Technical Information
SINEAX DME400-LON

Contents

1. Introduction

The SINEAX DME400-LON for LONWORKS® measures several variables of an electrical power system. In order to ensure easy integration in any LONWORKS® network, the DME400-LON complies with LONMarks® interoperability guidelines, version 3.0.

It provides all measured values as LONWORKS® Standard Network Variable Types (SNVTs).

The LONWORKS® network interface provides for example: power, energy, voltage, current, power factor and the system frequency. The device can be configured via the LONWORKS® interface using the file transfer protocol.

Additionally the DME400-LON is equipped with an RS232 serial interface to which a PC with the corresponding software can be connected. This is used for configuration or for executing auxiliary functions (display measured values, reset energy counters…).

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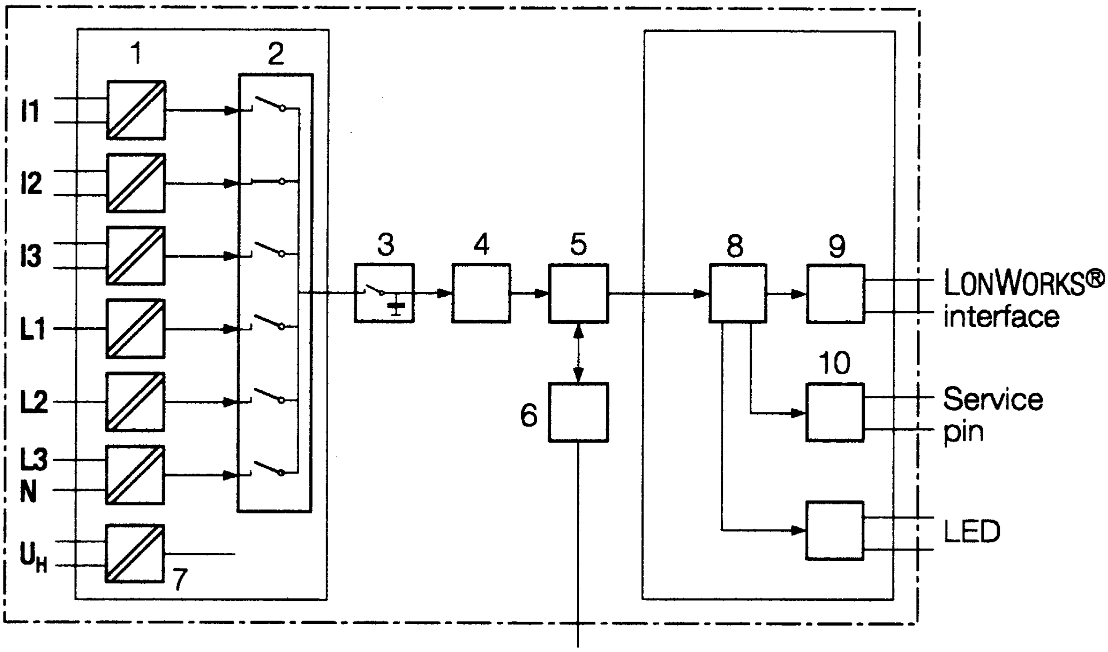
1.1. General Description

All inputs are electrically isolated from the system by means of input transformers. The simultaneously sampled instantaneous values are stored in the hold stage. Via the multiplexer, the stored instantaneous values are serially processed by the microprocessor. The measured values are computed from n * 32 sampled values (n = the number of inputs). The measured values determined by the microprocessor are transmitted to the Neuron chip which converts them to Standard Network Variable Types (SNVT).



1 = Input transformer
2 = Multiplexer
3 = Latching stage
4 = A/D and D/A converter
5 = Microprocessor
6 = Programming interface RS-232 (electrically insulated)
7 = Power supply
8 = NEURON® Chip
9 = FTT-10
10 = Service pin

1.2. Variables which are available via LONWORKS® Interface

Symbols	Meaning	
U	Input voltage	
U12	AC Phase-to-phase voltage L1 - L2	
U13	AC Phase-to-phase voltage L2 - L3	
U23	AC Phase-to-phase voltage L1 - L3	
U1N	AC Phase-to-neutral voltage L1- N	
U2N	AC Phase-to-neutral voltage L2- N	
U3N	AC Phase-to-neutral voltage L2- N	
UM	Average value of the voltage	
I	Input current	
I1	AC Input current L1	
I2	AC Input current L2	
I3	AC Input current L3	
IM	Average value of the currents	
IMS	Average value of the currents and sign of the active power	
IB	RMS value of the current with wire setting range (bimetal measuring function)	15 min
IB1	RMS value of the current with wire setting range (bimetal measuring function), phase 1	15 min
IB2	RMS value of the current with wire setting range (bimetal measuring function), phase 2	15 min
IB3	RMS value of the current with wire setting range (bimetal measuring function), phase 2	15 min
IBS	Slave pointer function for the measurement of the RMS value IB	15 min
IBS1	Slave pointer function for the measurement of the RMS value IB, phase 1	15 min
IBS2	Slave pointer function for the measurement of the RMS value IB, phase 2	15 min
IBS3	Slave pointer function for the measurement of the RMS value IB, phase 3	15 min
F	Frequency of the input variable	
P	Active power of the system	
P1	Active power phase 1 (phase-to-neutral L1 – N)	
P2	Active power phase 1 (phase-to-neutral L2 – N)	
P3	Active power phase 1 (phase-to-neutral L3 – N)	
PF	Active power factor cosf = P/S	
PF1	Active power factor phase 1, P1/S1	
PF2	Active power factor phase 2, P2/S2	
PF3	Active power factor phase 3, P3/S3	
Q	Reactive power of the system	
Q1	Reactive power phase 1 (phase-to-neutral L1 – N)	
Q2	Reactive power phase 2 (phase-to-neutral L2 – N)	
Q3	Reactive power phase 3 (phase-to-neutral L3 – N)	
S	Apparent power of the system	
S1	Apparent power phase 1 (phase-to-neutral L1 – N)	
S2	Apparent power phase 2 (phase-to-neutral L2 – N)	
S3	Apparent power phase 3 (phase-to-neutral L3 – N)	
LF	Power factor of the system	
LF1	Power factor phase 1	
LF2	Power factor phase 2	
LF3	Power factor phase 3	
QF	Reactive power factor sinf = Q/S	
QF1	Reactive power factor phase 1, Q1/S1	
QF2	Reactive power factor phase 2, Q2/S2	
QF3	Reactive power factor phase 3, Q3/S3	
EA	Energy counter 1	
EB	Energy counter 2	
EC	Energy counter 3	
ED	Energy counter 4	

Where c.t.s and/or v.t.s are used for measurement, the values refer to the primaries of the transformers.

1.3. Variables which can be changed via LONWORKS® Interface

- Reset the energy counters
- Reset the maximum value pointers

1.4. Configuration of the DME400-LON

There are two ways to configure the DME400-LON:

1) Via RS232, and PC Software
2) Via LONWORKS® Interface

The following parameters can be configured:

- System / application

A11	AC single-phase
A13	AC 3-wire 3-phase, symmetrical load
A14	AC 4-wire 3-phase, symmetrical load
A24	AC 4-wire 3-phase, asymmetrical load (Open-Y-Connection)
A34	AC 3-wire 3-phase, asymmetrical load (Aron-Connection)
A44	AC 4-wire 3-phase, asymmetrical load
A12	AC 3-wire 3-phase, symmetrical load, Phase-shift U: L1 - L2, I: L1
A15	AC 3-wire 3-phase, symmetrical load, Phase-shift U: L2 - L3, I: L1
A16	AC 3-wire 3-phase, symmetrical load, Phase-shift U: L3 - L1, I: L1

- Frequency measurement (via voltage circuit or current circuit)
- Network frequency (16.6, 50 or 60Hz)
- Voltage input transformer
  - Primary voltage U_p
  - Secondary voltage U_r
- Current input transformer
  - Primary current I_p
  - Secondary current I_r
- Significance of the energy counter (P,Q,...)
- Text information
- Minimum time between two updates of the measurements that are available at the LONWORKS® interface. This setting can only be changed via the LONWORKS® interface.

1.5. Files

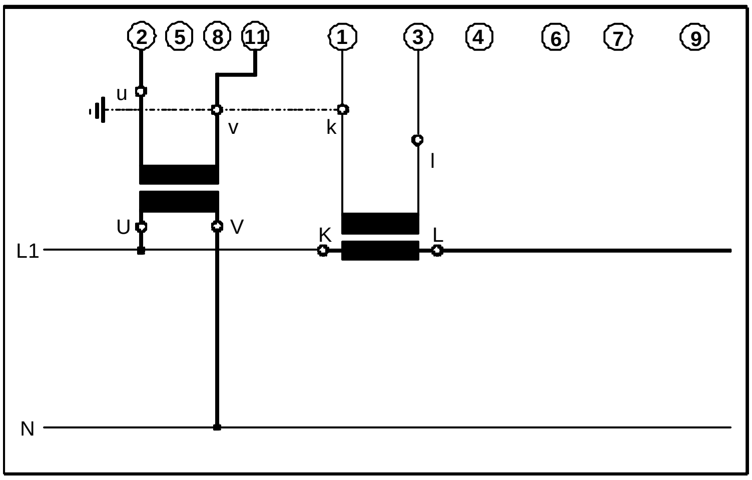
Device description for the installation tools

DME400.XIF	External Interface File

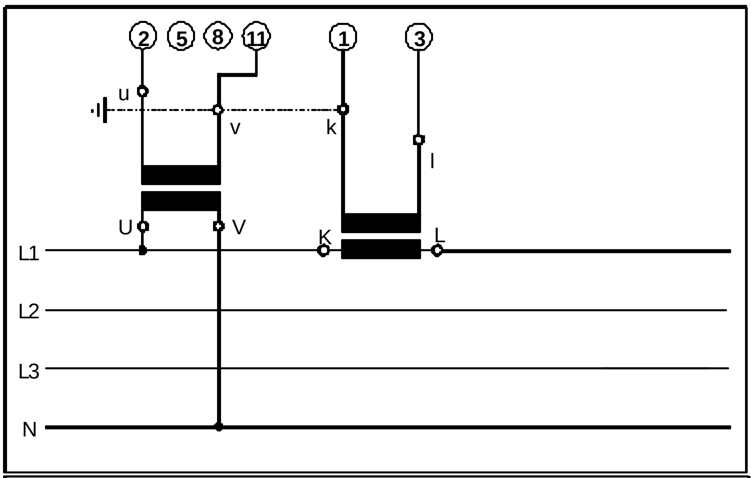
Defined UCPTs for installation tools

CB_UC01.TYP	Binary definitions of user types
CB_UC01.ENM	Binary definitions of user enumeration
CB_UC01.FMT	ASCII definition of user formats

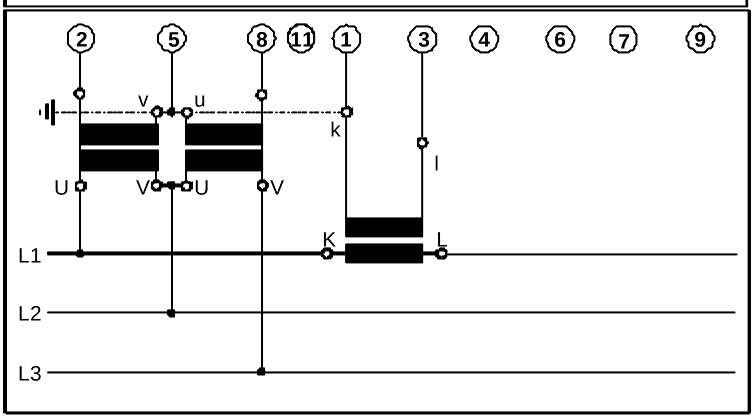
1.6. Connection Diagrams



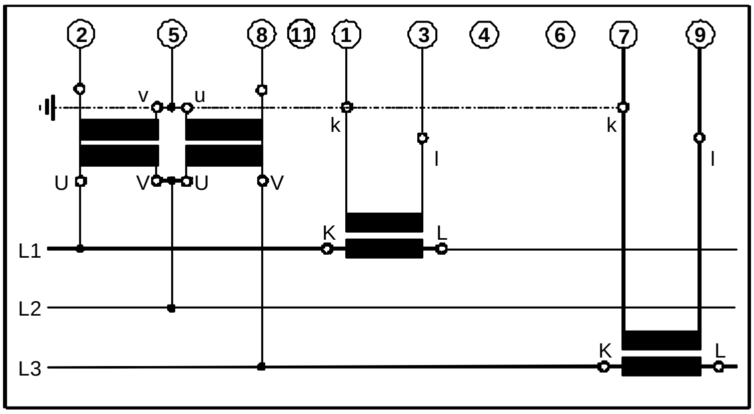
A11:
Single-phase
AC system



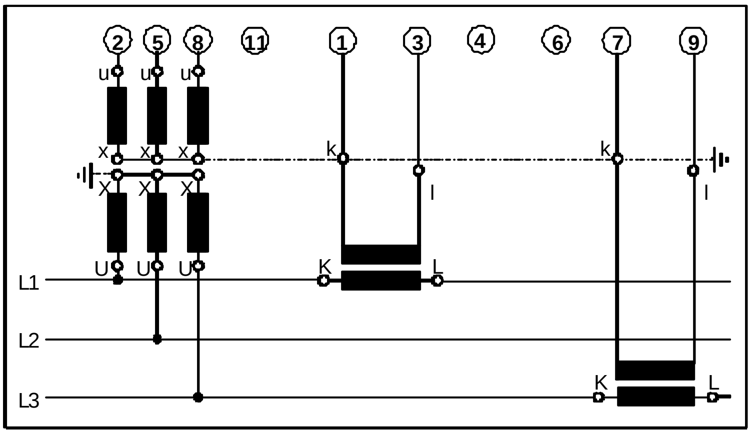
A14:
4-wire
3-phase
symmetric load
I: L1



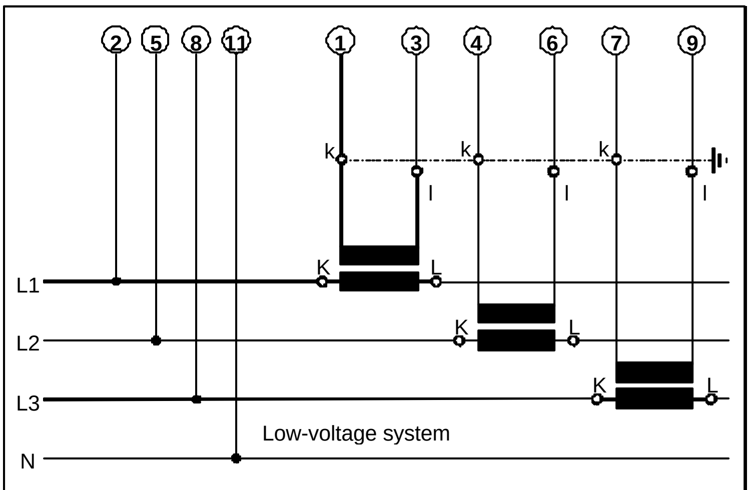
A13:
3-wire
3-phase
symmetric load
I: L1



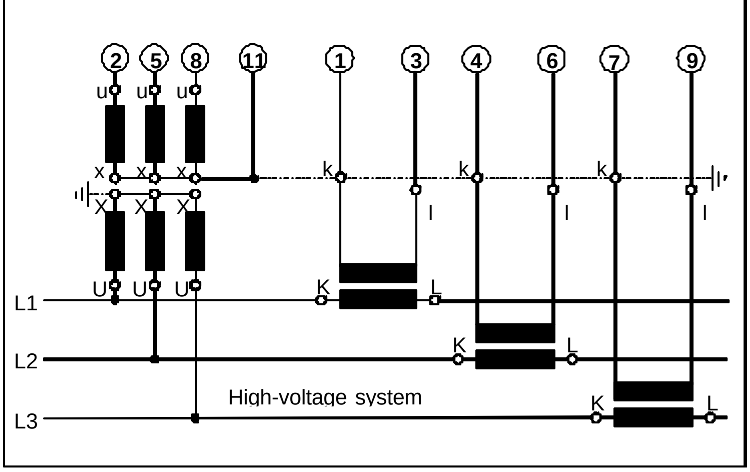
A34:
3-wire
3-phase
asymmetric load
Aron connection



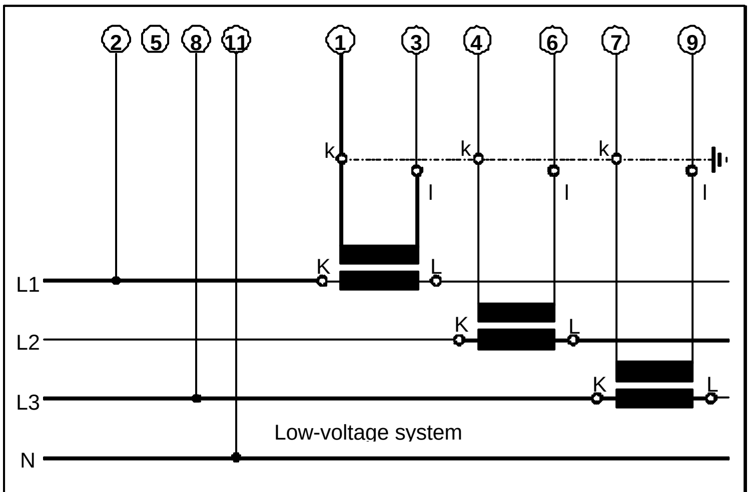
A34:
3-wire
3-phase
asymmetric load



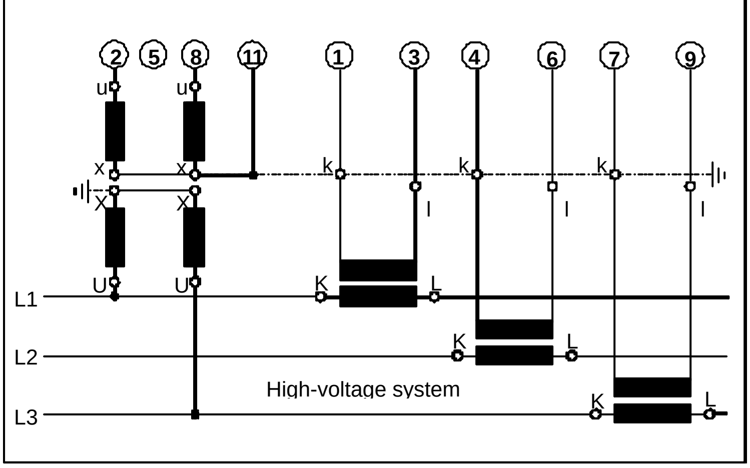
A44:
4-wire
3-phase
asymmetric load



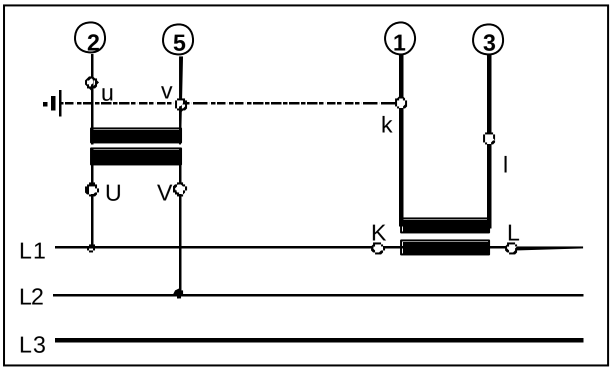
A44
3-wire
3-phase
asymmetric load
(3 single-pole isolated voltage transformers in high-voltage system)



A24:
4-wire
3-phase
asymmetric load
(Open-Y connection)

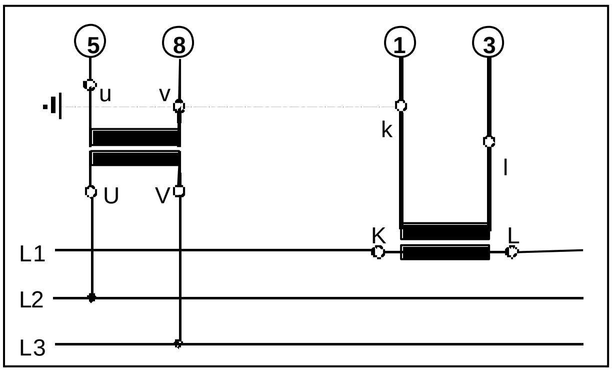


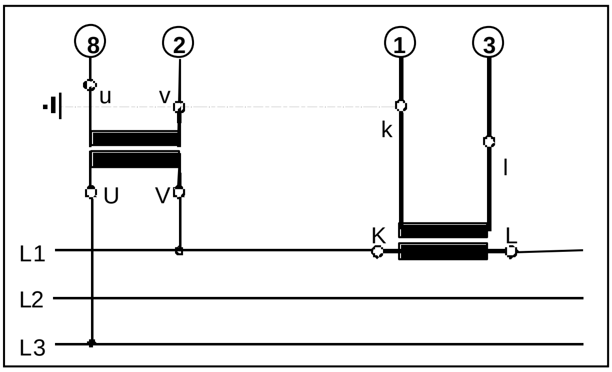
A24:
3-wire
3-phase
asymmetric load
(Open-Y connection)



A12
3-wire
3-phase
symmetric load
Phase voltage:
U: L1 – L2, I: L1

A15
3-wire
3-phase
symmetric load
Phase-voltage:
U: L2 – L3, I: L1





A16
3-wire
3-phase
symmetric load
Phase voltage:
U: L3 - L1, I: L1

2. LON Introduction

LON (Local Operating Network) is a Network System developed by the Echelon Corporation. The emphasis is on the decentralized network concept for control devices, sensors and actuators. Within large systems, this concept allows intelligence to be distributed to the peripheral devices. This makes functions possible, over and above the normal functions of the individual products (for example: identification, increased intelligence).

2.1. Physical Media

There are several different transfer media for the realization of a LON network:

Type	Medium	Distance	Transmission speed	Topology
Free Topology				
FTT-10	2-wire	2700m 500m	78 kbit/s	any Bus
Link Power				
LPT-10	2-wire	320m	78 kbit/s	any
Twisted Pair				
TPT/XF-78	2-wire	2000m	78 kbit/s	Bus
TPT/XF-1250	2-wire	500m	1250 kbit/s	Bus
Power Line				
PLT-20	230V power line	5000m	4.8 kbit/s	any
PLT-30	230V power line	5000m	2.0 kbit/s	any

Further physical media are: radio, fiber optic systems, infrared, intrinsically safe connections, coax.

The DME400-LON is equipped with the widely used and flexible FTT-10 interface.

2.2. Network Variables

The information exchange of measurements and the execution of commands takes place by means of the so-called network variables.

With the output variables, measurement information is available. The execution of commands is made by setting a value in the input variable.

In order to ensure the compatibility of different devices, SNVTs (Standard Network Variable Types) are defined by the LONMARK® Interoperability Association. SNVTs already exist for various physical parameters (current, voltage, temperature,...).

With the installation of a network, the desired output variables of the sender are connected with the corresponding input variables of the recipient. After installation, the individual devices then work completely autonomously. If the value of an output variable is updated, the input variable of the corresponding instrument is updated.

The following table lists the standard network variables of the DME400-LON:

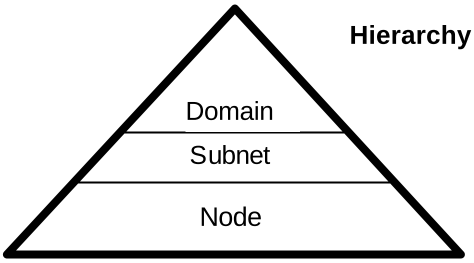
Name	Type	Application A11,A13 A14,A12 A15,A16	 A34	 A24 A44	Description
nvi00Request	SNVT_obj_request	●	●	●	Node Object
nvo00Status	SNVT_obj_status	●	●	●	Node Object
NviFileReq	SNVT_file_req	●	●	●	Node Object
NvoFileStat	SNVT_file_status	●	●	●	Node Object
nvo_VoltSY_Value	SNVT_volt_f	●	-	-	Input voltage
nvo_Volt12_Value	SNVT_volt_f	-	●	●	AC Phase-to-phase voltage L1 - L2
nvo_Volt23_Value	SNVT_volt_f	-	●	●	AC Phase-to-phase voltage L2 - L3
nvo_Volt13_Value	SNVT_volt_f	-	●	●	AC Phase-to-phase voltage L1 - L3
nvo_Volt1N_Value	SNVT_volt_f	-	-	●	AC Phase-to-neutral voltage L1 - N
nvo_Volt2N_Value	SNVT_volt_f	-	-	●	AC Phase-to-neutral voltage L2 - N
nvo_Volt3N_Value	SNVT_volt_f	-	-	●	AC Phase-to-neutral voltage L3 - N
nvo_VoltUM_Value	SNVT_volt_f	-	-	●	Average value of the voltage
nvo_AmpSY_Value	SNVT_amp_f	●	-	-	Input current
nvo_Amp01_Value	SNVT_amp_f	-	●	●	AC current L1
nvo_Amp02_Value	SNVT_amp_f	-	●	●	AC current L2
nvo_Amp03_Value	SNVT_amp_f	-	●	●	AC current L3
nvo_AmpIM_Value	SNVT_amp_f	-	●	●	Average value of the current
nvo_AmpMS_Value	SNVT_amp_f	-	●	●	Average value of the current and sign of the active power
nvo_AmpB0_Value	SNVT_amp_f	●	-	-	RMS value of the current with wire setting range (bimetal)
nvo_AmpB1_Value	SNVT_amp_f	-	●	●	RMS value of the current with wire setting range (bimetal), phase 1
nvo_AmpB2_Value	SNVT_amp_f	-	●	●	RMS value of the current with wire setting range (bimetal), phase 2
nvo_AmpB3_Value	SNVT_amp_f	-	●	●	RMS value of the current with wire setting range (bimetal), phase 3
nvo_AmpBS_Value	SNVT_amp_f	●	-	-	Slave pointer function for the measurement of the RMS value
nvo_AmpS1_Value	SNVT_amp_f	-	●	●	Slave pointer function for the measurement of the RMS value, phase 1
nvo_AmpS2_Value	SNVT_amp_f	-	●	●	Slave pointer function for the measurement of the RMS value, phase 2
nvo_AmpS3_Value	SNVT_amp_f	-	●	●	Slave pointer function for the measurement of the RMS value, phase 3
nvo_Frequency	SNVT_freq_f	●	●	●	Frequency of the input variable
nvo_TrueSY_Power	SNVT_power_f	●	●	●	Active power of the system
nvo_True01_Power	SNVT_power_f	-	-	●	Active power phase 1 (phase-to-neutral L1 – N)
nvo_True02_Power	SNVT_power_f	-	-	●	Active power phase 2 (phase-to-neutral L2 – N)
nvo_True03_Power	SNVT_power_f	-	-	●	Active power phase 3 (phase-to-neutral L3 – N)
nvo_ActSY_PwrFct	SNVT_pwr_fact	●	●	●	Active power factor cosf = P/S
nvo_Act01_PwrFct	SNVT_pwr_fact	-	-	●	Active power factor phase 1, P1/S1
nvo_Act02_PwrFct	SNVT_pwr_fact	-	-	●	Active power factor phase 2, P2/S2
nvo_Act03_PwrFct	SNVT_pwr_fact	-	-	●	Active power factor phase 3, P3/S3
nvo_ReactSY_Pwr	SNVT_power_f	●	●	●	Reactive power of the system
nvo_React01_Pwr	SNVT_power_f	-	-	●	Reactive power phase 1 (phase-to-neutral L1 – N)
nvo_React02_Pwr	SNVT_power_f	-	-	●	Reactive power phase 2 (phase-to-neutral L2 – N)
nvo_React03_Pwr	SNVT_power_f	-	-	●	Reactive power phase 3 (phase-to-neutral L3 – N)
nvo_ApparSY_Pwr	SNVT_power_f	●	●	●	Apparent power of the system
nvo_Appar01_Pwr	SNVT_power_f	-	-	●	Apparent power phase 1 (phase-to-neutral L1 – N)
nvo_Appar02_Pwr	SNVT_power_f	-	-	●	Apparent power phase 2 (phase-to-neutral L2 – N)
nvo_Appar03_Pwr	SNVT_power_f	-	-	●	Apparent power phase 2 (phase-to-neutral L3 – N)
nvo_PwrSY_Fact	SNVT_pwr_fact	●	●	●	Power factor of the system
nvo_Pwr01_Fact	SNVT_pwr_fact	-	-	●	Power factor phase 1
nvo_Pwr02_Fact	SNVT_pwr_fact	-	-	●	Power factor phase 2
nvo_Pwr03_Fact	SNVT_pwr_fact	-	-	●	Power factor phase 3
nvo_ReactSY_Fact	SNVT_pwr_fact	●	●	●	Reactive power factor sinf = Q/S
nvo_React01_Fact	SNVT_pwr_fact	-	-	●	Reactive power factor phase 1, Q1/S1
nvo_React02_Fact	SNVT_pwr_fact	-	-	●	Reactive power factor phase 2, Q2/S2
nvo_React03_Fact	SNVT_pwr_fact	-	-	●	Reactive power factor phase 3, Q3/S3
nvo_EnergyA	SNVT_elec_whr_f	●	●	●	Energy counter 1
nvo_EnergyB	SNVT_elec_whr_f	●	●	●	Energy counter 2
nvo_EnergyC	SNVT_elec_whr_f	●	●	●	Energy counter 3
nvo_EnergyD	SNVT_elec_whr_f	●	●	●	Energy counter 4
nvi_Reset_Energy	SNVT_lev_disc	●	●	●	Energy counter reset
nvi_ResSlavePnt	SNVT_lev_disc	●	●	●	Maximum value pointer reset

● Indicates whether the LONMARK Network is enabled.

Network variables of non-used objects all have the value zero. As these values do not change, they are not transmitted on the network.

The variables which are active can be determined by using the variable nvi00Request and nvo00Status in accordance with the definition of the SNVTs.

2.3. Addressing



At the top level of a network, there is the Domain. It is used to separate networks.

The underlying level (Subnet) is a logical ordering of groups of network nodes which use the same transmission channel.

Each Subnet may contain 127 nodes.

Groups can be formed within a domain independently of the Subnet. This method of addressing makes it possible for several participants to receive a message simultaneously.

Before each participant can be assigned an address, it must be addressed via its personal address (Neuron ID).

In addition, there is broadcast addressing, which allows a message to be sent to all participants of a Subnet or even of a Domain.

The individual methods of addressing are summarized in the following table:

Method of Addressing	Recipients	Number of Addresses
BROADCAST	All	
NEURON_ID	Unit	1
SUBNET_NODE	Node	2 Domain 255 Subnets 127 Nodes
GROUP	Group	255 Groups 64 per group

2.4. Status of the Instrument

The most important statuses of a DME400-LON are presented in this chapter:

Unconfigured (UNCNFG)

The device is ready for installation. It responds to calls from the network.

Measurements cannot be updated.

The File Transfer Protocol cannot be used for configuration.

Online

Measurements can be updated.

The File Transfer Protocol can be used for the configuration of the device.

Security measures (authorization) are active.

The instrument no longer responds to all calls from the network. For this reason, before a new installation, the device should be reset to the UNCNFG status .

2.5. Installation

The installation of a LON network can be done with manufacturer independent installation software.

The installation tool can assign addresses to individual devices (Domain, Subnet, and Node). The individual participants must be known in order to allocate their addresses. Several methods are possible:

Service-Pin: On pressing the service pin, the instrument sends its device address. For this purpose, the output card of the DME400-LON is equipped with a switch. If the instrument may not be opened, a switch can be installed at the terminals.

Find and Wink: By polling by the LONWORKS® network, the neuron_IDs of the individual participants can be determined. A wink command causes each instrument to announce itself. During this, the DME400-LON shortly flashes an LED connected at the terminals.

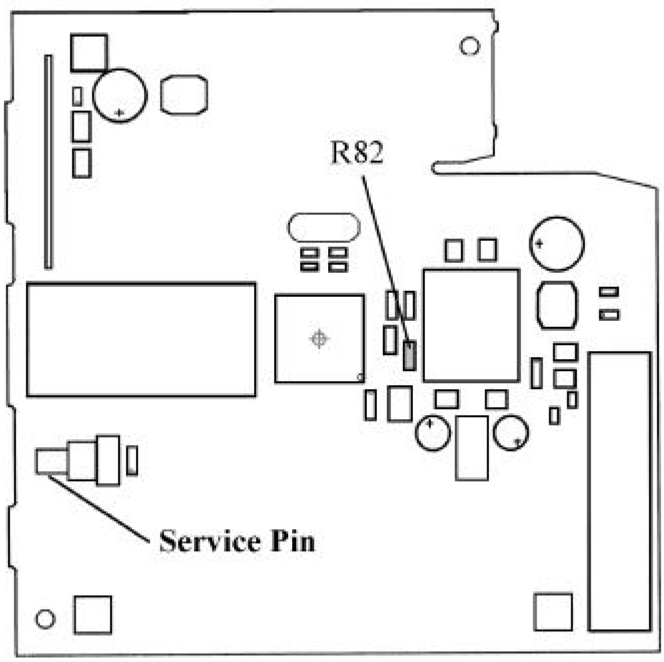
Input of the neuron_ID by hand:
For this purpose, the neuron_ID is printed on the label of each DME400-LON.

After a successful address allocation, the output network variables are configured with the corresponding input network variables (binding).

Depending on the application, groups are formed.

In order to be able to set the required instrument functions, the individual instruments are configured.

If a DME that has already been installed, needs to be reinstalled, the device can be manually set to the status UNCNFG. First the chip resistor R82 must be removed. Then with the device switched on, the service pin must be pressed for at least 10 seconds. The DME400-LON is now ready for the new installation.



Position of R82 and the service pin.

2.6. Configuration

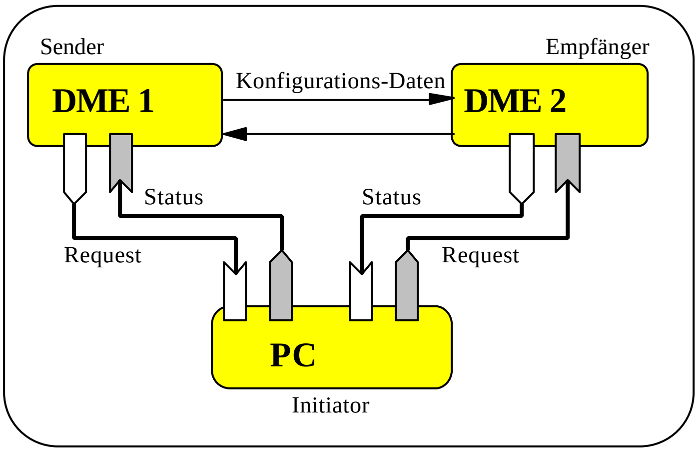
Three possibilities are available for the configuration of LON devices:

1) SCPTs: Standard Configuration Parameter Types
   These are Network Variables, similar to SNVTs, with which the parameters can be set
2) Read and write directly to the memory
3) File Transfer Protocol

There are two Standard Network Variable Types used to set up a file transfer:
- SNVT_file_req is used for communication from the initiator to the sender and receivers
- SNVT-file status is used for communication from the sender and receivers to the initiator.

When the configuration parameter value file is received, the data values are checked. If a value is not permitted, it will be changed to a permitted value. No file error is reported in this case.

The user should take into account that when he closes the file after having sent it, the DME400-LON needs about 2 seconds to successfully close the file.



To configure an instrument the PC writes or reads a file from the DME.

2.7. Self-Documentation of the Instrument

In accordance with the LONMARK® interoperability guidelines, certain information must be stored in the instrument in order to simplify the integration into a LONWORKS® network.

Node self-documentation

The standard objects used in the instrument are documented. The DME400-LON uses:

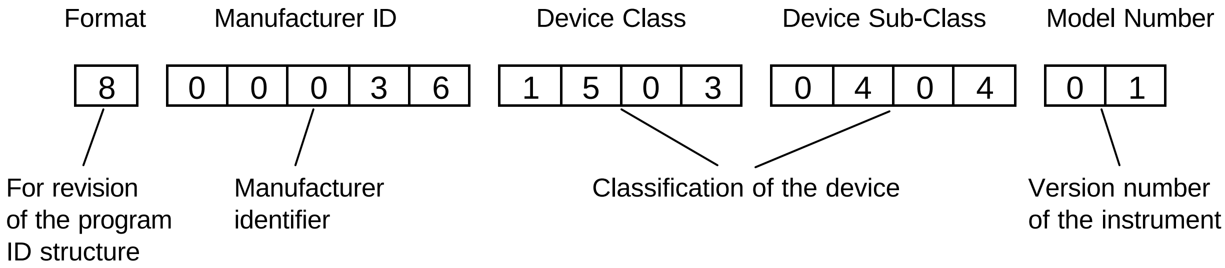
1 Node Object
51 Open Loop Sensor Object
2 Open Loop Actuator Object

Network variable self-documentation

The association of the individual objects is documented.

Standard program ID

The instrument can be identified with the help of the standard program ID. The DME400-LON has the following standard program ID (HEX):



2.8. Data Security

In the LONTALK® protocol, different methods are used in order to assure the security of the data:

- Network access:
  The method used with LON to control the access to the bus prevents frequent collisions.
- Reliability:
  Automatic data repetition is supported by the LONTALK® protocol. It can be guaranteed that the data has really reached its destination.
- Security by checking the sender:
  The LONTALK® protocol has an "authentication" function. With this function an unauthorized access to the device can be prevented .
  With the DME400-LON, this is a security measure, that for example, prevents the unauthorized resetting of the energy counters.

3. First Steps

The following chapter is meant as an introduction to LON-technology. It describes putting an instrument into service and displaying measurements.

3.1. Equipment of a PC with an Interface Card

The communication of a PC with a LON network is made with an interface card. Different interface types exist for adaptation to the different applications. The driver corresponding to the type of card must be installed.

Some possible interface cards are as follows:

- PCC10 for Notebooks (Echelon)
- SLTA10 (Echelon)
- PCCLTA10 (Echelon)
- PCNSI (Echelon)

Example of an PCMCIA card from Echelon for use in a notebook

3.2. The Test Program

The following test program supports the display of measurements of a transducer for test purposes. It is not suitable for use in existing installations.

Main menu:

```
Testprogramm fuer DME400-LON
------------------------------

Geraet    : 01              Anzahl angeschlossene Geraete: 7
Neuron ID : 00 01 87 03 07 00

       + : Naechstes Gerät
       - : vorheriges Gerät

       K: Konfiguration
       R: Reset Zaehler
       M: Messwerterfassung
       S: Suchen von Geraeten im UNCNFG-State

       E : Ende des Programmes
```

By pressing the corresponding letter keys the sub menu is activated. Selecting the individual instrument is made with the + and - keys.

Finding the Instruments

In order to be able to communicate with the required instruments, they must first be announced to the software.

1) By pressing the service pin of all connected instruments the neuron-ID is reported to the software.
2) The command "find instruments in the UNCNFG-State" finds all connected instruments that have not yet been installed.

   Subsequently, the addresses of the installed instruments must be obtained with help of the service pin.

Important: The addresses of all connected instruments must be known in order for the software to function correctly.

Measuring:

```
DME400-LON    Messwerterfassung mit LONWORKS Interface
   Geraet 1      lesen   -/-                           Anzahl Geraete : 7

 U-Dreieck      U-Stern          Strom         Bimetall      Schleppzeiger
   [V]            [V]               [A]           [A]            [A]
                SY    -----     SY  -----         -----          -----
 L12   0.050    L1N 229.930     L1  1.999         1.991          1.966
 L23   0.050    L2N 229.930     L2  2.000         1.992          1.967
 L13   0.000    L3N 229.930     L3  2.000         1.992          1.967
                UM  229.930     IM  2.000

 Frequenz       IM*sign(P)     Wirkleistung  Blindleistung  Scheinleist.
     [Hz]           [A]             [W]           [VA]          [VA]
 F  49.994      IM   2.000      SY 1196.501     -687.278      1379.578
                                L1 398.603      -228.919       459.629
                                L2 398.949      -229.208       460.090
                                L3 398.891      -229.266       460.090

 Energie                       Wirkfaktor    Blindfaktor    Leist.faktor
            [Whr]
 Energie A 974.000              SY  0.867       -0.498         -0.133
 Energie B 6496.000             L1  0.867       -0.498         -0.133
 Energie C 3352.000             L2  0.867       -0.498         -0.133
 Energie D   7.000              L3  0.867       -0.498         -0.133
```

Selecting the instrument required is made with the + and - keys. With <ESC> the measurement ends and returns to the main menu

Configuration

```
Konfiguration DME          Geraet 1
  A:  Datum         (yy:mm:dd) : 1998:01:30
  B:  Zeit          (hh:mm:ss) :   15:33:24

  C:  Anwendung =   A44, 4-Leiter-Drehstromnetz, ungl. belastet
  D:  Quelle Frequenzmessung      = Strompfad
  E:  Nennfrequenz                =   50.000    Hz
  F:  Min_Send_Time(dd:hh:mm:ss) = 00:00:00:00

  G:  Strom-Trafo      (sek)  Ir   =    5.000     A
  H:  Strom-Trafo      (prim) Ip   =    5.000     A
  I:  Spannungs-Trafo (sek)  Ur   =  200.000     V
  J:  Spannungs-Trafo (prim) Up   =  200.000     V

  K:  Energie A: Energie von : Scheinleistung des Netzes
  L:  Energie B: Energie von : Scheinleistung des Netzes
  M:  Energie C: Energie von : Wirkleistung des Netzes   (Bezug)
  N:  Energie D: Energie von : Wirkleistung des Netzes   (Abgabe)

  O: Info-Text DME400-LON elektrischer
               Messumformerm (programmierbar)
               mit LONWORKS Interface
```

With <ESC> you close the "configuration menu" and return to the main menu. Before closing you are asked whether the data should be stored in the DME.

Configuring an Energy Counter

```
Energiezähler       A: nicht definiert
                    B: Energy von : Eingangsstrom             (Bezug)
                    C: Energy von : Wechselstrom im Leiter L1 (Bezug)
                    D: Energy von : Wechselstrom im Leiter L2 (Bezug)
                    E: Energy von : Wechselstrom im Leiter L3 (Bezug)
                    F: Energy von : Wirkleistung des Netzes   (Bezug)
                    G: Energy von : Wirkleistung P1           (Bezug)
                    H: Energy von : Wirkleistung P2           (Bezug)
                    I: Energy von : Wirkleistung P3           (Bezug)
                    J: Energy von : Blindleistung des Netzes  (induktiv)
                    K: Energy von : Blindleistung Q1          (induktiv)
                    L: Energy von : Blindleistung Q2          (induktiv)
                    M: Energy von : Blindleistung Q3          (induktiv)
                    N: Energy von : Scheinleistung des Netzes
                    O: Energy von : Scheinleistung S1
                    P: Energy von : Scheinleistung S2
                    Q: Energy von : Scheinleistung S3
                    R: Energy von : Wirkleistung des Netzes   (Abgabe)
                    S: Energy von : Wirkleistung P1           (Abgabe)
                    T: Energy von : Wirkleistung P2           (Abgabe)
                    U: Energy von : Wirkleistung P3           (Abgabe)
                    V: Energy von : Blindleistung des Netzes  (kapazitiv)
                    W: Energy von : Blindleistung Q1          (kapazitiv)
                    X: Energy von : Blindleistung Q2          (kapazitiv)
                    Y: Energy von : Blindleistung Q3          (kapazitiv)
```

Terminating the program

Before the program is terminated, you are asked whether the instrument should be put in the UNCNFG-mode.

This must be done if the instruments are to be reused (new installation),. Only instruments in the UNCNFG-mode can be found again without the help of the service-pin.

Finally, the current instrument addresses are stored on a diskette and are available for the next time the program is used..