective energy status  
0C/8C – internal communication error  
(note: error occurred / error gone)

40 – date/time changed  
48 – CT changed  
49 – VT changed  
60 – reset occurred  
68 – energy value reconstructed from cyclical backups

## 4.2 Units of Measure and Resolution

### Ammeter – amMeter ObjectId: 3

#### Current

Type	CT	Display	LON Unit of Measure	LON Resolution
EM228x	1	xx.xx A	A	10 mA
EM238x	1	x.xxx A	A	1 mA
	2 ... 10	xx.xx A	A	10 mA
	11 ... 100	xxx.x A	A	100 mA
	101 ... 1000	xxxx A	A	1 A
	1001 ... 10 000	xx.xx kA	A	10 A

### Voltmeter – voltMeter ObjectId: 2

#### Voltage

Type	VT at U3 (100 V)	VT at U5 ... U7	Display	LON Unit of Measure	LON Resolution
EM228x	--	1	xxx.x V	V	0.1 V
EM238x	1 ... 4	1	xxx.x V	V	0.1 V
	5 ... 40	2 ... 10	xxxx V	V	1 V
	41 ... 400	11 ... 100	xx.xx kV	V	10 V
	401 ... 1000	101 ... 1000	xxx.x kV	V	100 V

### Power Meter – powerMeter ObjectId: 4

#### Power

Type	CTxVT at U3	CTxVT at U5 ... U7	Display	LON Unit of Measure	LON Resolution
EM228x	---	1	xx.xx kW	W	10 W
EM238x	1 ... 4	1	xxxx W	W	1 W
	5 ... 40	2 ... 10	xx.xx kW	W	10 W
	41 ... 400	11 ... 100	xxx.x kW	W	100 W
	401 ... 4000	101 ... 1000	xxxx kW	W	1 kW
	4001 ... 40,000	1001 ... 10,000	xx.xx MW	W	10 kW
	40,001 ... 400,000	10,001 ... 100,000	xxx.x MW	W	100 kW
	400,001 ... 1,000,000	100,001 ... 1,000,000	xxxx MW	W	1 MW

### Energy Meter – energyMeter ObjectId: 5

#### Energy

Type	CTxVT	Display	LON Unit of Measure	LON Resolution	LON cWh
EM228x	1	xxxxx.xx kWh	kWh	10 Wh	0.1 Wh
EM238x	1 ... 10	xxxxxxx Wh	kWh	1 Wh	0.01 Wh
	11 ... 100	xxxxx.xx kWh	kWh	10 Wh	0.1 Wh
	101 ... 1000	xxxxxx.x kWh	kWh	100 Wh	1 Wh
	1001 ... 10000	xxxxxxx kWh	kWh	1 kWh	10 Wh
	10,001 ... 100,000	xxxxx.xx MWh	MWh	10 kWh	100 Wh
	100,001 ... 1,000,000	xxxxxx.x MWh	MWh	100 kWh	1 kWh

Invalid energy values (reactive energy for meters without reactive energy metering) are indicated with the value 80000000h.

### 4.3 Cutoff Date Function

By means of network variable "nviEnergyFrzTs" (index 115) it is possible to preselect the date and time for the "freezing" of the meter reading, i.e. the momentary energy value status is copied in a separate data area for subsequent read-out (cutoff date energies).

The point in time of recording the cutoff date energies can be found in network variable "nvoEnergyFrzTs" (index 116). The energy values for tariffs 1-8 are supplied by network variables with index 117 to 148.

The following agreements have been reached for setting the cutoff date:

- Point in time in the future: Cutoff date energies are updated at this point in time.
- Date in the past: no updating of the cutoff date energies.
- Present date, time in the past: current device time and cutoff date energies are imported in memory.
- "0" as specification for the day, month or year serves as a placeholder: the cutoff date energies are updated at each respective date.
- Everything set to "0" (placeholder) in date and time: cutoff date with device clock, every day at midnight, first import immediately.

The network variable nvoEnergyFlowHrs indicates the number of operating hours. Operating hours are only counted when start-up current has been exceeded. Only full hours are saved to memory.

### 4.4 Manufacturer-Specific Configuration Types (UCPTs)

UCPTvoltSendDelta	SNVT_volt_f
UCPTfreqSendDelta	SNVT_freq_hz
UCPTConnType	conn_type
UCPTptVoltagePrim	SNVT_volt_f
UCPTptVoltageSec	SNVT_volt_f
UCPTctCurrentPrimary	SNVT_amp_f
UCPTctCurrentSec	SNVT_amp_f
UCPTenergyAccumMode	acc_mode
UCPTenergySendDelta	SNVT_elec_whr_f
UCPTpulseRate	SNVT_count_f
UCPTpwrSendDelta	SNVT_power_f
UCPTpwrFactSendDelta	SNVT_pwr_fact_f

#### typedef enum conn\_type\_t {

```
CT_NUL = -1      —
CT_2WIRE_TRANSFORMER = 20      U2381
CT_2WIRE_DIRECT = 21      U2281
CT_3WIRE_TRANSFORMER = 30      U2387
CT_3WIRE_DIRECT = 31      —
CT_4WIRE_TRANSFORMER = 40      U2389
CT_4WIRE_DIRECT = 41      U2289
}conn_type;
```

#### typedef enum acc\_mode\_t {

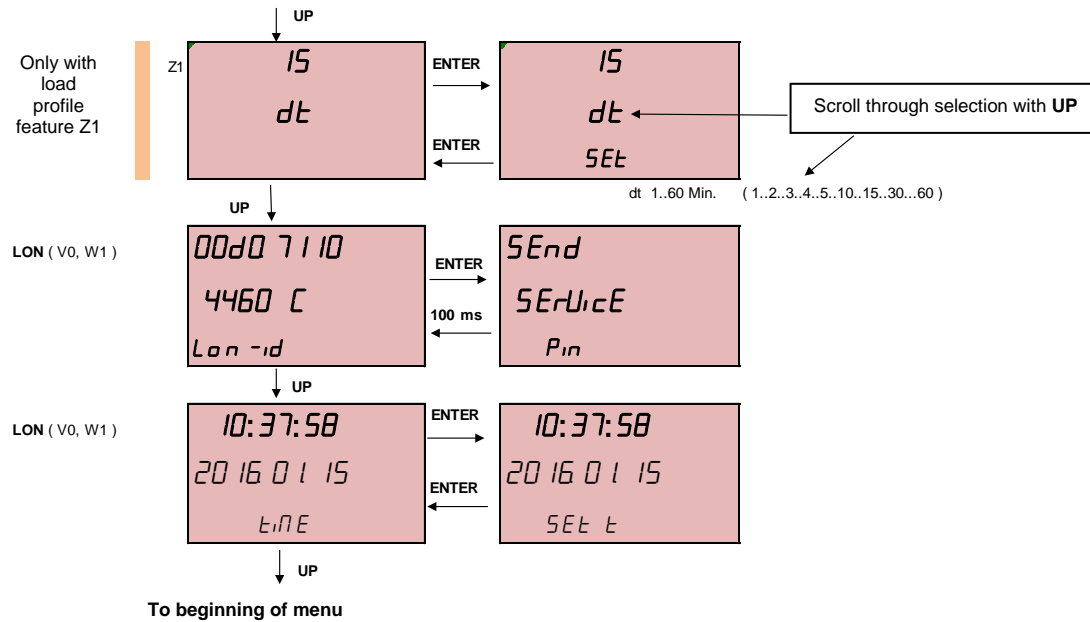
```
ACC_NUL = -1
ACC_BIDIR_SIGNED = 0      difference between energy import and energy export
ACC_BIDIR_ABS = 1      energy import and energy export
ACC_UNIDIR_IN = 2      energy import only: U1281...U1389
ACC_UNIDIR_OUT = 3      energy export only
}acc_mode;
```

## 5 Control and Display Functions

The neuron ID appears in an additional menu entry. The service pin message is transmitted by pressing the “UP” key.

Overview of Parameter Settings (excerpt from operating instructions no. 3-349-868-01, expanded to include LON parameter setting)

### 5.1 Menu continued by meters with LON Interface



#### Installing the Meter

The meter can be installed to a LON network by manually entering the neuron ID, or by triggering the service pin message.

#### Status of the LON Node (Node State) and “Δ Lon” Message

The status of the LON node is indicated by means of a symbol to the right of the neuron ID.

Symbol	Status
c	LON chip is configured (configured online)
n	LON chip has no application (no application)
u	LON chip is not configured (unconfigured online)
o	LON chip is offline (offline)

#### Bus Symbol



The BUS symbol appears when the LON node in the meter transmits a data packet. The more data packets are transmitted, the longer the symbol is displayed.

#### Wink Command for Identifying the LON Node

When a wink command is received, the neuron ID is displayed briefly.



## 5.2 Error Messages

Message via LON Interface	Cause / Remedy	Device Display
Node object Object Id: 0		
No error messages of its own. Transmits OR-gated error messages from all other objects.		
amMeter Object Id: 3		
over_range	A maximum current value has been exceeded.	Δ IHi1, Δ IHi 2, Δ IHi 3
electrical_fault	Negative power, or current transformer connections are reversed. Check connection.	Phase symbol for the affected phase blinks.
unable_to_measure	Error in analog component. Send device to service center.	Δ AnALog
	Device is not calibrated. Send device to service center.	Δ CALib
powerMeter Object Id: 4		
No error messages		
voltMeter Object Id: 2		
over_range	A maximum voltage value has been exceeded.	Δ UHi1, Δ UHi 2, Δ UHi 3
under_range	Phase failure or a minimum voltage value has been fallen short of. Check connection.	Phase symbol for the affected voltage disappears, e.g. phase 2.
electrical_fault	Incorrect phase sequence. Check connection.	Phase symbols blink in following order: ~3 ~2 ~1
unable_to_measure	Synchronization to line frequency is not possible.	Δ SYnc
energyMeter Object Id: 5		
Electrical fault	EEPROM for meter reading is defective, send device to service center.	Δ EnErgY

### 5.3 Report Mask for All Objects

Error Message	Node Object	amMeter	powerMeter	voltMeter	energyMeter
Object_Id	0	1	2	3	4
invalid_id	0	0	0	0	0
invalid_request	0	0	0	0	0
disabled	0	0	0	0	0
out_of_limits	0	0	0	0	0
open_circuit	0	0	0	0	0
out_of_service	0	0	0	0	0
mechanical_fault	0	0	0	0	0
feedback_failure	0	0	0	0	0
over_range	1	1	0	1	0
under_range	1	0	0	1	0
electrical_fault	1	1	0	1	1
unable_to_measure	1	1	0	1	0
comm_failure	0	0	0	0	0
fail_self_test	0	0	0	0	0
self_test_in_progress	0	0	0	0	0
locked_out	0	0	0	0	0
manual_control	0	0	0	0	0
in_alarm	0	0	0	0	0
in_override	0	0	0	0	0
report_mask	1	1	1	1	1

## 6 Product Support

When you need support, please contact:

GMC-I Messtechnik GmbH

**Product Support Hotline – Industrial Division**

Phone: +49 911 8602-500

Fax: +49 911 8602-340

e-mail: [support.industrie@gossenmetrawatt.com](mailto:support.industrie@gossenmetrawatt.com)

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 **GOSSEN METRAWATT**  
GMC-I Messtechnik GmbH  
Südwestpark 15  
D-90449 Nürnberg • Germany

Phone: +49 911 8602-111  
Fax: +49 911 8602-777  
E-Mail [info@gossenmetrawatt.com](mailto:info@gossenmetrawatt.com)  
[www.gossenmetrawatt.com](http://www.gossenmetrawatt.com)