

## Integration of Belimo Top Line fire protection actuators in LonWorks® networks

Guide for system integrators



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The Top Line fire protection product range for LonWorks®

**Note**

Detailed product information under [www.belimo.com](http://www.belimo.com)



**Top Line fire protection actuator with thermo-electrical tripping device**

The actuator is connected directly to the BKN230-24LON with a tab connection.

Typical installation in the fire damper



230Vac

LonWorks

Free Topology



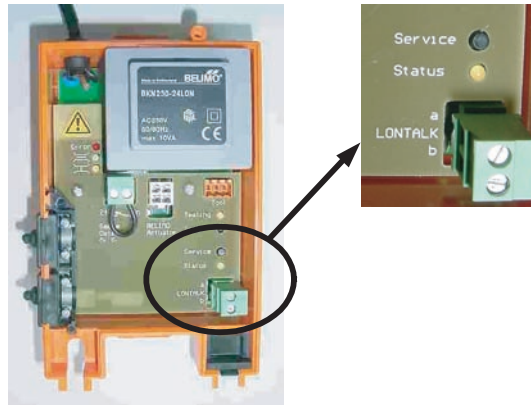
**Communication and power supply unit BKN230-24LON (LonMark certified)**

This is also the interface to the LonWorks® network and is provided with a unique Neuron ID (address label on device).



Connection to LonWorks® network

The Top Line fire protection actuator BF(G)24TL-T-ST is connected to the LonWorks network by the communication and power supply unit BKN230-24LON. Every BKN230-24LON module has a unique address number (Neuron ID), which is noted on two labels on the housing. One of the labels is designed so that it can be easily pulled off and attached to the building plan, for example. This makes the documentation of the system and the Neuron addresses used simple and easy to understand. The BKN230-24LON can be directly integrated in the administration tool (e.g. LonMaker ) by entering the Neuron ID or by pressing the service key.



BKN230-24LON

Signalization of LonWorks® status

Display	Colour	Status	Function
Status LED	Yellow	Illuminated	No user software loaded
		Flashes	Not configured (factory status) <sup>1)</sup>
		Off	Configured (normal status)

<sup>1)</sup> The BKN230-24LON is not configured ex works. This status can be achieved if the service key is pressed for 3 ... 10 d while applying the supply voltage.

Wink event

If the wink command is sent to the BKN230-24LON module, this responds by flashing the "ERROR", "OPEN" and "CLOSED" LEDs one after the other at 1s intervals. The entire duration of onsingle wink event is approx. 7s.

Functional profiles

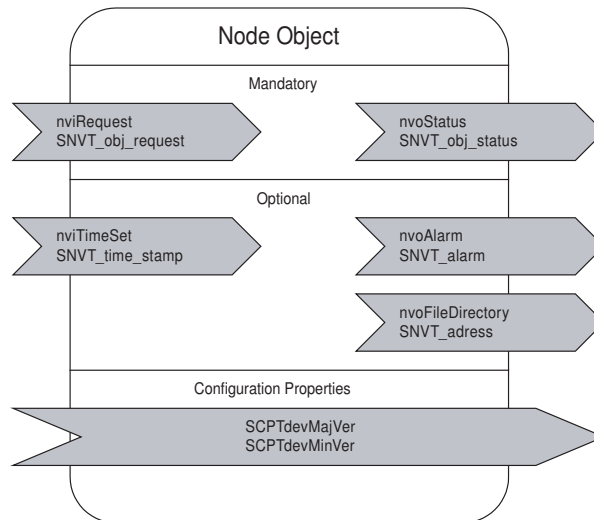
Attached is a short description of one of the most important functions of the available objects. A detailed description of the functional profiles can be directly downloaded from the LonMark® website under the following addresses.

Object name	Web link
Node	<a href="http://www.lonmark.org/press/download/LYR732.pdf">www.lonmark.org/press/download/LYR732.pdf</a>
Fire smoke damper actuator	<a href="http://www.lonmark.org/press/download/11001_10.pdf">www.lonmark.org/press/download/11001_10.pdf</a>
Open loop sensor object (smoke fire initiator)	<a href="http://www.lonmark.org/press/download/11003_01.pdf">www.lonmark.org/press/download/11003_01.pdf</a>

The corresponding XIF file can be downloaded under [www.lonmark.org/products/prodinfo.cfm?ProductID=537](http://www.lonmark.org/products/prodinfo.cfm?ProductID=537) or directly from the BKN230-24LON module.

## Node object

The node object monitors and controls the functions of the individual objects (FSDA and open-loop sensor) in the BKN230-24LON.



Variable / variable type	Supported values	Remarks
<code>nviRequest</code> <code>SNVT_obj_request</code> [#92]	RQ_NORMAL RQ_UPDATE_STATUS RQ_UPDATE_ALARM RQ_REPORT_MASK RQ_CLEAR_ALARM RQ_SELF_TEST	Normal mode, no special function Current status output to <code>nvoStatus</code> Forces output to <code>nvoAlarm</code> for desired object In <code>nvoStatus</code> , the supported bits are set to 1 Clears stored errors (if possible) Initiation of the mechanical actuator test
<code>nvoStatus</code> <code>SNVT_obj_status</code> [#93]	<code>invalid_id</code> <code>invalid_request</code> <code>report_mask</code> <code>out_of_service</code> <code>mechanical_fault</code> <code>over_range</code> <code>under_range</code> <code>unable_to_measure</code> <code>comm_failure</code> <code>locked_out</code> <code>self_test_in_progress</code> <code>in_alarm</code>	Incorrect object number Faulty request Signalizes output of status mask (sh. RQ_REPORT-MASK) Actuator / detector out of order Damper mobility error Missing end stop Mechanical overload Switch position (sw switch) unclear RcvrHrtBt triggered Ambient temperature / actuator temperature too high Test run active Collective signal bit, correlates with <code>nvoAlarm</code>
<code>nviTimeSet</code> <code>SNVT_time_stamp</code> [#84]	In accordance with <code>SNVT_time_stamp</code>	Synchronisation of the node-internal clock for the alarm time stamps. Initialised with: Tuesday, January, 1 2002, 0:00:00min. after power-up
<code>nvoAlarm</code> <code>SNVT_alarm</code> [#88]	<code>AL_FIR_TRBL</code> (state) <code>PR_4</code> (priority level)  <code>AL_FIR_ALM</code> (state) <code>PR_1</code> (priority level)  <code>AL_NO_CONDITION</code>	Fault in FSDA object Alarm.alarm_limit(1) contains set position (e.g. EMERG_NORMAL) Alarm.value(1) contains actual pos. (e.g. EMERG_FIRE) Fault in OLS object: Alarm.alarm_limit(1;2) 0; 0 Alarm.alarm_value(1;2) 1; 100 (BAE or contact error) There is no error.
<code>nvoFileDirectory</code> <code>SNVT_adress</code> [#114]		Is required for direct memory read/write!
<code>nciDevMajVer</code> unsigned short		Software version of the node object
<code>nciDevMinVer</code> unsigned short		Software version of the node object

**Note** The variable `nvoAlarm` serves as a collective signal and doesn't supply detailed information about the cause of the disturbance. For this reason, it makes sense to use `nvoStatus` (node object) and `nvoFireAlm` (open-loop sensor) for monitoring the drives. This makes it considerably easier to maintain the system and remedy errors. For the same reason, it is also recommended to activate the "test run" function (`RQ_SELF_TEST`).

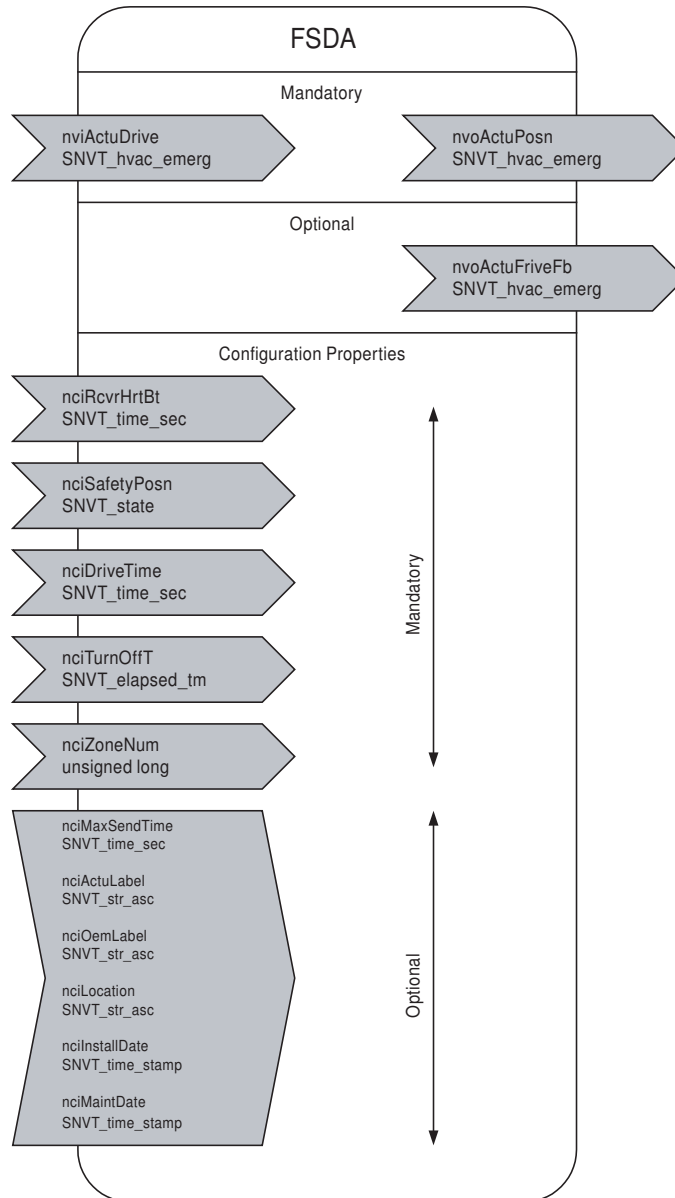
**Node object (continued)**

**Test of the actuator via LonWorks® network** The actuator connected to the network can be tested via the LonWorks network by sending an RQ\_SELF\_TEST command to the input variable nviRequest of the node object. This way, the same test is executed which is executed by pushing the TEST key on the BKN230-24LON. During the test run, the yellow “TEST” LED lights up on the BKN module.

**Comment** A test via the bus network can only be initiated when the actuator is in the operating position (open). In other words, nviActuDrive = EMERG\_NORMAL! A test run can always be started directly on the BKN module, however (by pressing the key TEST for >3s)!

**Fire smoke damper actuator object**

**Fire smoke damper actuator object** The FSDA object contains all functions which are needed for setting, controlling and querying the fire protection actuator.



**Fire smoke damper actuator object** (*continued*)

Variable / variable type	Supported values	Remarks
nviActuDrive SNVT_hvac_emerg [#103]	EMERG_NORMAL EMERG_FIRE (default)	Damper in operating position Damper in safety position
nvoActuPosn SNVT_hvac_emerg [#103]	EMERG_NORMAL EMERG_NUL EMERG_FIRE	Damper in operating position Intermediate position / actuator not yet reached end pos. Damper in safety position
nvoActuDriveFb SNVT_hvac_emerg [#103]	EMERG_NORMAL EMERG_FIRE	Shows the current value of nviActuDrive.
nciMaxSendTime SNVT_time_sec [#107]	off (0), 1 ... 3600 s default off	Within this maximum time, nvoActuPosn must be sent once.
nciRcvrHrtBt SNVT_time_sec [#107]	off (0), 5 ... 6553 s default off	Max. time without new bus command until nviActuDrive is set to EMERG_FIRE.
nciSafetyPosn SNVT_state [#83]	Bit 1: 0 (closed)	Safety position of the actuator - cannot be changed.
nciActuLabel SNVT_str_asc [#36]	From actuator	Belimo string, e.g. BF24TL-T-ST
nciDriveTime SNVT_time_sec [#107]	From actuator	Running time for spring lift / motor operation Display of factory setting
nciTurnOffT SNVT_elapsed_tm [#87]	off (0), 1 ... 300 s Init: 30 s permanently set!	Running time, spring return
nciZoneNum unsigned long	0 (init) ... 65534	Zone number, stored in BKNLON, e.g. for storing the building zone number
nciOemLabel SNVT_str_asc [#36]	From actuator	OEM string (contents e.g.: BSK type, etc.)
nciLocation SNVT_str_asc [#36]	From actuator	System position
nciInstallDate SNVT_time_stamp [#84]		Date of installation, stored in the BKNLON
nciMaintDate SNVT_time_stamp [#84]		Date of the last inspection, stored in the BKNLON
nciObjMajVer unsigned short		Software version of the FSDA object
nciObjMinVer unsigned short		Software version of the FSDA object

**Setting recommendations for Receive Heartbeat function**


The nciRcvrHrtBt variable defines the maximum time without a new bus command before nviActuDrive is set to EMERG\_FIRE, thus moving the fire protection actuator to its safety position (damper closed).

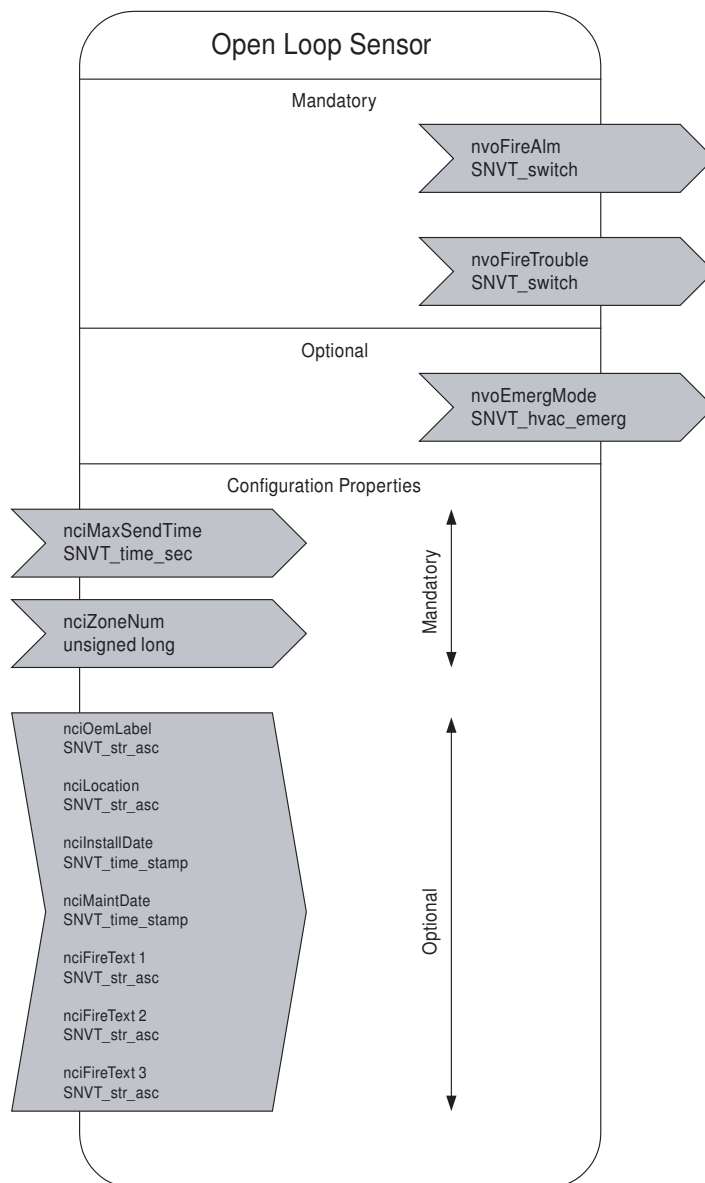
The default value of this variable is 0 (disabled). For fire protection applications, however, we recommend a time setting of 60 seconds, for example. Here, it is to be observed that a control command is periodically sent to nviActuDrive by the higher-level controller (e.g. fire alarm system) at short intervals (e.g. every 30 seconds). This way it is guaranteed that the actuators close the fire protection dampers preventively when the bus communication is interrupted and the highest level of safety possible is guaranteed.

**Comment**

Even when bus communication is interrupted in the event of fire, due to the tripping of the temperature switch or the smoke alarm contact, the fire damper is closed immediately.

## Open loop sensor object

The open-loop sensor object contains all functions which are provided by the temperature fuses of the actuator and the additional tripping contact (connection to the BKN module).



Variable / variable type	Supported values	Remarks
nvoFireAlm SNVT_switch [#95]	See comment below	Indicates when BAE and / or smoke detector was triggered.
nvoFireTrouble SNVT_switch [#95]	0; 0 Everything OK 1; 100 Error	Indicates whether BAE and smoke detector can be read. If not, then: state = 1, Value = 100.
nvoEmergMode SNVT_hvac_emerg [#103]	EMERG_NORMAL (status 0) EMERG_FIRE (status 1)	For directly controlling an FSDA. nvoFireAlm
nciMaxSendTime SNVT_time_sec [#107]	off (0), 1 ... 3600 s default off	Within this maximum time, nvoFireAlm must be sent once
nciZoneNum unsigned long	0 (init) ... 65534	Zone number, stored in the BKNLON
nciOemLabel SNVT_str_asc [#36]	From actuator	OEM string (contents e.g.: BSK type, etc.)



## Open-loop sensor object (continued)

Variable / variable type	Supported values	Remarks
nciLocation SNVT_str_asc [#36]	From actuator	System position
nciInstallDate SNVT_time_stamp [#84]		Date of installation, stored in the BKNLON
nciMaintDate SNVT_time_stamp [#84]		Date of the last inspection, stored in the BKNLON
nciFireText 1 SNVT_str_asc [#36]		Can be freely defined by the integrator. Relevant text field in the event of fire
nciFireText 2 SNVT_str_asc [#36]		Can be freely defined by the integrator. Relevant text field in the event of fire
nciFireText 3 SNVT_str_asc [#36]		Can be freely defined by the integrator. Relevant text field in the event of fire
nciObjMajVer unsigned short		Software version of the OLS object
nciObjMinVer unsigned short		Software version of the OLS object

**Comments on nvoFireAlm** The output variable nvoFireAlm allows a very differentiated output of its statuses. The following values are possible:

Status	Value	Description
0	0	No alarm
1	1	Smoke alarm
1	2	Channel temperature too high
1	3	Smoke alarm and channel temperature too high
1	4	Ambient temperature too high
1	5	Smoke alarm and ambient temperature too high
1	6	Channel temperature and ambient temperature too high
1	7	Smoke alarm and channel temperature and ambient temperature too high

If the ambient temperature was too high (status 1 and values >3), it must be taken into account that the nvoStatus of the node object might go to "locked\_out". This alarm signal cannot be reset by the test run since the actuator was exposed to too high a temperature and may be defective. The damper installation and the actuator must then be checked by the manufacturer in any case and replaced, if necessary.

**Setting recommendation for MaxSendTime Variable**

For safety reasons, we recommend a setting of the MaxSendTime of the open-loop object to 60 ... 300 seconds. This way, it is guaranteed that the sensor status is sent to the higher-level controller periodically, at least once within the set time window.



**Preventive isolation in the event of a plant shutdown**

In addition to personal protection, motorised fire dampers can also contribute greatly to material asset protection. If the fire dampers are not closed when the ventilation system is switched off, in the event of fire, fumes can spread unhindered via the channel network into the building and cause considerable damage. By closing the motorised fire dampers when the plant is shut down (e.g. during the night), smoke is prevented from passing into the neighbouring fire zones when the ventilation system is switched off, which therefore protects the existing material assets (passive safety).



**Automatic damper mobility test**

When the OEM (manufacturer of the fire dampers) parameterises the actuator, he has the option of activating an automatic damper mobility test using a software tool. In this test, the opened damper blade is moved by a few degrees out of its position, depending on the network (controlled by the actuator itself). Here, the actuator itself and the damper mobility are tested. The magnitude of the rotary movement to be carried out is chosen by the OEM, depending on the damper type used.

This test is started automatically every 24 hours. Any errors occurring are communicated via the bus network and can be evaluated and displayed. Since the rotary movement of the damper blade is relatively small, operation of the plant is not disturbed as far as ventilation goes. It is to be observed, however, that the exact time at which the test is carried out cannot be defined. This might be disturbing in a noise-sensitive environment (running noises of the actuator and damper noises in the air flow during the test).

Typical application

