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TROX® TECHNIK

Automation und Systemtechnik

Trox Netcom – LON-WA5 / B

Plug-In User manual

1. Introduction

This manual provides detailed documentation for installing and operating the LNS-based plug-in Trox WA5B01 for the LON coupling module LON-WA5/B. The applicable network variables and configuration parameters of the LON object are also described.

The LON-WA5/B functions as a coupling module between LonWorks technology and analogue technology, enabling the integration of analogue volume flow controllers into a LonWorks network.
The module doesn't have any project-specific parameters at the delivery and must be configured on site by customer.
The plug-in allows simple and user-friendly setting of the necessary configurations for the coupling module.

The plug-in for the LON-WA5/B and the available applications (xif/apb file) can be requested from the Internet.

For all the latest information, please visit us on the Web at http://www.trox.de/.

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2. Plug-In Installation

The system requirements and step-by-step installation instructions are described below.

2.1 System Requirements

The Trox WA5B01 plug-in is an LNS-enabled plug-in based on the standard of the network management tool Lonmaker 3.
Before installing the plug-in on your PC, please check for the following system requirements:

- PC — Recommended: Pentium III 1 GHz or faster
- Operating system — Microsoft® Windows® 2000®; Microsoft Windows XP®;
- RAM — At least 256 MB
- Hard disk space — At least 30 MB
- Monitor — Super VGA (1024x768)
- LNS — Version 3 with Service Pack 8 or higher

2.2 Installing the Plug-In

Check the Device Resource Files before running the installation.

2.2.1 Device Resource Files (DRF)

The definitions of the various network variable types are stored in the resource files.
Only standard network variables were used for the LON-WA5/B application, so there are no manufacturer-specific definitions to import.
The current LonMark Device Resource Files (data version 12.0 or higher) must be installed on the PC, however.

2.2.2 Installation

To install the plug-in, launch the set-up programme (Setup). Follow the on-screen instructions. The set-up program automatically installs the necessary data on your PC and creates the program folder *Windows Start > Programs > TROX LNS Plugins*. Accept the default installation paths.

2.2.3 Registration

A one-time registration of the plug-in on the PC is required.
If registration is not run as part of the installation process, it can be run later by selecting *Windows Start > Programs > TROX LNS Plugins > WA5B01.exe*. Follow the instructions to complete the registration process.
Registration is required for the plug-in to be available in the network management tool.

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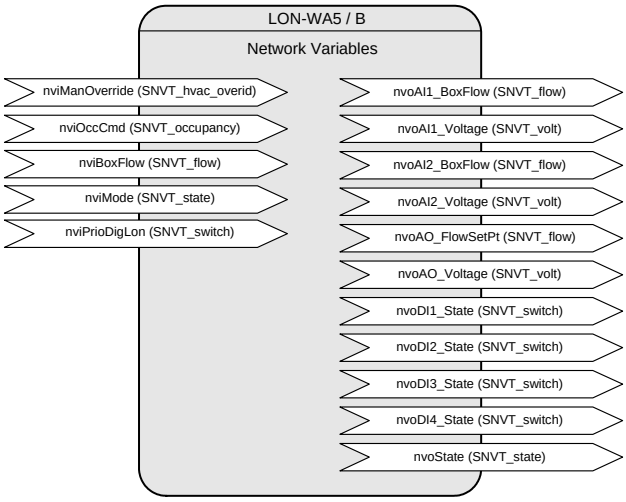
3. Description of the function object

The LON node consists of a node object and a virtual functional block. The virtual functional block consists of network variable and configuration parameters. All variables and parameters are based on standard network variables (SNVT) so that a simple integration of the LON-WA5/B is ensured into the LonWorks network.

3.1 Network variables



nviManOverride
SNVT type: SNVT_hvac_overid
Function:
A volume flow set point or a defined operating mode of the volume flow rate controller can be set through this input.
The variable contains the fields:

- state
- percent
- flow

The following settings are supported:
Valid values status:

- HVO_Off: no function
- HVO_Flow_Value: Sets the set value to the flow field value based on the adjusted operating range (VMin…VMax)
- HVO_Flow_Percent: Sets the set value to the percent field value based on the adjusted operating range (VMin…VMax)
- HVO_Close The output is set to 0 V and both relays are activated in order to force the damper blade in the full shut-off position
- HVO_Minimum The volume flow rate controller controls V_{Min}
- HVO_Maximum The volume flow rate controller controls V_{Max}

Note:
To ensure a perfect functioning of the nviManOverride variable through the Change Format, the format of SNVT_hvac_overid#SI must be changed to SNVT_hvac_overid#SI_LO.

nviOccCmd
SNVT type: SNVT_occupancy
Function:
The four possible operating modes of the volume flow rate controller can be set through this input. It can be configured freely with the aid of the appropriate SCPTdirection (nviOccCmd) configuration parameter at which predefined setting which operation mode is executed.

Default setting:

- OC_Nul: no function
- OC_Occupied: The volume flow rate controller controls V_{Max}
- OC_Unoccupied: The volume flow rate controller controls V_{Min}
- OC_Bypass: no function
- OC_Standby: The volume flow rate controller controls V_{Min}

nviMode
SNVT type: SNVT_state
Function:
Determines the function of the volume flow rate controller.

Bit	Function	0	1
1	Day operation	inactive	active
2	Reduced operation	inactive	active
3	Emergency operation	inactive	active
4	Close	inactive	active
12	Close	inactive	active
13	Emergency operation	inactive	active
14	Reduced operation	inactive	active
15	Day operation	inactive	active

It can be configured freely with the aid of the appropriate SCPTdirection (nviMode) configuration parameter at which
predefined setting which operation mode is executed.

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nviBoxFlow
SNVT type: SNVT_Flow
Function:
The volume flow rate controller can set a variable volume flow setpoint within the limits of the specified operating range through the BoxFlow.
In order to be able to define the variable setpoint, either the nviOccCmd or nviMode input in the "variable" operating mode must be configured.

nviPrioDigLon
SNVT type: SNVT_switch
Function:
Determines the priority for the operating mode change-over via LON or the digital input.

Value	State	Function
0,0	0	Priority DI
> 0,0	1	Priority LON

In the default setting, the digital inputs have priority over the LON inputs. The DI 1 has thereby the highest priority. The LON inputs have the following priority among themselves:
- nviManOverride
- nviOccCmd
- nviMode

As soon as a valid value is set through an input, the following inputs are ignored.

nvoAI1_BoxFlow
SNVT type: SNVT_flow
Function:
Output actual volume flow rate analogue input AI1.

nvoAI1_Voltage
SNVT type: SNVT_volt
Function:
Output analogue input voltage AI1.

nvoAI2_BoxFlow
SNVT type: SNVT_flow
Function:
Output actual volume flow rate analogue input AI2.

nvoAI2_Voltage
SNVT type: SNVT_volt
Function:
Output analogue input voltage AI2.

nvoAO_FlowSetPt
SNVT type: SNVT_flow
Function:
Output volume flow set point analogue output.

nvoAO_Voltage
SNVT type: SNVT_volt
Function:
Output analogue output voltage.

nvoDI1_State
SNVT type: SNVT_switch
Function:
Status digital input DI1.

Value	State	Function
0,0	0	inactive
100,0	1	active

nvoDI2_State
SNVT type: SNVT_switch
Function:
Status digital input DI2.

Value	State	Function
0,0	0	inactive
100,0	1	active

nvoDI3_State
SNVT type: SNVT_switch
Function:
Status digital input DI3.

Value	State	Function
0,0	0	inactive
100,0	1	active

nvoDI4_State
SNVT type: SNVT_switch
Function:
Status digital input DI4.

Value	State	Function
0,0	0	inactive
100,0	1	active

nvoState
SNVT type: SNVT_state
Function:
Output of actual operating mode and DI/DO status.

Bit	Operating mode	0	1
0	Variable	inactive	active
1	Min	inactive	active
2	Max	inactive	active
3	Close	inactive	active
4	Flow_value (nviManOverride)	inactive	active
5	Flow_percent (nviManOverride)	inactive	active
10	Relais 2	inactive	active
11	Relais 1	inactive	active
12	DI 4	inactive	active
13	DI 3	inactive	active
14	DI 2	inactive	active
15	DI 1	inactive	active

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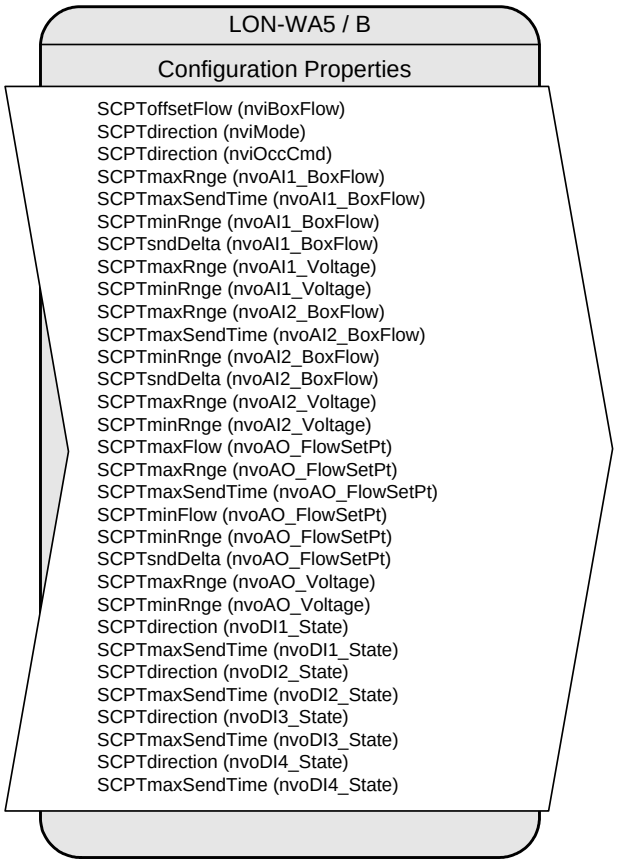
3.2 Configuration parameters



SCPToffsetFlow (nviBoxFlow)
SCPT type: SCPT_offsetFlow
Function:
Through the configuration parameter it is possible to input an offset volume flow rate, which can be added or subtracted from the volume flow set point.
This configuration allows the connection of a master-slave circuit between two volume flow rate controllers with LON-WA5/B and with a constant volume flow difference.

SCPTdirection (nviMode)
SCPT type: SCPT_direction
Function:
Configuration of the operating mode, which is to be carried out with the respective setting of the nvi_mode input variable.

Bit	Operation mode	Setting	0	1
0	Variable	Day operation	inactive	active
1	Min		inactive	active
2	Max		inactive	active
3	Close		inactive	active
4	Variable	Reduced operation	inactive	active
5	Min		inactive	active
6	Max		inactive	active
7	Close		inactive	active
8	Variable	Emergency operation	inactive	active
9	Min		inactive	active
10	Max		inactive	active
11	Close		inactive	active
12	Variable	Close	inactive	active
13	Min		inactive	active
14	Max		inactive	active
15	Close		inactive	active

Note:
Per each setting possibility, only one operating mode may be selected.

SCPTdirection (nviOccCmd)
SCPT type: SCPT_direction
Function:
Configuration of the operating mode, which is to be carried out with the respective setting of the nvi_OccCmd input variable.

Bit	Operating mode	Setting	0	1
0	Variable	Occupied	inactive	active
1	Min		inactive	active
2	Max		inactive	active
3	Close		inactive	active
4	Variable	Un-occupied	inactive	active
5	Min		inactive	active
6	Max		inactive	active
7	Close		inactive	active
8	Variable	Bypass	inactive	active
9	Min		inactive	active
10	Max		inactive	active
11	Close		inactive	active
12	Variable	Standby	inactive	active
13	Min		inactive	active
14	Max		inactive	active
15	Close		inactive	active

Note:
Per each setting possibility, only one operating mode may be selected.

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Configuration of analogue input 1:

SCPTmaxRnge (nvoAI1_BoxFlow)
SCPT type: SCPT_maxRnge
Function:
Volume flow corresponding to the maximum voltage (SCPTmaxRnge - nvoAI1_Voltage).

SCPTmaxSendTime (nvoAI1_BoxFlow)
SCPT type: SCPT_maxSendTime
Function:
Time interval after which the actual volume flow value is re-sent.

SCPTminRnge (nvoAI1_BoxFlow)
SCPT type: SCPT_minRnge
Function:
Volume flow corresponding to the minimum voltage (SCPTminRnge - nvoAI1_Voltage).

SCPTsndDelta (nvoAI1_BoxFlow)
SCPT type: SCPT_sndDelta
Function:
Output tolerance when volume flow changes.

SCPTmaxRnge (nvoAI1_Voltage)
SCPT type: SCPT_ maxRnge
Function:
Maximum voltage at analogue input 1.

SCPTminRnge (nvoAI1_ Voltage)
SCPT type: SCPT_minRnge
Function:
Minimum voltage at analogue input 1.

Configuration of analogue input 2:

SCPTmaxRnge (nvoAI2_BoxFlow)
SCPT type: SCPT_maxRnge
Function:
Volume flow corresponding to the maximum voltage (SCPTmaxRnge - nvoAI2_Voltage).

SCPTmaxSendTime (nvoAI2_BoxFlow)
SCPT type: SCPT_maxSendTime
Function:
Time interval after which the actual volume flow value is re-sent.

SCPTminRnge (nvoAI2_BoxFlow)
SCPT type: SCPT_minRnge
Function:
Volume flow corresponding to the minimum voltage (SCPTminRnge - nvoAI2_Voltage).

SCPTsndDelta (nvoAI2_BoxFlow)
SCPT type: SCPT_sndDelta
Function:
Output tolerance when volume flow changes.

SCPTmaxRnge (nvoAI2_Voltage)
SCPT type: SCPT_ maxRnge
Function:
Maximum voltage at analogue input 2.

SCPTminRnge (nvoAI2_ Voltage)
SCPT type: SCPT_minRnge
Function:
Minimum voltage at analogue input 2.

Configuration of analogue output:

SCPTmaxFlow (nvoAO_FlowSetPt)
SCPT type: SCPT_maxFlow
Function:
Maximum tolerance of the volume flow set point command variable (upper limit of operating range).

SCPTmaxRnge (nvoAO_FlowSetPt)
SCPT type: SCPT_maxRnge
Function:
Volume flow that should be controlled at the defined maximum voltage (SCPTmaxRnge - nvoAO_Voltage).

SCPTmaxSendTime (nvoAO_FlowSetPt)
SCPT type: SCPT_maxSendTime
Function:
Time interval after which the volume flow set point is re-sent.

SCPTminFlow (nvoAO_FlowSetPt)
SCPT type: SCPT_minFlow
Function:
Minimum tolerance of the volume flow set point command variable (lower limit of operating range).

SCPTminRnge (nvoAO_FlowSetPt)
SCPT type: SCPT_minRnge
Function:
Volume flow that should be controlled at the defined minimum voltage (SCPTminRnge - nvoAO_Voltage).

SCPTsndDelta (nvoAO_FlowSetPt)
SCPT type: SCPT_sndDelta
Function:
Output tolerance when volume flow changes.

SCPTmaxRnge (nvoAO_Voltage)
SCPT type: SCPT_ maxRnge
Function:
Maximum voltage of analogue output

SCPTminRnge (nvoAO_Voltage)
SCPT type: SCPT_minRnge
Function:
Minimum voltage of analogue output

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Configuration of digital inputs

SCPTdirection (nvoDI1_State)
SCPT type: SCPT_direction
Function:
Configuration of the operating mode, which is to be carried out through the digital input 1.

Bit	Operating mode	Adjustment	0	1
0	Variable	DI1	inactive	active
1	Min		inactive	active
2	Max		inactive	active
3	Close		inactive	active

SCPTmaxSendTime (nvoDI1_State)
SCPT type: SCPT_maxSendTime
Function:
Time interval after that the DI1 status is transmitted again.

SCPTdirection (nvoDI2_State)
SCPT type: SCPT_direction
Function:
Configuration of the operating mode, which is to be carried out through the digital input 2.

Bit	Operating mode	Adjustment	0	1
0	Variable	DI2	inactive	active
1	Min		inactive	active
2	Max		inactive	active
3	Close		inactive	active

SCPTmaxSendTime (nvoDI2_State)
SCPT type: SCPT_maxSendTime
Function:
Time interval after that the DI2 status is transmitted again.

SCPTdirection (nvoDI3_State)
SCPT type: SCPT_direction
Function:
Configuration of the operating mode, which is to be carried out through the digital input 3.

Bit	Operating mode	Adjustment	0	1
0	Variable	DI3	inactive	active
1	Min		inactive	active
2	Max		inactive	active
3	Close		inactive	active

SCPTmaxSendTime (nvoDI3_State)
SCPT type: SCPT_maxSendTime
Function:
Time interval after that the DI3 status is transmitted again.

SCPTdirection (nvoDI4_State)
SCPT type: SCPT_direction
Function:
Configuration of the operating mode, which is to be carried out through the digital input 4.

Bit	Operating mode	Adjustment	0	1
0	Variable	DI4	inactive	active
1	Min		inactive	active
2	Max		inactive	active
3	Close		inactive	active

SCPTmaxSendTime (nvoDI4_State)
SCPT type: SCPT_maxSendTime
Function:
Time interval after that the DI4 status is transmitted again.

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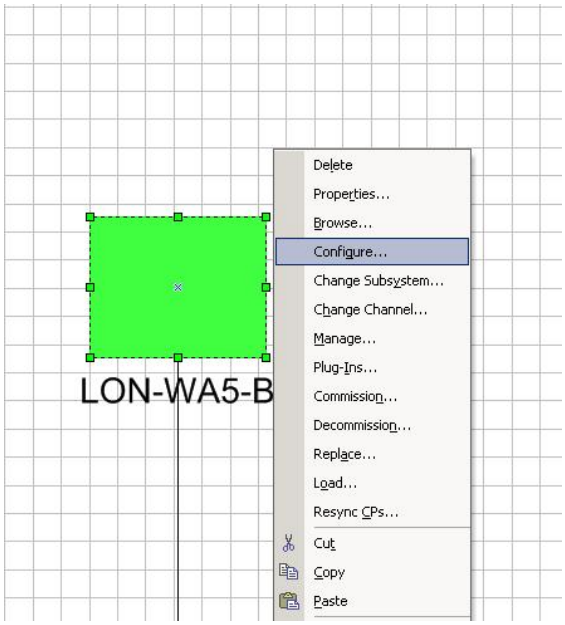
4. Plug-In Description

The interface of the WA5B01 plug-in consists of six tabs. Chapter 4.2 describes the contents of each tab in detail.

4.1 Starting the Plug-In

The plug-in is started through the respective device in the network management tool Lonmaker. Click to select the node, then right-click and select “Configure”.
The plug-in is restarted for each individual LON node—that is, the plug-in enables access to the current node.



Only one plug-in may be open at a time.

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4.2 Description of the Tabs

The individual tabs and their function are described in detail in the following sections.

4.2.1 "AI 1" and "AI 2" Tabs

The necessary settings for the analogue inputs are made on the AI 1 and AI 2 tabs. The LON-WA5/B has two analogue inputs for integrating up to two actual values of volume flow controllers into the LonWorks network.

The characteristic line of the analogue input (actual signal of the volume flow controller) derives from the minimum and maximum volume flow and the defined voltage range of the volume flow controller.

The following analogue input parameters can be defined:

item 1: AI configuration

- voltage min

Minimum voltage of volume flow controller (0 or 2 VDC).

- voltage max

Maximum voltage of volume flow controller (10 VDC).

- input voltage

Displays current input voltage at analogue input (actual value of connected volume flow controller).

- value min

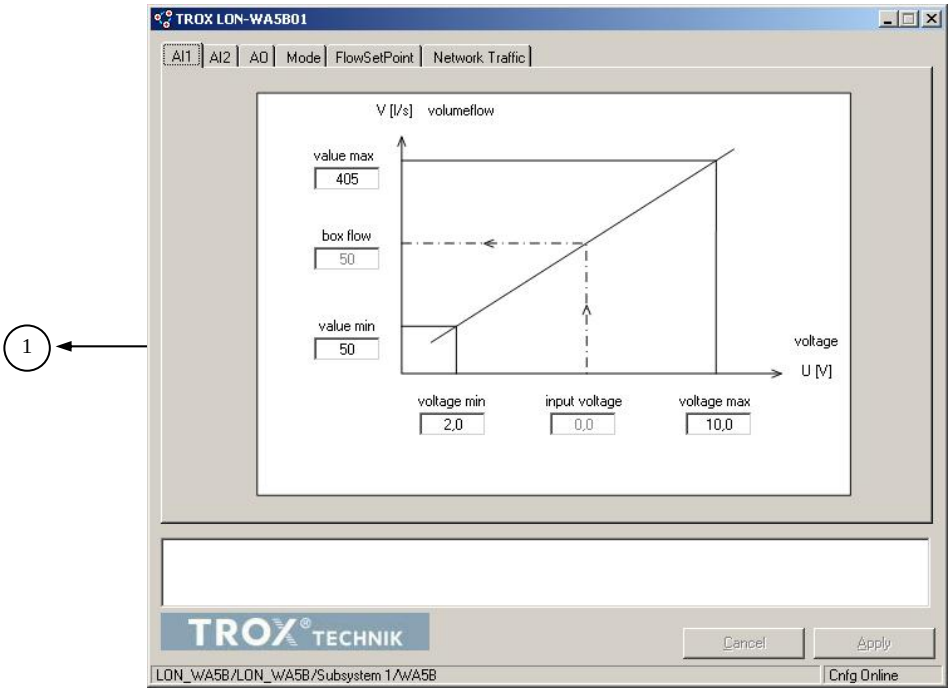
Volume flow corresponding to minimum voltage (voltage min).
Default setting should be 0 l/s, since the volume flow controller is factory-set at 0 – $V_{nominal}$.

- value max

Volume flow corresponding to maximum voltage (voltage max).
Default setting should be $V_{nominal}$ of the corresponding volume flow controller, since the controller is factory-set at 0 – $V_{nominal}$.

- box flow

Displays actual volume flow in l/s.



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4.2.2 "AO" Tab

The analogue output configuration is defined on the AO tab. Here it is possible to indicate the characteristic line of the volume flow controller and to define an operating range for the command variable.
Accordning to this it is possible, when the appropriate volume flow controller setting is given, to control any set point in the operating range via the LON.
For this reason, the volume flow controller is always factory-set at 0 l/s – $V_{nominal}$, so that the characteristic line extends across the entire volume flow range of the respective controller. The applicable operating range of the command variable can then be selected within the minimum and maximum tolerances.

item 1: AO configuration

- value min

Volume flow that should be controlled at the defined minimum voltage (volt min) of the volume flow controller (lower limit of characteristic line).

- value max

Volume flow that should be controlled at the defined maximum voltage (volt max) of the volume flow controller (upper limit of characteristic line).

- flow Setpoint

Displays the actual volume flow set point based on the selected operation mode and the defined operating range.

- Vmin

Minimum tolerance of the volume flow set point command variable (lower limit of operating range).

- Vmax

Maximum tolerance of the volume flow set point command variable (upper limit of operating range).

- volt min

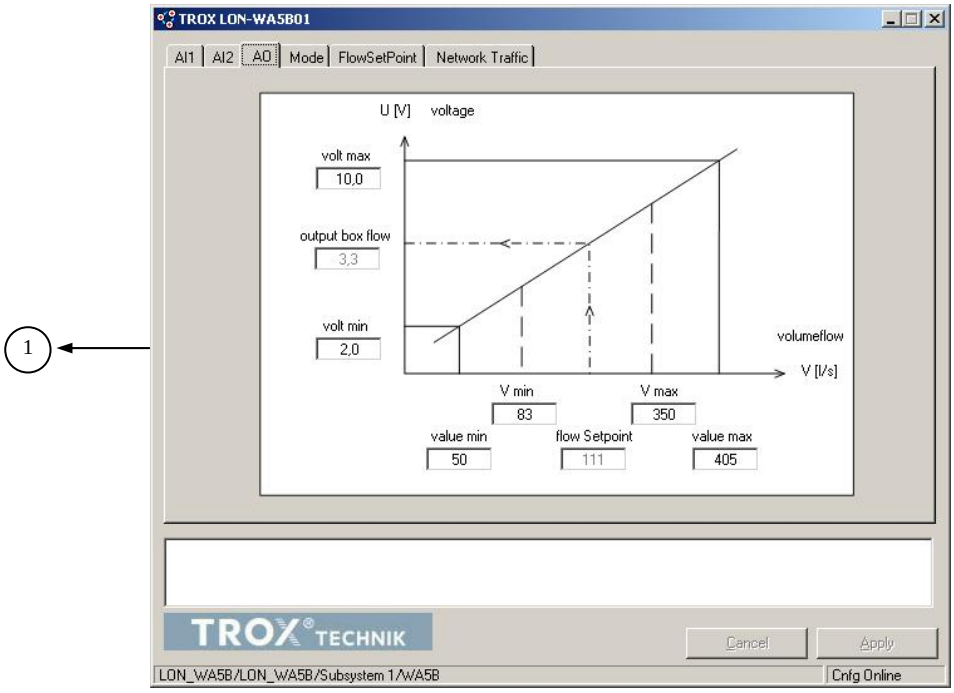
Minimum voltage of analogue output (0 or 2 VDC).

- volt max

Maximum voltage of analogue output (10 VDC).

- output box flow

Displays the command variable (set output voltage) for the connected volume flow controller.



4.2.3 "Mode" Tab

It is possible through the LON-WA5/B to set various operation modes for the analogue volume flow controller. The available modes are:
- Variable mode, Min mode, Max mode and Close.

The Mode tab shows the operation mode derived from the respective volume flow controller setting.
The order of the input options on the tab reflects the priority of the various operation mode settings. In the default setting, the digital inputs have priority over the LON inputs, and DI 1 has the highest priority. The LON inputs, as illustrated, have the following relative priority:
- nviManOverride (SNVT_hvac_overid)
- nviOccCmd (SNVT_occupancy)
- nviMode (SNVT_state)

As soon as a valid setting is obtained via a LON input, the subsequent inputs are ignored.
In the default state, the *Day* mode is active.
The arrows in front of the drop-down list boxes indicate which input is currently connected.

item 1: configuration mode

- digital inputs DI 1 – DI 4

One operation mode can be set through each of the four digital inputs. Use the drop-down list box to select the desired operation mode for each input.

- ManOverride

Displays the operation mode set via the LON input nviManOverride (SNVT_hvac_overid).

- OccCmd

The settings *Occupied*, *Unoccupied*, *Bypass* and *Standby* can be defined via the LON input nviOccCmd (SNVT_occupancy). Use the drop-down list box to assign an operation mode to each setting. This operation mode will run when the corresponding setting is defined.

- Mode

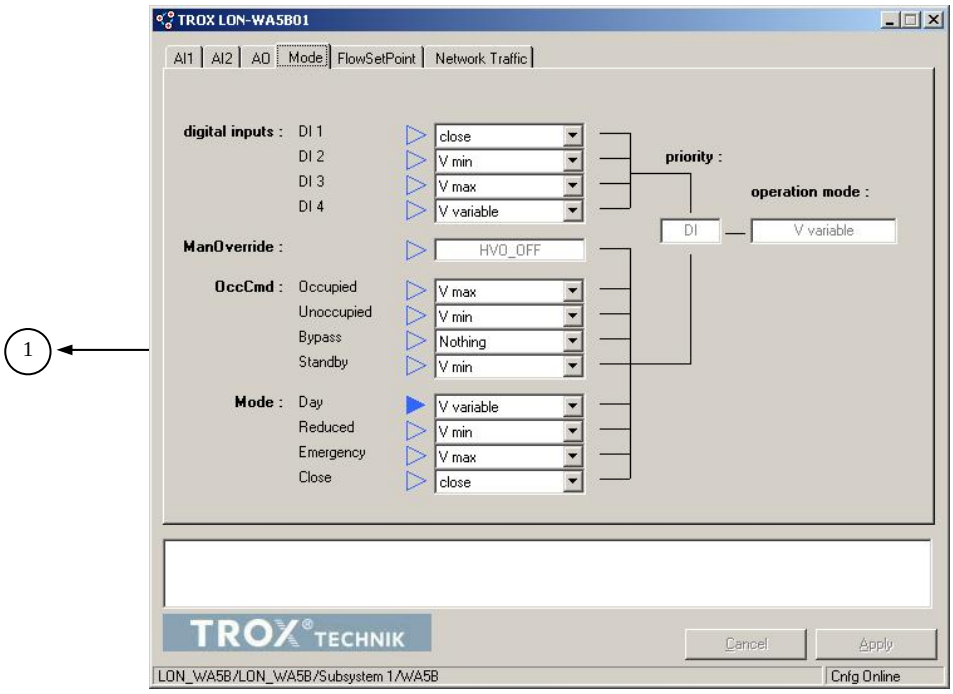
The functions *Day*, *Reduced*, *Emergency* and *Close* can be set via the LON input nviMode (SNVT_state). Use the drop-down list box to assign an operation mode to each setting. This operation mode will run when the corresponding setting is defined.

- priority

Displays the current priority for the operation setting (DI/LON).

- operation mode

Displays the current operation mode setting for the volume flow controller.



4.2.4 "FlowSetPoint" Tab

The FlowSetPoint tab shows the set point which, based on the selected operation mode and the current configurations, is output to the volume flow controller through the analogue output.
The arrows in front of the drop-down list boxes indicate which set point setting is currently valid.

item 1: FlowSetPoint configuration

- operation mode

Displays the current operation mode.

- variable (boxflow)

Displays the volume flow set point of the nviBoxFlow set via the LON input. The input is active only when the "Variable" operation mode is set.

- V min

Displays the minimum tolerance of the volume flow set point command variable (lower limit of operating range).

- V max

Displays the maximum tolerance of the volume flow set point command variable (upper limit of operating range).

- ManOveride

The LON input nviManOverride includes three fields (state, flow, percent) used to set a volume flow set point. The areas shown display the values set for flowvalue and flowpercent.

- ManOveride – flow value

Displays the volume flow set point set via flowvalue relative to the defined operating range (VMin…VMax).

- ManOveride – flowpercent

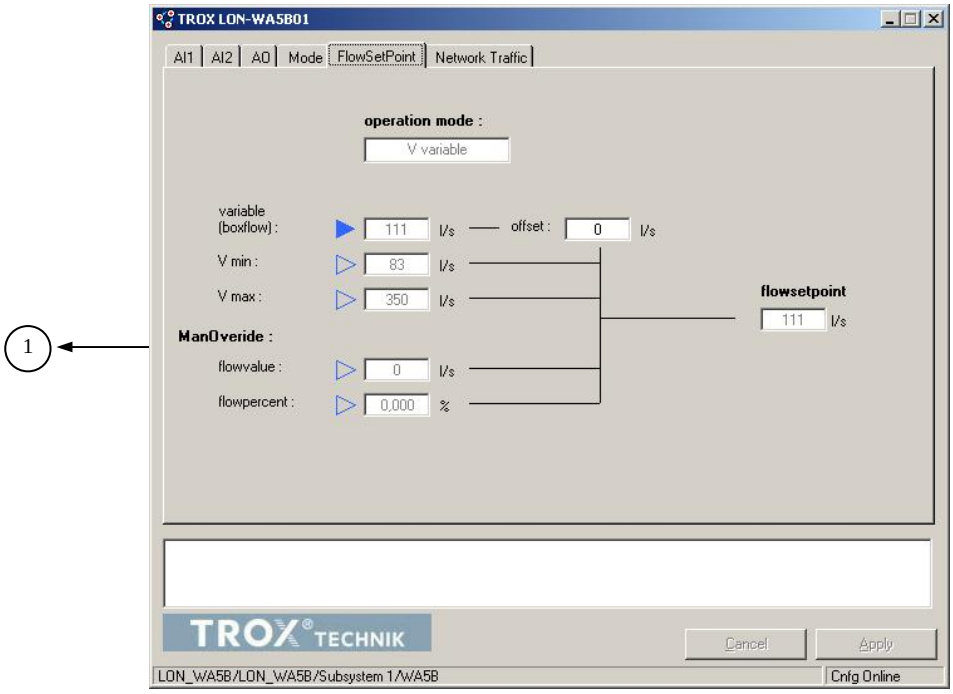
Displays the volume flow set point set via flowpercent relative to the defined operating range (VMin…VMax).

- offset

Offset volume flow that can be added to the volume flow set point (plus sign) or subtracted from it (minus sign).

- flowsetpoint

Displays current volume flow set point.



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4.2.5 "Network Traffic" Tab

The settings for data transmission to the LonWorks network can be defined on the Network Traffic tab.

item 1: maxSendTime configuration

- nvoAI1_BoxFlow – nvoDI4_state

Time intervals can be configured for each existing output variable. The values are re-sent to the network at the set intervals. This makes it possible to adapt the LON-WA5/B to an existing bus load.

item 2: sndDelta configuration

- nvoAI1_BoxFlow/nvoAI2_BoxFlow/nvoAO_FlowSetPt

In addition to the time intervals, output tolerances for a volume flow change can be defined for the three output variables. If there is a volume flow change greater than the defined value, the new volume flow is sent to the network.