SIEMENS

Climatix™
LON communication module POL906.00/XXX
Documentation on basics

CB1P3931en
07.06.2011

Building Technologies

Siemens Switzerland Ltd
Building Technologies Group
International Headquarters
Gubelstrasse 22
CH-6301 Zug
Tel. +41 41-724 24 24
Fax +41 41-724 35 22
www.siemens.com/sbt

Contents

1 About this document

1.1 Revision history

Version	Date	Changes	Section	Pages
01	28.05.2009	First edition		
02	09.09.2009	New and added sections Changed NV names and data	4.4, 4.5, 4.6 5.1, 5.4, 5.5	26…29 31, 34…50
03	07.06.2011	Described NVs are brought in accordance with StdAHU XIF V100	5.1, 5.4, 5.5, 5.6	31, 34, 39, 41, 51

1.2 Before you start

Validity

This document applies to the following product:

Name	Type (ASN)	Short name
LON communication module	POL906.00/STD	LON module

Product versions

Description and functional scope of the products are based on the Climatix Valid Version Set 7.0 or higher.

Target audience

This document is intended for the following audience:

- LON system integrators
- Measuring and control engineering staff of OEM customers
- Sales and commissioning staff of OEM customers
- Siemens employees in sales and support

Use

This document intends to help the target audience to:

- Create offers for LON integration of Climatix controllers, types POL63x (AHU applications) and POL68x (chiller applications).
- Engineer and commission ventilation and air conditioning plants equipped with the above listed device combinations.

Prerequisites

The above target audience:

- Has general professional knowledge on planning and commissioning HVAC technology measuring and control solutions.
- Knowledge of the SAPRO programming and SCOPE commissioning tools (applies to staff programming and commissioning applications).
- Has basic knowledge of LON.

1.3 Reference documents

Further information

The following documents contain additional information on the products described in this manual:

Document	Order no.
Data sheet "Communication module LON"	CB1Q3931en

1.4 Document conventions

Symbols used

Below is an overview of all symbols used in this document denoting risks or important information:

This symbol draws your attention to special safety notes and warnings. Failing to observe these notes may result in injury and/or serious damages.

This symbol denotes special information that, when failed to observe, may result in faulty functionality *or loss of data*.

Notes with this symbol provide important information that requires appropriate attention.

This symbol marks passages containing tips and tricks.

Abbreviations

The following abbreviations are used in text and illustrations:

Abbreviation	Meaning
BACS	**B**uilding **A**utomation and **C**ontrol **S**ystem
BSP	**B**oard **S**upport **P**ackage (operating system)
Climatix	Controller family with common tools
CPT	**C**onfiguration **P**roperty **T**ype (LON)
FTT-10A	**F**ree **T**opology **T**ransceiver for channel type TP/FT-10 (LON)
HVAC	**H**eating, **V**entilating, **A**ir **C**onditioning
LON	Local Operating Network
LNS	**L**onWorks **N**etwork **S**ervice (LON interface)
MS	**M**anagement **S**tation
NV	**N**etwork **V**ariable (LON)
SAPRO	Programming tool SAPRO
SCOPE	Commissioning and service tool SCOPE
SELV	**S**afety **E**xtra-**L**ow **V**oltage
SNVT	**S**tandard **N**etwork **V**ariable **T**ype (LON)
TP/FT-10	Physical channel to transmit data over **T**wisted **P**air to **F**ree **T**opology networks.

1.5 Important information on safety

Field of application

Use LON communication modules only for control and monitoring functions in ventilation, air conditioning and refrigeration plants.

Intended use

Trouble-free and safe product operation of the above products presupposes transport, storage, mounting, installation, and commissioning as intended as well as careful operation.

Electrical installation

Fuses, switches, wiring and grounding must comply with local safety regulations for electrical installations.

Wiring

When wiring, strictly separate AC 230 V mains voltage from AC 24 V safety extra-low voltage (SELV) to protect against electrical shock!

Commissioning and maintenance

Only qualified staff trained accordingly may prepare for use, commission, and maintain LON communication modules.

Maintenance

Maintenance of LON communication modules generally only means regular cleaning. We recommend removing dust and dirt from system components installed in the control panels during standard service.

Faults

Only authorized staff may diagnose and correct faults and recommission the plant. This applies to working within the panel as well (e.g. testing or changing fuses).

Storage and transport

Refer to the environmental conditions specified in the respective data sheets for storage and transport.
If in doubt, contact your supplier.

Disposal

Devices contain electrical and electronic components; do not dispose of them in household garbage.
Observe all local and applicable laws.

1.6 Trademarks and copyrights

Trademarks, legal owners

The table below lists the third-party trademarks used in this document and their legal owners. The use of trademarks is subject to international and domestic provisions of the law.

Trademarks	Legal owner
LonLink™ LON® / LonManager® LonMark® LonTalk® LonWorks®	Echelon Corporation
Microsoft …	Microsoft Corporation see http://www.microsoft.com/TRADEMARKS/t-mark/nopermit.htm
Neuron®	Echelon Corporation

All product names listed in the table are registered (®) or not registered (™) trademarks of the owner listed in the table. We forgo the labeling (e.g. using the symbols ® and ™) of trademarks for the purposes of legibility based on the reference in this section.

Copyright

1.7 Quality assurance

Document contents

These documents were prepared with great care.

- The contents of all documents are checked at regular intervals.
- All necessary corrections are included in subsequent versions.
- Documents are automatically amended as a consequence of modifications and corrections to the products described.

Please make sure that you are aware of the latest document revision date.

Suggestions

If you find lack of clarity while using this document, or if you have any criticisms or suggestions, please contact the product manager in your nearest branch office. The addresses of the Siemens regional companies are available at www.siemens.com/sbt.

1.8 Document use/ request to the reader

Request to the reader

Before using our products, it is important that you read the documents supplied with or ordered at the same time as the products (equipment, applications, tools etc.) carefully and in full.
We assume that persons using our products and documents are authorized and trained appropriately and have the technical knowledge required to use our products as intended.

More information

More information on the products and applications is available:

- On the intranet (Siemens employees only) at https://workspace.sbt.siemens.com/content/00001123/default.aspx
- From the Siemens branch office near you www.siemens.com/sbt or from your system supplier
- From the support team at headquarters fieldsupport-zug.ch.sbt@siemens.com if there is no local point of contact

Exemption from liability

Siemens assumes no liability to the extent allowed under the law for any losses resulting from a failure to comply with the aforementioned points or for the improper compliance of the same.

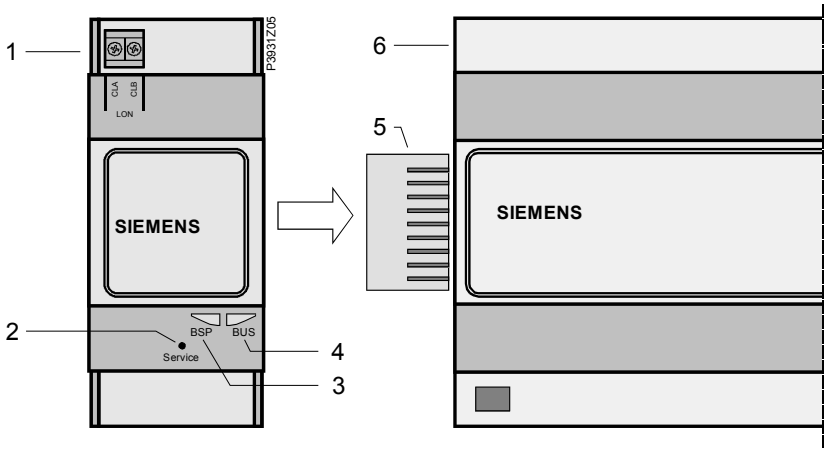
Blank page

2 LON module

2.1 Mechanical design

Design

The figure shows the LON module. It is connected to the Climatix controller via the internal communication extension bus. This is done via plug connection on the left side of the controller.



Elements and connections

The elements and connections in the figure are:

Pos.	Element / Connection
1	LON interface. Plug connection: Screw/terminal connection.
2	"Service" button; see Section 4.4 "Commission LON ".
3	Status display "BSP" (Board Support Package).
4	Status display "BUS" (bus connections o.k. / bus traffic).

Status displays

The status LEDs "BSP" and "BUS" can light red, green and yellow in operation.

"BSP" LED

This LED informs on the status of the "Board Support Package" (BSP). Color and flashing frequency of the LED:

Color	Flashing frequency	Meaning / Mode
Red / yellow	1 s "on" / 1 s "off"	Upgrade mode.
Green	Steady "on"	BSP operating and communication with controller working.
Yellow	Steady "on"	BSP operating, but no communication with controller.
Red	Flashing at 2Hz	BSP error (software error).
Red	Steady "on"	Hardware fault.

"BUS" LED

This LED shows the status of external communication with the bus, not to the controller. Color and flashing frequency of the LED:

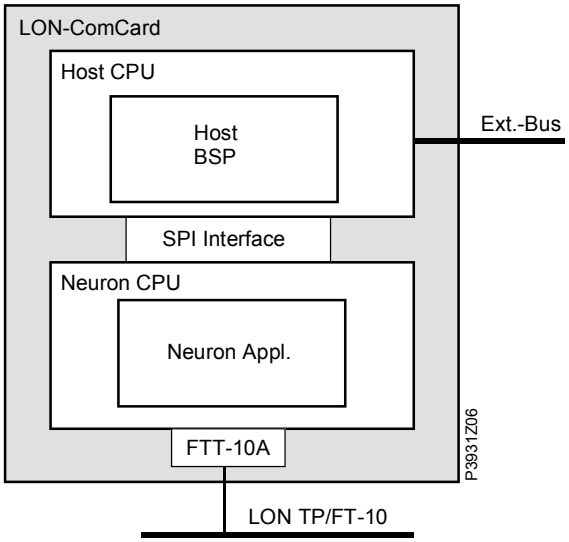
Color	Flashing frequency	Meaning / Mode
Green	Steady "on"	Communication active.
Red	Steady "on"	Communication interrupted.

Power supply is outside the allowed range if both LEDs are dark.

2.2 Functional design

Block diagram

The diagram shows the functional elements of the LON module:



Description of elements

The elements and functions are:

Element	Description / Function
LON-ComCard	LON communication module.
Host CPU	• Interprets the mapping file. Mapping file: Assignment of network variables and their properties; see Section 4.3 "Map". • Uses COV events to communicate with the Climatix controller via the internal communication extension bus. • Forwards all value changes to be sent via LON to the Neuron CPU. • Contains the logic for send/receive heartbeat. • Own flash memory.
Host	LON module operating system.
BSP	**B**oard **S**upport **P**ackage (operating system)
Ext. Bus	Bus to extend communication between module and controller.
SPI Interface	Connects the Neuron CPU to the host CPU for LON communication.
Neuron CPU	Transmits all communication data (SNVT description and CPT files) to the host CPU during startup. Has own flash memory for Neuron application.
Neuron Appl.	• Special LON application (LON node) to support connection LON bus/Climatix controller. • Supports the 62 network variables as per Section 5.1 • Two of the NVs are reserved for system purposes: ObjectRequest and ObjectStatus. • Use an LNS tool for commissioning. • Only the R&D team may modify the application.
FTT-10A	Bus coupling unit "Free Topology Transceiver" by Echelon.
LON TP/FT-10	LonWorks communications interface: Channel type "Twisted-Pair/Free Topology".

2.3 LON module purpose

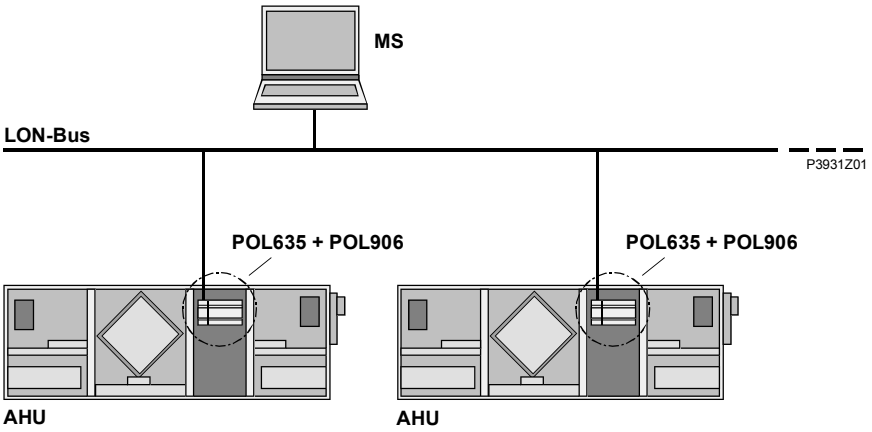
Integration in a BACS

The LON communication module has the following purpose:

- Integrate Climatix family controllers in a building automation and control system using a LON bus.

Example

The figure shows an example for Climatix controller types 635, controlling and monitoring a number or air handling devices individually:



MS	Management station
AHU	Air handling unit.
POL635	Climatix controller, basic version.
POL906	Climatix communication module LON.

Integration aims at providing all required controller data to the management station to be able to change selected setpoints and stages.

LON module or LON controller?

The LON module typically is used when integration over LON is required. This is true for the following cases:

- When LON was not required during the bid phase of a project, but a need for integration was added later on.
- When future extensions of a plant are planned during engineering, but integration over LON carried out only upon actual need.

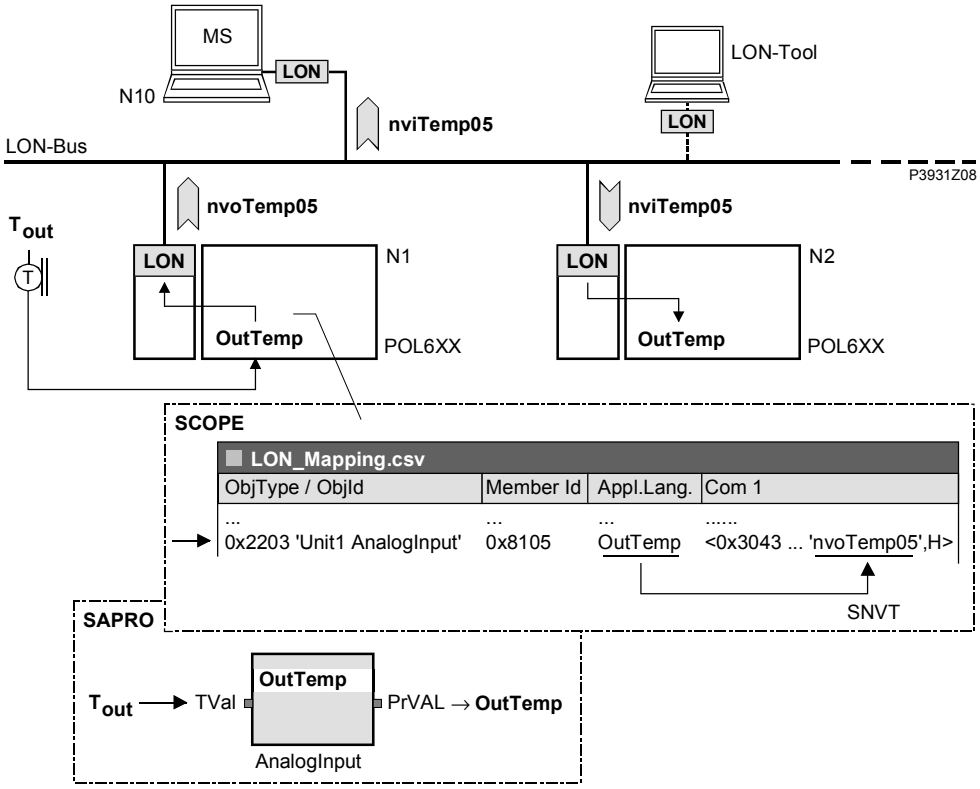
Thus, in roughly 80% of all cases, controller type POL635 (basic version) or POL638 (Ethernet version) is used, and a LON module added later on.

When LON is required from the outset, controller type POL636 with integrated LON interface is available. LON modules then are no longer needed.

2.4 Principles of LON integration

Example: Transmit temperature value

The following figure shows (simplified) how to integrate Climatix 6XX controllers POL6XX via LON modules in a LON bus system. In the example, the outside temperature T_{out} acquired at first controller N1 is to be sent to controller N2 and the management station MS.



Controller N1 puts the value for T_{out} as a network variable "nvoTemp05" on the bus. Controller N2 and MS N2 read the value as "nviTemp05".

Elements shown in the figure

The elements and functions in the figure are:

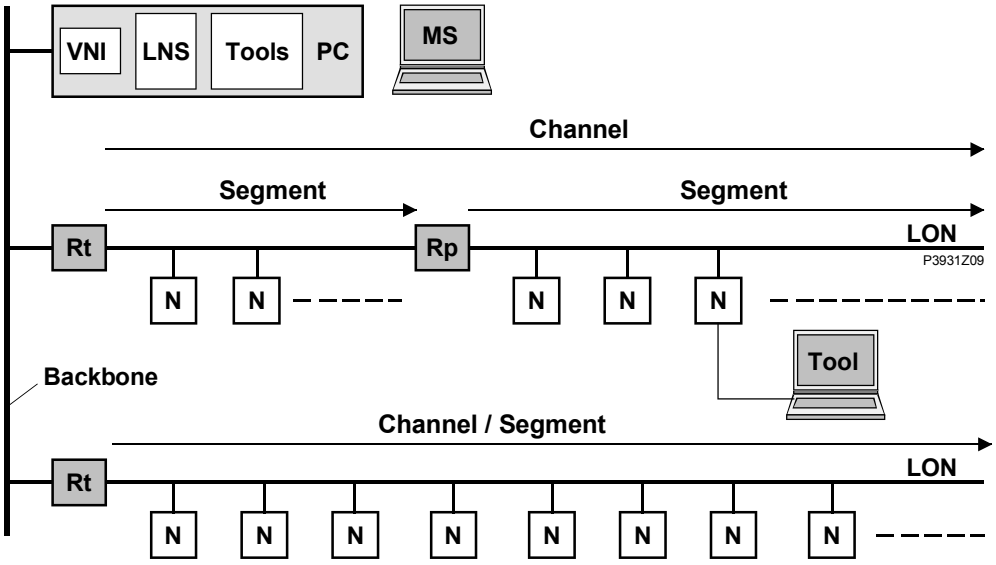
Element	Function
LON	Here stands for: – LON interface (Neuron Chip) in LON module. It contains 62 standard network variables of common variable types (SNVT_temp_p, SNVT_press_p, etc.); see Section 5.1. – LON interface to MS and LON tool.
SCOPE	In SCOPE, a corresponding network variable (nvo… or nvi…) is assigned to each Climatix data point (object/member) that is to send a value to the bus or receive a value from it. This is done via mapping file "LON_Mapping.csv" for language support. In the above example, network variable "nvoTemp05" is assigned to "OutTemp" in controller N1.
SAPRO	Information from the "LON_Mapping.csv" file is from the application created in SAPRO. Example: The present value for T_{out} is available at TVal in controller N1, i.e. at member 3043 of object "OutTemp".
LON tool	A binding tool, e.g. "LonMaker", is used to create the logical connections between the nodes involved (node N…) via network variables. This is done after files "LON_Mapping.csv" are loaded in the controllers.

3 LON networks

3.1 General design

Physical design

The figure shows the physical design for a general LON network:



Elements

Displayed elements:

Element	Explanation
MS	Management station, PC with: VNI (Virtual Network Interface) LNS (LonWorks Network Services) Tools: BAC software, engineering tool (e.g. LonMaker and possibly SCOPE).
Backbone	E.g. Ethernet TCP/IP, interconnects building networks.
Channel	Physical LON transmission channel, e.g. TP/FT-10.
Router (Rt)	Interconnect subnets.
Segment	Physical segment of a channel.
Repeater (Rp)	Interconnect segments. No processing function.
Nodes (N)	LON node: Device with Neuron Chip (controller, interface etc.).
Tool	PC with LON tool (NL220, LonMaker): – Load LON application. – Create bindings.

Logical organization

A LON network is divided into domain, subnet, and node. A logical, unique address (ID) is assigned to each LON node accordingly:

Term	Explanation	ID
Domain	Comprises max. 255 subnets.	1 … 2^{48}
Subnet	Comprises max. 127 nodes.	1 … 255
Node	Smallest, addressable unit.	1 … 127

The address is comprised of: Domain-ID → Subnet-ID → Node-ID.
Assignment in general occurs when the system integrator configures and commissions the network using the LON tool (e.g. LN220, LonMaker).

For more information on LON

see www.echelon.com und www.lonmark.org

3.2 Interface and transmission

FTT-10A transceiver

The LON communication module comes with a FTT-10A bus coupling unit.
This "Free Topology Transceiver" for Neuron Chip-based devices was developed by Echelon as a successor to the FTT-10 for simple creation and extension of LonWorks networks with channel type TP/FT-10.

Allowed topologies

The following topologies are possible for devices with FTT-10A transceiver:
- Free topology (including star and ring topologies).
- Line topology (bus topology).

TP/FT-10 channel type

TP/FT-10 stands for "Twisted Pair / Free Topology".
It specifies a physical channel for data transmission to free topology networks using twisted pair at a transfer rate of 78 kbps.
Channel type TP/FT-10 is LonMark®-certified.

Cable types

Echelon allows three cable types for channel type TP/FT-10, including the Category 5 network cable used commonly in building automation and control (TIA 568A Cat-5).

Cat-5 specifications

Unshielded cable, twisted pair with at least 18 beats per meter:

Cross-sectional area	Min. ∅ 0.5mm, AWG24, 0.22mm²
Impedance	100 Ω +/- 15 % @ f > 1 MHz
Operating capacity between two wires of a pair.	< 46 nF/km
Capacity pair to ground, asymmetric.	< 3.3 nF/km
DC loop resistance	< 168 Ω
Cable length	See Sections 3.3 and 3.4 "Bus topologies".

Repeater and router

Repeaters and router are used in the following cases:
- The entire cable length in a physical segment exceeds 450 m (in a free topology) or 900 m (in a line topology).
- The max. possible number of nodes per physical segment is exceeded: 64 nodes with FTT-10A transceivers.

- Each trunk can have max. one physical repeater.
- Repeaters or routers may not be used in a ring topology. They must be placed **before** the network's ring port.

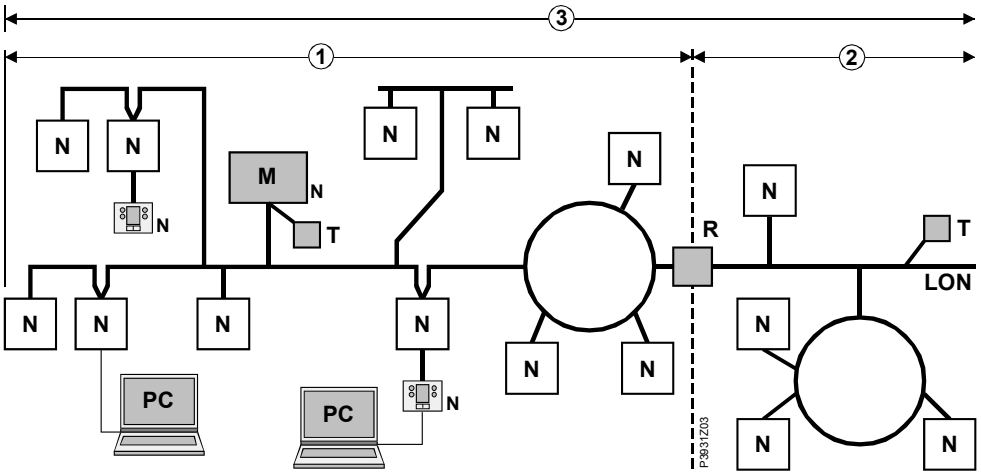
3.3 Free topology

Application

The free topology with channel type TP/FT-10 allows for any combination of line, star, and ring topologies. It is thus suitable for nearly all types of buildings. The max. cable length (total for all lines) is 450 m.
Line topology with terminators at both ends or a repeater or router must be used for greater distances. Only 1 physical repeater is allowed in series, i.e. one physical repeater between any two nodes.

Structure

The following figure shows an example for a free topology structure with two physical segments:



1	First physical segment (max. 250 m)	N	Nodes (LON nodes, devices)
2	Second physical segment	R	Repeater / router
3	Trunk (= everything connected to the master)	T	Bus terminator

M Master: The brains of the system. Always needed. Saves and manages all network information (NV bindings, etc). Device: Management station or master controller.

PC PCs (tools) can log in to any node on the network and have access to all other nodes.

Specifications

Below is a list of all primary data for individual elements. The max. distance and length apply to network cables Category 5 (TIA Cat-5) as per 3.2:

Element	Value
Max. distance between the two nodes farthest apart in a given physical segment.	250 m
Max. cable length in a segment. (Total of all lines including lines to room units).	450 m
Max. number of nodes per physical segment. The following formula applies to mixed configurations of FTT-10A and LPT-10 transceivers: (1 x number of LPT-10) + (2 x number of FTT-10A) ≤ 128	64 FTT-10A 128 LPT-10 *)
Bus terminator at the busiest point of the physical segment, i.e. the area with the highest network data traffic (e.g. at master).	52.3 Ω (RXZ01.1)

*) LPT-10: "Link Power Transceiver" by Echelon.
Compatible to FTT-10A. Offers the advantage that voltage supply for nodes can also be run via the bus line. Requires special link-power power supplies.

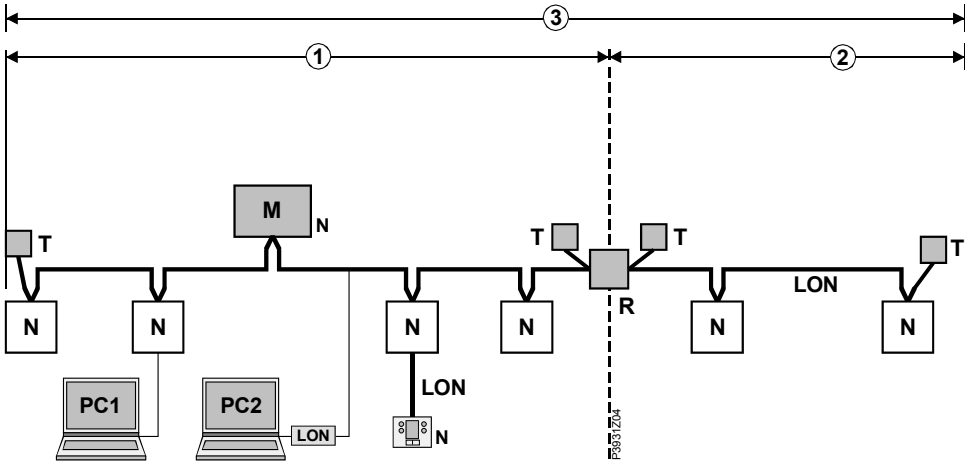
3.4 Line topology

Application

The line topology with terminators at both ends is used when a long bus cable is needed (more than 450 m) or if the max. Distance between two nodes exceeds 250 m.
Note however that the length of individual LON stubs may not exceed 3 m, which also applies to cables to room units.

Structure

The following figure shows an example for a line topology structure with two physical segments:



1	First physical segment (max. 900 m)	N	Nodes (LON nodes, devices)
2	Second physical segment	R	Repeater / router
3	Trunk (= everything connected to the master)	T	Bus terminator

M Master: The brains of the system. Always needed. Saves and manages all network information (NV bindings, etc). Device: Management station or master controller.

PC1 PCs (tools) can log in to any node on the network and have access to all other nodes.

PC2 PCs (tools) with own LON interface can directly access the bus/nodes.

Specifications

Below is a list of all primary data for individual elements. The max. distance and length apply to network cables Category 5 (TIA Cat-5) as per 3.2:

Element	Value
Max. cable length per physical segment.	900 m
Maximum stub line length. The same also applies to connections to room units.	3 m
Max. number of nodes per physical segment. The following formula applies to mixed configurations of devices with FTT-10A and LPT-10 transceivers: (1 x number of LPT-10) + (2 x number of FTT-10A) ≤ 128	64 FTT-10A 128 LPT-10 *)
Bus terminators at each end of the physical segment.	105 Ω (RXZ02.1) both ends

*) LPT-10: "Link Power Transceiver" by Echelon.
Compatible to FTT-10A. Offers the advantage that voltage supply for nodes can also be run via the bus line. Requires special link-power power supplies.

3.5 Bus termination

Bus terminators

Bus terminators are used for properly terminating a network based on twisted pair-technology with regard to impedance. Use the following terminators in dependence of the topology:

- Free topology:
  1 bus terminator 52.3 Ω (Siemens RXZ01.1) at busiest point of network.
- Line topology:
  2 bus terminators 105 Ω (Siemens RXZ02.1) at both network ends.

Terminators often are integrated in system devices and can be activated via switches or jumpers.

Error states

Errors from bus termination may result in the following states:

- Signal level too low.
- Signal level (too) high.

Signal level too low

Possible causes:

- Wrong bus terminator (e.g. RXZ01.1 rather than RXZ02.1).
- Too many bus terminators (e.g. integrated bus terminator in repeater or bus supply not considered).

Signal level (too) high

Possible causes:

- A high-level signal or signal reflections point to a missing or wrong bus terminator.
- Bus terminator placed incorrectly:
  → Find the busiest point in the network through trial and error.

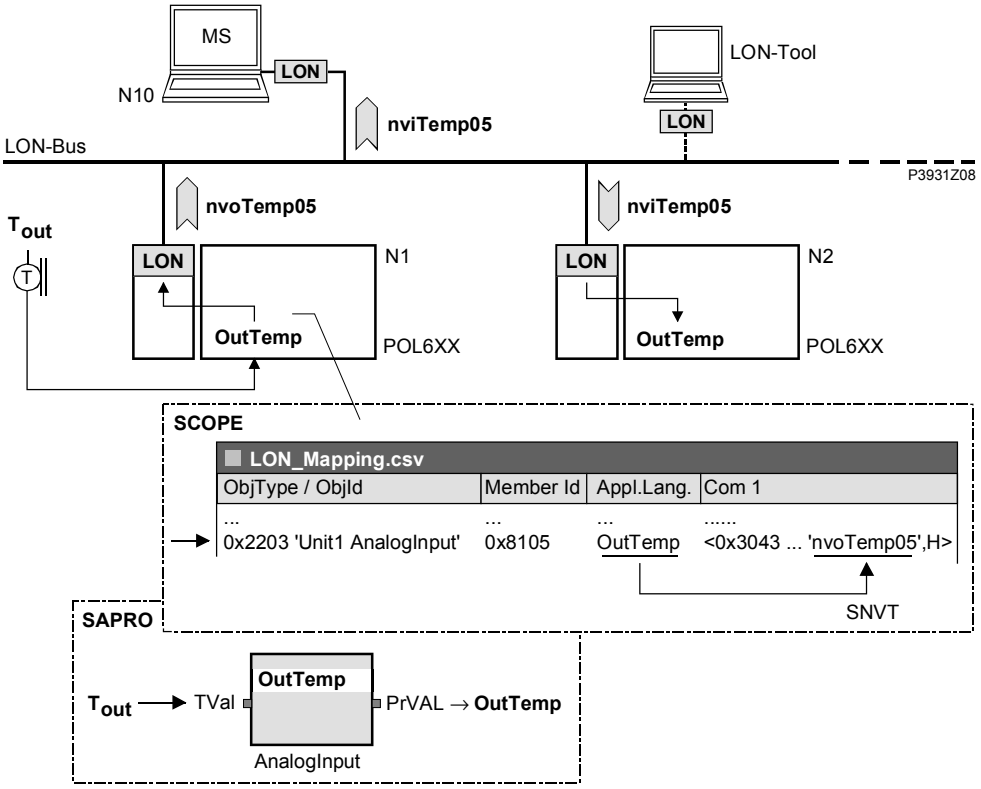
Blank page

4 Procedure for integration

4.1 Example

Principle

The following figure again shows the example from Section 2.4, depicting the principle to integrate Climatix 6XX controllers in a LON bus system:



Task

Outside temperature T_{out} acquired at first controller N1 is to be placed on the LON bus to allow controller N2 and management station MS to pick it up.
The following pages describe the correct procedure for presenting T_{out} as network variable "nvoTemp".

Hardware required

- Climatix 6XX controller + Climatix communication module LON
  or
- Climatix 6XX controller with integrated LON interface.
- LON interface for PC (PCMCIA card for laptop).

Tools required

- SAPRO programming software.
- SCOPE commissioning software.
- LON tool (e.g. LN220 or LonMaker) to bind network variables and monitor SNVTs.

Jobs

Integration includes the following jobs:

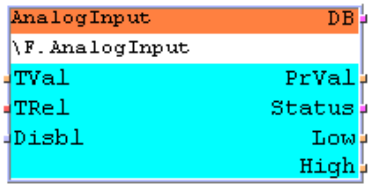
Procedure	Job	Section
1	Create SAPRO application	4.2
2	Mapping	4.3

The following pages describe the two jobs.

4.2 Create SAPRO application

Insert automation objects

Insert and connect the required automation objects in the SAPRO application:

Step	Action
1	Insert automation object. For our example: *AnalogInput:*  P3931O01
2	Connect.
3	Set parameters.
4	Generate file "MBRTCode.bin".
5	Load file in the controller.

Explanations (figure)

The elements and functions are:

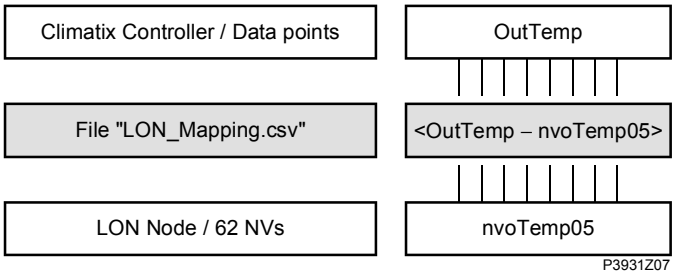
Element	Description / Function
AnalogInput	Reads an analog process value (here OutTemp) from a physical input.

See the SAPRO online help for detailed information on how to create applications for automation objects.

4.3 Mapping

Principle

The following diagram shows how to connect Climatix controller data points to LON network variables of the communication module. Here, based on data point "OutTemp":



LON_Mapping.csv

Create a file named "LON_Mapping.csv". This file ensures that SAPRO automation objects are provided as network variables on the LON bus. The objects to be integrated are mapped to virtual member **0x8105** in the file.

Procedure

To map objects in SCOPE proceed as follows:

Step	Action
1	Read language support file "ObjLang.csv" from the controller and rename to "**LON_Mapping.csv**".
2	Delete all object rows except those for the LON objects to be integrated!
3	Change all member IDs of the BACnet objects to **0x8105** in column B (Member Id).
4	Assign the required properties in column "D" ("Com1"); see table "Syntax in COM1" and examples on the following pages.
5	Generate file "**OBH.bin**" from file "LON_Mapping.csv".

Step 5: If the controller is also integrated in BACnet, and if file "OBH.bin" was also created from the mapping file, merge both files.

Sample file

The figure shows an excerpt for file "LON_Mapping.csv":

LON_Mapping.csv

	A	B	C	D
1	0x2206 'Unit1\Unit1.AnalogOutput'	0x8105	DAT	<0x0100,0x0111,0.0,0.0,,'nvoDischAirTemp',H>
2	0x2207 'Unit1\Unit1.BinaryOutput'	0x8105	RAT	<0x0100,0x0111,0.0,0.0,,'nvoRATemp'H>
3	0x2208 'Unit1\Unit1.MultistateOutput'	0x8105	UnitState	<0x0100,0x0111,0.0,0.0,'0=6;1=6;2=9;3=9;4=9;5=1;0;255','nvoUnitStatus;0;3',H>
4	0x2204 'Unit1\Unit1.BinaryInput'	0x8105	ClearAlarms	<0x3043,0x3044,1.0,0.0,,'nviClearAlarms;0;4',h>
5	0x2205 'Unit1\Unit1.MultistateInput'	0x8105	NetCurrState	<0x3043,0x3044,1.0,0.0,'1=0;2=1;3=2;5=255;5;255','nviOccSchedule;0;4',wh,255>
6	0x2203 'Unit1\Unit1.AnalogInput'	0x8105	OutTemp	<0x3043,0x3044,0.0,0.0,,'nvoTemp05',H>

P3931O02

Note row 6:
It describes "Analog Input" with object ID "OutTemp" per our example.
Explanations for the assigned properties in column "D" ("Com1") to follow.

Syntax in column "D" (COM1)

Syntax to define the properties in column "D" ("COM1") per Step 4 of the mapping process:

[COV1, COV2]<MemberID, StateID,[Gain], [Offset],['subst'],'LONName', Flags = rRwWhH=LONDefault>

Meaning of elements:

Element	Meaning
COV1, COV2	Optional members for COV increment. If no default value is set, a value of 0.1 is used.
MemberID	The value is written to or read from. If just one bit is needed, addressing "MemberID.Bitposition" (e.g. 5.1) is used. In this case, the member value is converted to ULONG and calculated from Bit No. 1. Afterwards, the value is written back to its native format.
StateID	The status member. If set to -1 it is disabled.
Gain	Gain factor (Default = 1.0). If the Gain is equal 0.0 than a default conversion depending on the SNVT type is handled.
Offset	Offset (Default = 0.0). `OBHvalue = rawLonValue * Gain + Offset` For the SNVT type switch, it could also contain the amount of steps.

'Subst'	Substitution table for different enumerations (maximum 25 value pairs)
	'OBHValue1=LonValue1; OBHValue2=LonValue2….. OBHValue25=LonValue25;DefaultObh;DefaultLon(e.g.:'1=3; 2=1; 3=2;8;1')
	`With LonValueX = (rawLonValueX * Gain + Offset)`
	`If no matching value found the default value is used.`

'LONName'	Name of the Network variable. For structured SNVTs or UNVTs the LONName has format: "NV-Name; Offset; Type" (Type is the native data type) – NV-Name: Name of the structured SNVTs – Offset: Byte Offset in the structure. – Type: 1 = Signed Char 2 = Unsigned Char 3 = 8-bit Signed Short 4 = 8-bit Unsigned Short 5 = 16-bit Signed Long 6 = 16-bit Unsigned Long 7 …11 = Reserved 12 = 32-bit Floating Point 13 = 32-bit Signed Quad
Flags	– w: write back to Neuron even to a nvi (not needed for nvos) – W: Write at initialization – h: ReceiveHeartbeat – H: SendHearbeat – M: Min Send time. Means that this snivit have fastest send interval of x seconds. The time can be configured with Member "MinSendTime" 0x00B7.
LONDefaut	Default value if receive heartbeat is missing. Caution: User-defined Network Variables (UNVTs) do not have a default gain! You have to define a gain different from 0. UNVTs by default have an unsigned type; all other types should be defined as a structured NVs!

Column "D" (COM1), example

The entry in row 6, column "D" (COM1) is as follows for our example:

<0x3043,0x3044,0.0,0.0,,'nvoTemp05',H>

The individual entries mean the following:

Element	Meaning
0x3043	Member written to output variable nvo.
0x3044	Reliability written (i.e. if value is valid or faulty).
0.0	Gain = Multiplication factor. Here: 0 because the value at the receiver must be the same as at the sender (no multiplication).
0.0	Offset. Here: 0 because no offset should be added.
nvoTemp05	Name of network variable to be written.
H	SendHeartbeat. Means that the value is sent always after this time. This time is set in the module.

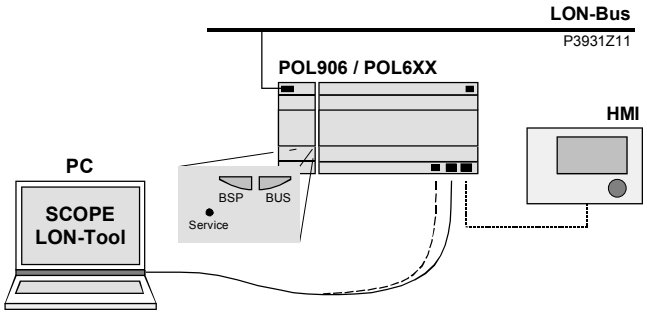
Comment: Element 'Subst' is not used as our example uses an analog value.

Controller N2, that is to read value "OutTemp" from the LON bus, also requires a suitable automation object (e.g. AnalogInput). Its present value is mapped as input variable nvi ("nviTemp05" in our example).

4.4 Commission LON module

Devices involved

The Climatix POL6XX controller and the LON module POL906 are involved in this action:



Tools

Tools used:
- Operator unit (HMI)
- PC with SCOPE (optional)
- PC with LON tool (NL220, LonMaker).

Prerequisites

Prerequisites for commissioning a LON section:
- Working SAPRO application (MBRTCode.bin) loaded and started in the Climatix controller (e.g. standard AHU application).
- Corresponding mapping file "OBH.bin" created according chapter 4.3, "Mapping" loaded to provide connections to LON.

Commission LON module

Proceed as follows to configure the LON module and connect to the LON bus:

Step	Action Type
1	Switch **OFF** the power supply of the controller.
2	Connect LON module to controller using plug connection.
3	Connect LON bus cable to LON module (pins CLA and CLB).
4	Switch **ON** the power supply: → The module starts / initialization begins. → As soon as the two LEDs "BSP" and "BUS" are steady green, communication with the controller and LON bus is active.
5	Carry out a further restart: Switch the power supply **OFF** / **ON**.
6	Generate a new node in the LON tool (preparation).
7	Press the Service pin on the LON module: → The module is recognized and displayed in the LON tool. → All network variables are available.
8	Load an individual LON application as needed (file "XY.XIF"). Standard application AHU V1.x is loaded by default.
9	Assign the logical address and bind the network variables via the LON tool (or have system integrator do it for you).
10	Enter the following module settings via HMI. Log in at level 4, password, 2000 as default, then go to: **Main Index > System overview > Communication > Comm module overview > Module[x] LON > Settings** – Receive Heartbeat – Send Heartbeat – MinSendTime

After successful LON commissioning via the LON tool, you can access the controller via the LON bus using Saphir Scope.

Parameter list

The following table lists all LON module parameters which are displayed by the HMI. Menu item:
Main Index > System overview > Communication > Comm module overview > Module[x] LON

Parameter	Range	Function
State	– OK – Alarm	Module state.
Comm failure	– Passive – Active	Communications error between module and processor (e.g. no LON application loaded on the Neuron chip).
Location		Displays an information, which may be set at commissioning the bus via LON Chip.
Application		Name of loaded LON application (list of LON variable) on the Neuron chip.
Neuron-ID		Displays ID number for the Neuron chips.
Send heart beat		Displays current interval for sending values.
Receive heart beat		Displays current interval for receiving values.
Min send intervall		Displays current minimum interval for sending values. A value may only be sent a maximum of one time during this interval.
Settings		Go to settings page to parameterize LON module.
Software version		Module software version.
Device ID		Module hardware ID.
Module		Displays module type (e.g. Pol906LON).

LON module parameterization

The following parameters can be set via the HMI. Menu item:
Main Index > System overview > Communication > Comm module overview > Module[x] LON > Settings

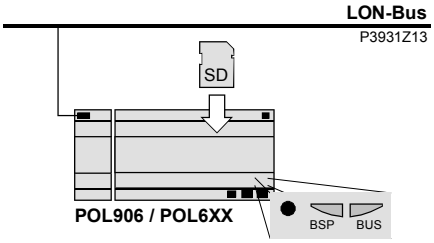
Parameter	Range	Function
Send heart beat	0…65535 [s]	Set interval for sending values.
Receive heart beat	0…65535 [s]	Set interval for receiving values.
Min send interval	0…65535 [s]	Set minimum interval for sending values.
Use default	– Passive – Active	Reset parameterization to default values.

The controller must be restarted after changes to parameterization to assume the data.

4.5 Upgrade BSP via SD card

Devices involved

The Climatix POL6XX controller and the LON module POL906 are involved in this action:



Prerequisite

To upgrade the BSP for the LON modul the following items are needed:

- SD card
- BSP file

Upgrade procedure

To upgrade the BSP proceed as follows:

Step	Action
1	Format an SD Card with FAT file system (not FAT-32).
2	Copy the BSP file to the SD Card and rename it to **POL8193.hex**.
3	Switch **OFF** the power supply of the controller.
4	Insert the SD card into the controller.
5	Press the small button near by the BSP LED (e.g. with a paper clip).
6	Switch **ON** the power supply: – If the BSP red LED is switched off the controller is in BSP upgrade mode. – If the BSP LED flashes between Red and Green the controller files will be updated
7	Wait until the BSP LED is yellow or switched off.
8	Carry out a further restart: Switch the power supply **OFF** / **ON**.

4.6 Load SAPRO applications over LON

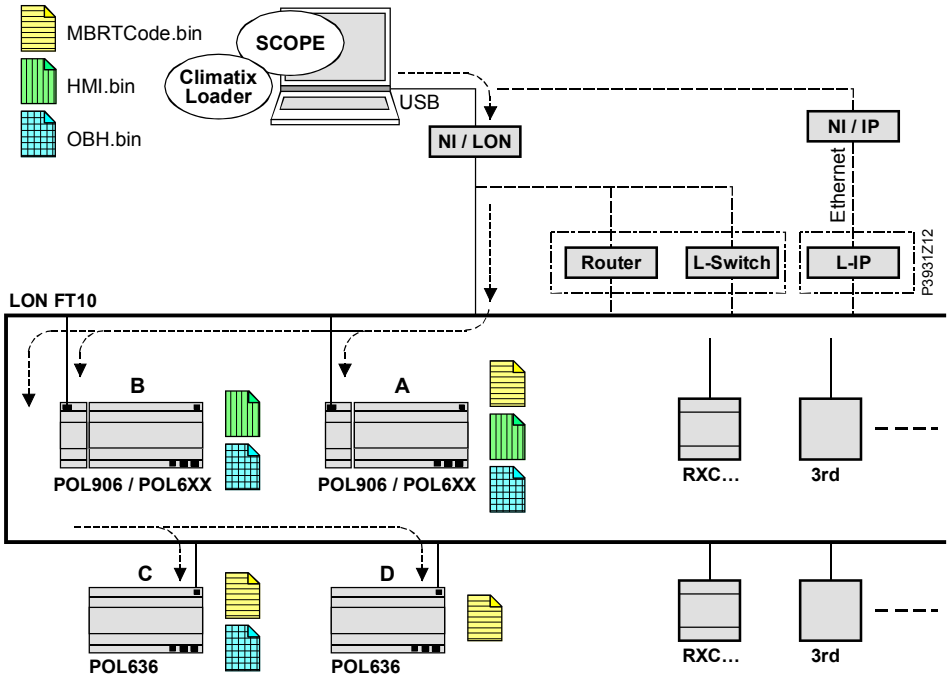
Two possibilities

PC tool SCOPE from VVS6 can communicate directly with the connected devices via a suitable LON network interface.
This allows for:

- Carry out all commissioning and service functions on any controller online from a central location (point-to-point connection).
- Carry out multiple downloads of SAPRO applications (MBRTCode.bin, HMI.bin, OBH.bin) to different controllers using supplementary tool "ClimatixLoader".

Topology

The figure below shows the different options:



Explanations (figure)

One or all files listed can be downloaded to the desired controllers as multiple download as needed. This is defined in supplementary tool "Climatix-Loader".

Connection is also possible via Ethernet if the associated infrastructure is available.

See the following for prerequisites and detailed software settings:

- SAPRO online help
- "ClimatixLoader" online help

Blank page

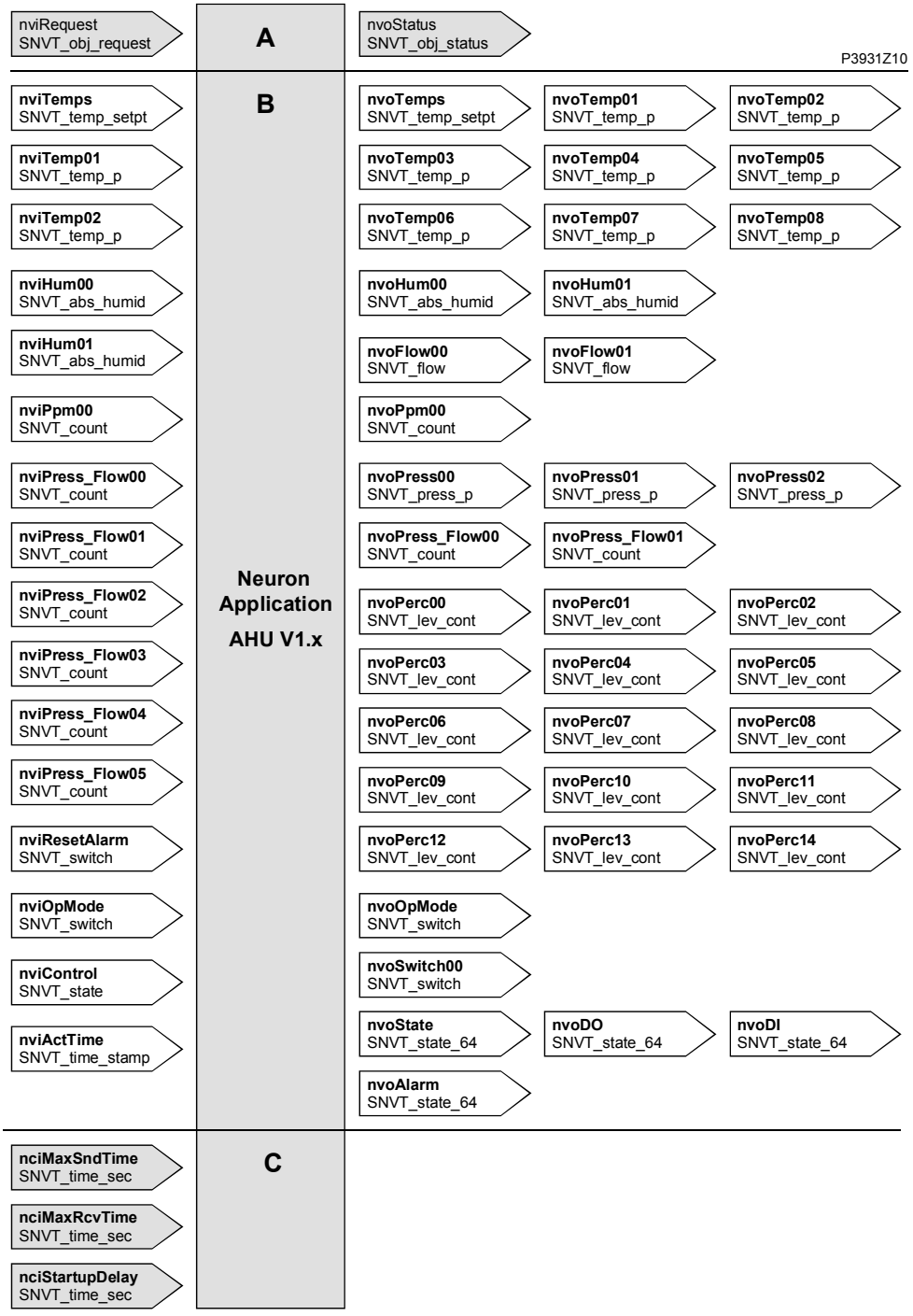
5 Network variables

5.1 Overview

Contents of set AHU V1.x

The LON module's Neuron application supports 61 network variables to integrate controllers with air handling applications in a management station, and allow controllers to exchange data over LON. The figure shows the variables for set AHU V1.x and their SNVTs, grouped as follows:

- Mandatory network variables (A)
- Optional network variables (B)
- Configuration parameters (C)



The sections below describe the network variables.

5.2 Standard application AHU V1.x

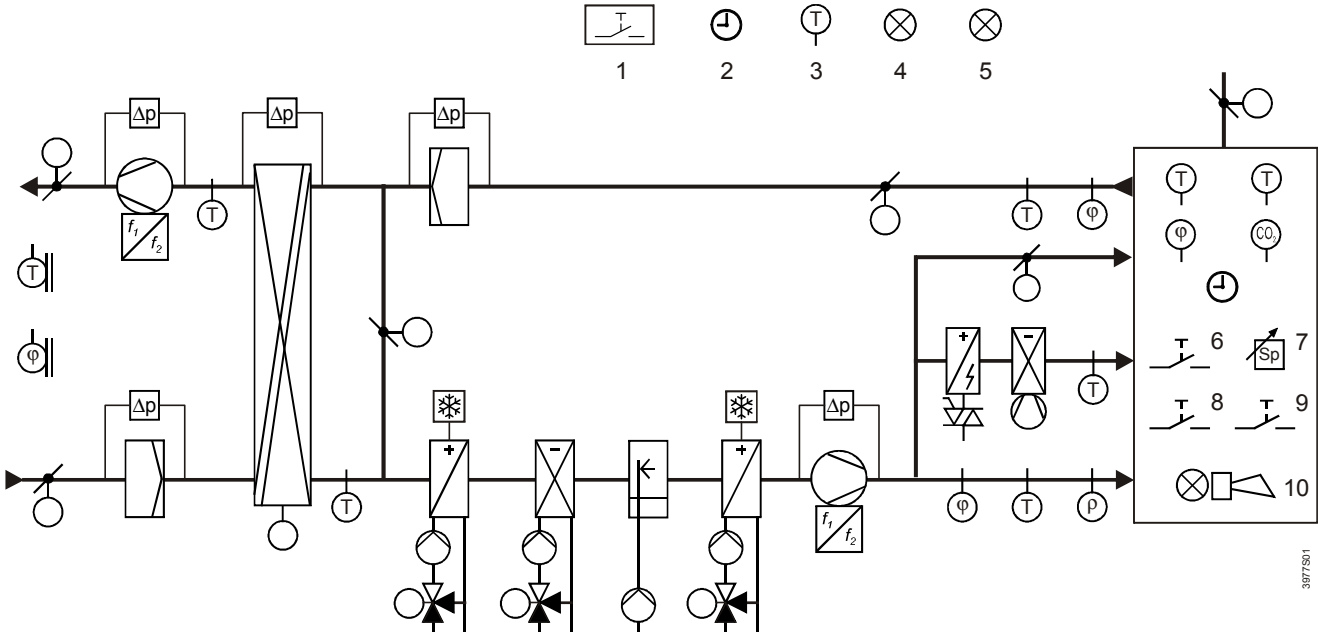
What are standard applications?

Standard applications for Climatix comprise predefined monitoring and control functions for a particular plant type.
Features:

- OEM customers receive standard applications as a set of loadable files. They can be loaded in the controller via SD card.
- An HMI operator unit allows for assigning inputs and outputs to the respective plant as well as select, configure and parameterize the required functions.

Standard application AHU V1.x

Standard application AHU V1.x is available at this time. It contains all common functions to control and monitor air conditioning units (**A**ir **H**andling **U**nits). The following diagram provides an overview of selectable measured values and control equipment:



Detailed information

See document CE1P3977en for a detailed description of standard application AHU V1.x.

Network variables

The set of loadable files mentioned above also includes a mapping file for integration in a higher building automation and control system via communications module. The Climatix controller automatically assumes the network variables required for integration as per the plant data points and functions configured and parameterized previously.

The following tables list all network variables as per the overview in Section 5.1.

5.3 Mandatory variables

Introduction

Two of the network variables supported by the LON module's Neuron application are mandatory. They are needed for system purposes: The two variables are:

- nviRequest
- nvoStatus

The following tables briefly describe each variable and its SNVT.
Refer to 6.1 “Description of SNVTs” for information on SNVTs.

Input variable

Requires a particular mode for a specific object in a device.

nviRequest

Network Name:	**nviRequest**
Description:	**Object request**
Type:	SNVT_obj_request
Remarks:	

Output variable

Signals the status of the requested object in the device.

nvoStatus

Network Name:	**nvoStatus**
Description:	**Object status**
Type:	SNVT_obj_status
Remarks:	

5.4 Optional input variables

Introduction

The LON module's Neuron application supports 62 network variables. 56 of these are optional. The following tables briefly describe each variable and its SNVT. Refer to 6.1 “Description of SNVTs” for information on SNVTs.
The network variable tables are listed by:

- Input variables (23)
- Output variables (33)

Input variables

Inputs variables sorted by the overview of Section 5.1:

nviTemps

Network Name:	**nviTemps**	Names in SNVT
Description:	• **Com Basic/Com Htg**	occupied_cool
	• **Com Deadzone/Com Clg**	standby_cool
	• **Eco Basic/Eco Htg**	unoccupied_cool
	• **Eco Deadzone/Eco Clg**	occupied_heat
	• **Min SupplyTemp Casc**	standby_heat
	• **Max SupplyTemp Casc**	unoccupied_heat
Type:	SNVT_temp_Setpt	
Remarks:	Structured Setpoint variable for 6 Setpoints	

nviTemp01

Network Name:	**nviTemp01**	
Description:	**ExtraSpv**	Setpoint for extra temperature sequence
Type:	SNVT_temp_p	
Remarks:		

nviTemp02

Network Name:	**nviTemp02**
Description:	**Out Tmp**
Type:	SNVT_temp_p
Remarks:	

nviHum00

Network Name:	**nviHum00**
Description:	**Hum BasicSetpoint/Hum**
Type:	SNVT_abs_humid
Remarks:	For absloute and relative humidity

nviHum01

Network Name:	**nviHum01**
Description:	**Hum Deadzone/DeHum**
Type:	SNVT_abs_humid
Remarks:	For absloute and relative humidity

nviPpm00

Network Name:	**nviPpm00**
Description:	**AirQSetpoint**
Type:	SNVT_count
Remarks:	

Optional input variables, *continued*

nviPress_Flow00

Network Name:	**nviPress_Flow00**
Description:	**St1 Setpoint SupplyFan**
Type:	SNVT_count
Remarks:	For Pressure, Flow and % (max 32766 Pa or l/sec)

nviPress_Flow01

Network Name:	**nviPress_Flow01**
Description:	**St2 Setpoint SupplyFan**
Type:	SNVT_count
Remarks:	For Pressure, Flow and % (max 32766 Pa or l/sec)

nviPress_Flow02

Network Name:	**nviPress_Flow02**
Description:	**St3 Setpoint SupplyFan**
Type:	SNVT_count
Remarks:	For Pressure, Flow and % (max 32766 Pa or l/sec)

nviPress_Flow03

Network Name:	**nviPress_Flow03**
Description:	**St1 Setpoint ExhaustFan**
Type:	SNVT_count
Remarks:	For Pressure, Flow and % (max 32766 Pa or l/sec)

nviPress_Flow04

Network Name:	**nviPress_Flow04**
Description:	**St2 Setpoint ExhaustFan**
Type:	SNVT_count
Remarks:	For Pressure, Flow and % (max 32766 Pa or l/sec)

nviPress_Flow05

Network Name:	**nviPress_Flow05**
Description:	**St3 Setpoint ExhaustFan**
Type:	SNVT_count
Remarks:	For Pressure, Flow and % (max 32766 Pa or l/sec)

Optional input variables, *continued*

nviResetAlarm

Network Name:	**nviResetAlarm**
Description:	**Reset/Acknowledge alarms**
Type:	SNVT_switch
Values:	0 Normal 1 Reset > 1 Not defined
State:	0: Inactive 1: Active
Default:	Value: 0 State : 0
Remarks:	State part must be set to 1 to use the value part.

nviOpMode

Network Name:	**nviOpMode**
Description:	**BmsStepSwitch/BmsTmpSwitch**
Type:	SNVT_switch
Values:	0 Auto, internal time scheduler 1 Stop mode 2 Step 1 3 Step 2 4 Step 3 > 4 Not defined OR 0 Auto, internal time scheduler 1 Stop mode 2 Economy, Step 1 3 Comfort, Step 1 4 Economy, Step 2 5 Comfort, Step 2 6 Economy, Step 3 7 Comfort, Step 3 > 7 Not defined
State	0: Inactive 1: Active
Remarks:	State part must be set to 1 to use the value part. Value part depending on configuration.

Optional input variables, *continued*

nviControl

Network Name:	**nviControl**		
Description:	**Ex Emergencystop, Timer, CommTest**		
Type:	SNVT_state (16 bit)		
Bits:	Bit [0 ...15]	Binary:	* Reverse:
	Emergency stop	0	15
	External control 1	1	14
	External control 2	2	13
	Summer/winter switch	3	12
		4	11
		5	10
		6	9
	Fire alarm	7	8
		8	7
		9	6
		10	5
		11	4
		12	3
		13	2
		14	1
	Communication testpuls	15	0
Remarks:		* On some LON tools the bits are named in the other direction, so take care	

nviActTime

Network Name:	**nviActTime**
Description:	**SystemClock**
Type:	SNVT_time_stamp
Remarks:	

5.5 Optional output variables

Output variables

Output variables sorted by the overview of Section 5.1:

nvoTemps

Network Name:	**nvoTemps**	Names in SNVT
Description:	• **Actual MainHtgSetpoint** • **Actual MainClgSetpoint** • **ExtSetpoint** • **Act CascSetpointHtg (Supplysetp)** • **Act CascSetpointClg (Supplysetp)** • **ExtraHtg Frost Tmp**	• occupied_cool • standby_cool • unoccupied_cool • occupied_heat • standby_heat • unoccupied_heat COV 1.0
Type:	SNVT_temp_Setpt	
Remarks:	Structured Setpoint variable for 6 Setpoints.	

nvoTemp01

Network Name:	**nvoTemp01**
Description:	**Supply Tmp**
Type:	SNVT_temp_p
Remarks:	

nvoTemp02

Network Name:	**nvoTemp02**
Description:	**Htg Frost Tmp**
Type:	SNVT_temp_p
Remarks:	

nvoTemp03

Network Name:	**nvoTemp03**
Description:	**Out Tmp**
Type:	SNVT_temp_p
Remarks:	

nvoTemp04

Network Name:	**nvoTemp04**
Description:	**ValidRoom Tmp**
Type:	SNVT_temp_p
Remarks:	

nvoTemp05

Network Name:	**nvoTemp05**
Description:	**ReturnAir Tmp**
Type:	SNVT_temp_p
Remarks:	

nvoTemp06

Network Name:	**nvoTemp06**
Description:	**Exhaust Tmp**
Type:	SNVT_temp_p
Remarks:	

Optional output variables, *continued*

nvoTemp07

Network Name:	**nvoTemp07**
Description:	**Hrec Water Tmp**
Type:	SNVT_temp_p
Remarks:	

nvoTemp08

Network Name:	**nvoTemp08**
Description:	**ExtraSupply Tmp**
Type:	SNVT_temp_p
Remarks:	

nvoPpm00

Network Name:	**nvoPpm00**
Description:	**AirQuality**
Type:	SNVT_count
Remarks:	

nvoPress00

Network Name:	**nvoPress00**
Description:	**SupplyAirPressure**
Type:	SNVT_press_p
Remarks:	

nvoPress01

Network Name:	**nvoPress01**
Description:	**ExhaustAirPressure**
Type:	SNVT_press_p
Remarks:	

nvoPress02

Network Name:	**nvoPress02**
Description:	**HrecFrost Pressure**
Type:	SNVT_press_p
Remarks:	

nvoPress_Flow00

Network Name:	**nvoPress_Flow00**
Description:	
Type:	SNVT_count
Remarks:	

nvoPress_Flow01

Network Name:	**nvoPress_Flow01**
Description:	
Type:	SNVT_count
Remarks:	

nvoFlow00

Network Name:	**nvoFlow00**
Description:	**SupplyAirFlow**
Type:	SNVT_flow
Remarks:	

Optional output variables, *continued*

nvoFlow01

Network Name:	**nvoFlow01**
Description:	**ExhaustAirFlow**
Type:	SNVT_flow
Remarks:	

nvoPerc00

Network Name:	**nvoPerc00**
Description:	**Htg Position**
Type:	SNVT_lev_count
Remarks:	

nvoPerc01

Network Name:	**nvoPerc01**
Description:	**Clg Position**
Type:	SNVT_lev_count
Remarks:	

nvoPerc02

Network Name:	**nvoPerc02**
Description:	**Hrec Position**
Type:	SNVT_lev_count
Remarks:	

nvoPerc03

Network Name:	**nvoPerc03**
Description:	**Hrec Damper Value**
Type:	SNVT_lev_count
Remarks:	

nvoPerc04

Network Name:	**nvoPerc04**
Description:	**Hrec Efficiency**
Type:	SNVT_lev_count
Remarks:	

nvoPerc05

Network Name:	**nvoPerc05**
Description:	**ElHtg Position**
Type:	SNVT_lev_count
Remarks:	

nvoPerc06

Network Name:	**nvoPerc06**
Description:	**SupplyFan Position**
Type:	SNVT_lev_count
Remarks:	

nvoPerc07

Network Name:	**nvoPerc07**
Description:	**ExhaustFan Position**
Type:	SNVT_lev_count
Remarks:	

Optional output variables, *continued*

nvoPerc08

Network Name:	**nvoPerc08**
Description:	**ExtraHtg Position**
Type:	SNVT_lev_count
Remarks:	

nvoPerc10

Network Name:	**nvoPerc10**
Description:	**Supply Hum**
Type:	SNVT_lev_count
Remarks:	

nvoPerc11

Network Name:	**nvoPerc11**
Description:	**Room Hum**
Type:	SNVT_lev_count
Remarks:	

nvoPerc12

Network Name:	**nvoPerc12**
Description:	**Outside Hum**
Type:	SNVT_lev_count
Remarks:	

nvoPerc13

Network Name:	**nvoPerc13**
Description:	**Hum Position**
Type:	SNVT_lev_count
Remarks:	

nvoPerc14

Network Name:	**nvoPerc14**
Description:	**DeHum PrVal**
Type:	SNVT_lev_count
Remarks:	

nvoHum00

Network Name:	**nvoHum00**
Description:	**SupplyHum Abs**
Type:	SNVT_abs_humid
Remarks:	

nvoHum01

Network Name:	**nvoHum01**
Description:	**RoomHum Abs**
Type:	SNVT_abs_humid
Remarks:	

nvoOpMode

Network Name:	**nvoOpMode**
Description:	**ActOpMode**
Type:	SNVT_switch
Values:	0 OFF
	1 On/Comfort
	2 Economy
	3 Not used
	4 Osstp
	5 Nightcooling
	6 Unoccupied
	7 Nightkick
	8 Firedamper test
	9 Fire
	10 Stop
	11 Overrun
	12 Startup
	> 12 Not defined
State:	0 :Inactive :Mode Auto
	1 :Active :Mode OS
Default:	Value : 0
	State : 0
Remarks:	

nvoSwitch00

Network Name:	**nvoSwitch00**
Description:	**Actual FanStep**
Type:	SNVT_switch
Values:	0 OFF
	1 Step 1
	2 Step 2
	3 Step 3
	> 3 Not defined
Remarks:	

nvoState

Network Name:	**nvoState**		
Description:	**Ex Alarm classes, Control modes**		
Type:	SNVT_state_64 (64 bit)		
Bits	Bit [0 … 63]	Binary:	* Reverse:
	- Alarm class danger (A)	0	63
	- Alarm class critical (A)	1	62
	- Alarm class low (B)	2	61
	- Alarm class warning (C)	3	60
	-	4	59
	- Manual control active	5	58
	- Summer mode	6	57
	-	7	56
	- Preheating, heating	8	55
	- Preheating, extra htg	9	54
	-	10	53
	- Actual control temp, room	11	52
	- Actual control temp, exh	12	51
	- Actual control temp, sply	13	50
	- Actual control hum, room	14	49
	- Actual control hum, sply	15	48
		16	47
		17	46
		18	45
		19	44
		20	43
		21	42
		22	41
		23	40
		24	39
		25	38
		26	37
		27	36
		28	35
		29	34
		30	33
		31	32
		32	31
		33	30
		34	29
		35	28
		36	27
		37	26
		38	25
		39	24
		40	23
Remarks:		* On some LON tools the bits are named in the other direction, so take care	

nvoState, *cont.*

Network Name:	**nvoState**		
Description:	**Ex Alarm classes, Control modes**		
Type:	SNVT_state_64 (64 bit)		
Bits	Bit [0 … 63]	Binary:	* Reverse:
		41	22
		42	21
		43	20
		44	19
		45	18
		46	17
		47	16
		48	15
		49	14
		50	13
		51	12
		52	11
		53	10
		54	9
		55	8
		56	7
		57	6
		58	5
		59	4
		60	3
		61	2
		62	1
		63	0
Remarks:		* On some LON tools the bits are named in the other direction, so take care	

nvoDO

Network Name:	**nvoDO**		
Description:	**All digital outputs**		
Type:	SNVT_state_64 (64 bit)		
Bits:	Bit [0 … 63]	Binary:	* Reverse:
	- Supply damper	0	63
	- Extract damper	1	62
	- Fire damper	2	61
	-	3	60
	- Supply fan, running	4	59
	- Supply fan, off	5	58
	- Supply fan, stage 1	6	57
	- Supply fan, stage 2	7	56
	- Supply fan, stage 3	8	55
	- Exhaust fan, running	9	54
	- Exhaust fan, off	10	53
	- Exhaust fan, stage 1	11	52
	- Exhaust fan, stage 2	12	51
	- Exhaust fan, stage 3	13	50
	-	14	49
	-	15	48
	- Cooling pump	16	47
	- Cooling DX, off	17	46
	- Cooling DX, stage 1	18	45
	- Cooling DX, stage 2	19	44
	- Cooling DX, stage 3	20	43
	-	21	42
	- Hrec pump/command	22	41
	-	23	40
	- Heating pump	24	39
	-	25	38
	- Electrical heating, off	26	37
	- Electrical heating, st1	27	36
	- Electrical heating, st2	28	35
	- Electrical heating, st3	29	34
	-	30	33
	-	31	32
	- Extra cooling pump	32	31
	- Extra cooling DX, off	33	30
	- Extra cooling DX, st1	34	29
	- Extra cooling DX, st2	35	28
	- Extra cooling DX, st3	36	27
	-	37	26
	- Extra heating pump	38	25
	-	39	24
	- Extra el heating, off	40	23
Remarks:			* On some LON tools the bits are named in the other direction, so take care

nvoDO, *cont.*

Network Name:	**nvoDO**		
Description:	**All digital outputs**		
Type:	SNVT_state_64 (64 bit)		
Bits:	Bit [0 … 63]	Binary:	* Reverse:
	- Extra el heating, stage 1	41	22
	- Extra el heating, stage 2	42	21
	- Extra el heating, stage 3	43	20
	-	44	19
	- Humidity command	45	18
	- Humidity pump	46	17
	-	47	16
	- Aux TSP command	48	15
	- Aux op mode indication	49	14
	-	50	13
	-	51	12
	-	52	11
	-	53	10
	-	54	9
	-	55	8
	- Alarm output, high	56	7
	- Alarm output, low	57	6
	-	58	5
	-	59	4
	-	60	3
	-	61	2
	-	62	1
	-	63	0
Remarks:		* On some LON tools the bits are named in the other direction, so take care	

nvoDI

Network Name:	**nvoDI**		
Description:	**All digital inputs**		
Type:	SNVT_state_64 (64 bit)		
Bits:	Bit [0 … 63]	Binary:	* Reverse:
	- Emergency stop	0	63
	- External control 1	1	62
	- External control 2	2	61
	- Su/wi changeover	3	60
	- Alarm acknowledge	4	59
	-	5	58
	-	6	57
	-	7	56
	- Aux input	8	55
	-	9	54
	-	10	53
	-	11	52
	-	12	51
	-	13	50
	-	14	49
	-	15	48
	- Dampers open	16	47
	- Fire dampers open	17	46
	- Fire dampers closed	18	45
	-	19	44
	- Supply fan feedback	20	43
	- Exhaust fan feedback	21	42
	-	22	41
	-	23	40
	-	24	39
	-	25	38
	-	26	37
	-	27	36
	-	28	35
	-	29	34
	-	30	33
	-	31	32
		32	31
		33	30
		34	29
		35	28
		36	27
		37	26
		38	25
		39	24
		40	23
Remarks:		* On some LON tools the bits are named in the other direction, so take care	

nvoDI, *cont.*

Network Name:	**nvoDI**		
Description:	**All digital inputs**		
Type:	SNVT_state_64 (64 bit)		
Bits:	Bit [0 … 63]	Binary:	* Reverse:
		41	22
		42	21
		43	20
		44	19
		45	18
		46	17
		47	16
		48	15
		49	14
		50	13
		51	12
		52	11
		53	10
		54	9
		55	8
		56	7
		57	6
		58	5
		59	4
		60	3
		61	2
		62	1
		63	0
Remarks:		* On some LON tools the bits are named in the other direction, so take care	

nvoAlarm

Network Name:	**nvoAlarm**		
Description:	**All alarms**		
Type:	SNVT_state_64 (64 bit)		
Bits:	Bit [0 … 63]	Binary:	* Reverse:
	- Dampers	0	63
	- Fire dampers	1	62
	-	2	61
	- Supply fan	3	60
	- Exhaust fan	4	59
	- Fan operating hours	5	58
	-	6	57
	-	7	56
	- Cooling	8	55
	-	9	54
	- Heating recovery	10	53
	- Heating recovery pump	11	52
	- Heating recovery frost	12	51
	- Heating recovery efficiency	13	50
	- Heating recovery damper	14	49
	-	15	48
	- Heating pump	16	47
	- Heating frost	17	46
	- Electrical heating	18	45
	-	19	44
	- Extra cooling	20	43
	-	21	42
	- Extra heating	22	41
	- Extra heating frost	23	40
	- Extra electrical heating	24	39
	-	25	38
	- Humidity pump	26	37
	- Humidity command	27	36
	-	28	35
	- Fire alarm	29	34
	-	30	33
	- Filter alarm	31	32
	- Out temperature	32	31
	- Supply temperature	33	30
	- Heating frost temperature	34	29
	- Room1 temperature	35	28
	- Room2 temperature	36	27
	- Exhaust temperature	37	26
	- Extract temperature	38	25
	- Hrec supply temperature	39	24
	- Heating recovery water temp	40	23
Remarks:		* On some LON tools the bits are named in the other direction, so take care	

nvoAlarm, *cont.*

Network Name:	**nvoAlarm**		
Description:	**All alarms**		
Type:	SNVT_state_64 (64 bit)		
Bits:	Bit [0 … 63]	Binary:	* Reverse:
	- Extra supply temperature	41	22
	- Extra heating frost temp	42	21
	- Aux temperature	43	20
	-	44	19
	-	45	18
	- Supply temperature deviation	46	17
	- Room/Exh temp deviation	47	16
	- Supply press/flow deviation	48	15
	- Exhaust pressflow deviation	49	14
	-	50	13
	- Outside humidity	51	12
	- Supply humidity deviation	52	11
	- Room humidity deviation	53	10
	- Dewpoint	54	9
	-	55	8
	- Air quality	56	7
	- External setpoint	57	6
	- Aux alarm	58	5
	-	59	4
	- Manual control	60	3
	-	61	2
	- Communication test	62	1
	- Modbus master	63	0
Remarks:		* On some LON tools the bits are named in the other direction, so take care	

5.6 Configuration parameters

Introduction

The LON module's Neuron application supports 62 network variables. 4 of these must be used as configuration parameters as described below.

nciMaxSndTime

Network Name:	**nciMaxSndTime**
Description:	**Send Heartbeat** Max. time an output variable has to be sent even if there hasn't changed anything.
Type:	SNVT_time_sec
Remarks:	

nciMaxRcvTime

Network Name:	**nciMaxRcvTime**
Description:	**Receive Heartbeat** Max. time an input variable has to be received. If it wasn't received during this time the value of this input variable is invalid.
Type:	SNVT_time_sec
Remarks:	

nciStartupDelay

Network Name:	**nciStartupDelay**
Description:	
Type:	SNVT_Time_Sec
Remarks:	

Blank page

6 Appendix

6.1 Description of SNVTs

You can find current descriptions of SNVTs (Standard Network Variable Types) used in set AHU V1.x per Section 5.2 on the homepage of "LonMark International" at:

http://types.lonmark.org/index.html
"LONMARK Resource Files, version XX.XX"

Blank page

Index

Siemens Switzerland Ltd
Building Technologies Group
International Headquarters
Gubelstrasse 22
CH-6301 Zug
Tel. +41 41-724 24 24
Fax +41 41-724 35 22
www.siemens.com/sbt