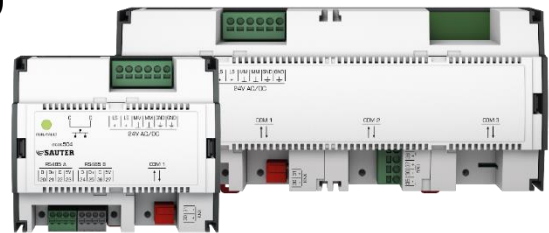




ecos504/505 FW V5.1 - ecos-DALI V3.0

ecos-DALI V5.1.0 / V3.0.16

ecosCom550 (DALI) protocol FW V3.0.16



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1. Main objectives

This product information announces the release of firmware Version 5.1.0 for the ecos504/505 room automation stations and protocol firmware version 3.0.16 for the ecos-DALI interface.

With this version, SAUTER is bringing a [functional expansion for DALI](#) (Digital Addressable Lighting Interface) to the market. New DALI-2 functions can now be used with the programmable ecos504/505 and the DALI interface (EY-CM550) for efficient solutions to current lighting control applications with DALI devices, such as state-of-the-art electronic control gears with smart data, DALI-2 sensors or input devices.

In addition, [improvements were made to the implementation of the MQTT connector](#) and the subscription-based BACnet objects were redesigned for greater flexibility.

As part of the [uniform BACnet implementation](#), the BACnet network layer will now be used with the [SAUTER BACnet-Stack](#) used for modulo 6, in addition to the BACnet application layer (used since V5.0). Consequently, the ecos firmware also has BACnet protocol revision 24 with the improvements and expansions from the modulo 6 firmware (e.g. hierarchical structure of the BACnet network port object). This BACstack porting for ecos504/505 is the basis that will enable a future version to support BACnet/SC for the ecos504/505 room automation station.

2. Application

This firmware version for the ecos504/505 room automation stations is programmed and commissioned with CASE Suite V5.2 or higher.

The new protocol firmware V3.0 for DALI can also be used with CASE Suite 5.2 and ecos504/505 from V5.0.

The firmware index for V5.1 is FI=24.

Station	Firmware version	CASE version
ecos504/505	5.1.0 (b4339)	5.2 (FI=24)
ecos-DALI	3.0.15 for ecos FW V5.0, V5.1 recommended	(FI=2.18)

Notes:

- Older ecos504/505 firmware versions 5.0.x are no longer recommended.
- The protocol firmware for ecos-DALI V2.2.8 can continue to be used. V3.0.16 is functionally backwards-compatible with the functions used from V2.2.x.
- ecos-DALI V3.0 has FI=2.18: use with older ecos FW below V5.0 (without the VPort/TCP tunnel function) has not been tested by SBA.
- ecos504 with moduWeb (EY-RC504F101) has been discontinued and is no longer supported with V5.1. For ecos504 with moduWeb, V5.0.2 is now available on the SAUTER deployment server.

3. Overview of product range

This version supports [all types of ecos504/505](#) except [ecos504-moduWeb](#) (EY-RC504F101).

With protocol version V3.0 for DALI (EY-CM550), all ecos504/505 with DALI interface can now use the new DALI-2 functions.

The improved MQTT connector and commissioning function comes into effect with the ecos-IoT (EY-RC504F202) and the ecos504/505 with MQTT licence (YY-FX502F00x).

Version 5.1 provides the BACnet implementation with BACnet protocol revision 24, as in modulo 6 with V2.1.

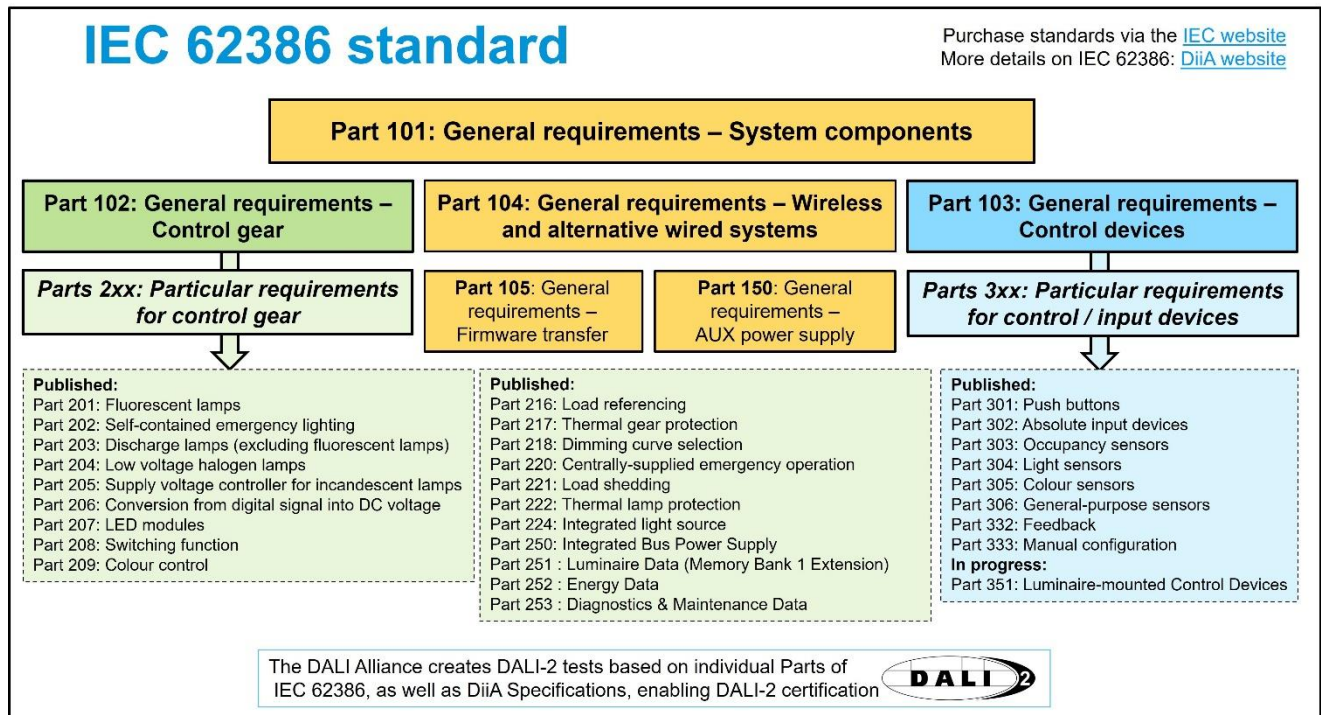
4. Overview of ecos-DALI with DALI-2



In 2016, SAUTER introduced the DALI master interface for ecos504 and ecos505 as ecos-DALI V1 (PI-16-579). Product information PI-21-739 announced the introduction of ecos-DALI V2, the first DALI-2 standard functions and additional functions for LED colour control, for example.

ecos-DALI V3 brings additional DALI functions to the ecos504/505 BACnet room automation station. The main objective of version 3 is to support DALI-2 events.

DALI-2 represents a massive leap forwards for the standard in terms of DALI product compatibility. The [DALI Alliance](#), of which SAUTER has been a member since 2023, enables DALI device certification (see [DALI product database](#)). The DALI Alliance website has very detailed information on [DALI Standard IEC 62386](#). Please see the graphic below for an overview:



SAUTER analysed the DALI-2 standard with the key functions and implemented and integrated these into the DALI interface for ecos504/505.

With the various control gear device types (=DALI ballasts; Part 102, 201 to 209 and additional types from Part 216–253) and the various control devices (= DALI-2 sensors, input devices), application

controllers; Part 103, 301 to 306 and additional parts 3xx), all these devices have a very wide range of operating and configuration parameters that are set using a DALI configuration tool.

Unfortunately, it is not possible to implement such a comprehensive DALI configuration tool as an embedded web application on the ecos. The DALI device parameters also need to match the planned BACnet lighting control application on the freely programmable ecos504/505 which means that the DALI parameters cannot be set independently of the CASE Engine function diagram. Requests have also been made to be able to set all parameters via Ethernet, via ecos (mass configuration). In Version 3.0, we have taken the first step in this direction.

In summary, the following new functions are available for ecos-DALI with protocol firmware V3.0 and ecos-FW V5.1:

- **DALI Multi-Master:**
With the ecos505, two DALI modules, each with 256 channels, can integrate a DALI network
Advantage: **more DALI data points per station.** Existing DALI networks that are equipped with Multi-Master-compatible DALI devices can be extended with the ecos.
- Recording **DALI events** from any input devices in the ecos-DALI module with corresponding CASE Plan
Advantage: Optimising bus communication and **quicker reaction to digital events** (presence, push-buttons) so that **up to 32¹⁾ DALI input devices** (DALI sensors) can be used per DALI bus.
¹⁾ Theoretically and depending on the DALI bus power supply and bus bandwidth utilisation, up to 64 DALI input devices can also be used per DALI bus.
- **Monitoring DALI bus traffic** via a VPort/Tunnel connection with the expanded ecoSnoopy.
Advantage: Checking DALI bus communication for parameter optimisation or analysing **faults**
- **Generic reading of all parameters** for control gears and input devices
Advantage: Additional DALI parameter information from DALI devices will make it possible, in future, to create a **more efficient DALI tool.**
- **Reading of smart data values** from the latest DALI control gears
Advantage: With support for the additional DALI device type profiles -252 and -253, it is possible to create **energy-efficient and low-maintenance lighting applications.**
- **Controlling emergency lights**
Advantage: With support for DALI device type profiles -202 and -220, DALI control gears for **emergency lighting systems** can be integrated into the programmable ecos.
- Introduction of optional automatic configuration of DALI devices (**mass configuration**) with CASE and BACnet.
- The ecos-DALI commissioning tool (the web-based **ecos-DALI-CT**) has been adapted to the ecos-DALI protocol firmware V3 and **simplified.**

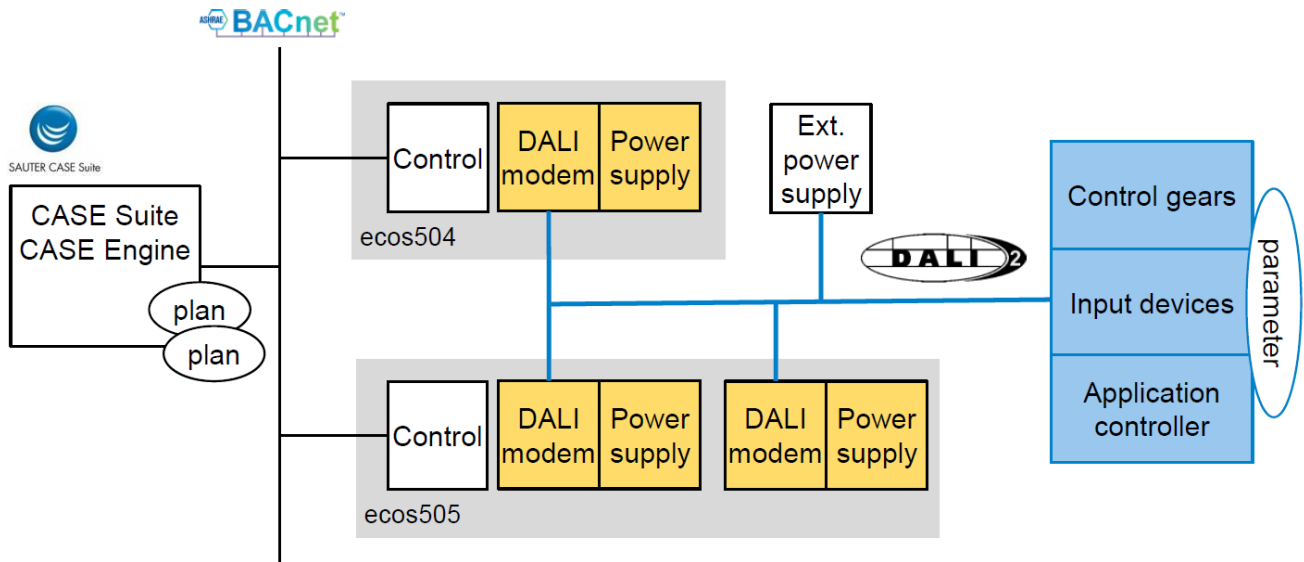
Note:

A comprehensive DALI function and parameter list supported with V3.0 is provided as an FAQ.

5. ecos-DALI V3 – in detail

5.1 ecos-DALI as a DALI Multi-Master

The DALI module can be used as a DALI Multi-Master. As a programmable BACnet station, the ecos504/505 with DALI constitutes a DALI Multi-Master Controller with DALI power supply.

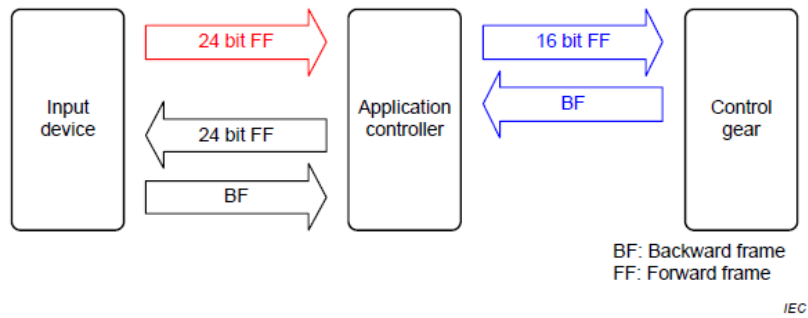


Examples of use:

- Parallel switching of two DALI interfaces on one ecos50x to a DALI network has now been comprehensively tested and approved, meaning that the number of usable DALI channels per DALI network can be increased (2x 256 channels).
- The smart DALI power supply can also be maximised (doubled) (2x 116 mA) provided this is only interconnected from an ecos505 (this was also permitted previously).
IMPORTANT: When the internal DALI power supply function is activated or an external power supply is switched on, ensure that the total power supply does not exceed 250 mA.
- A stand-alone DALI lighting solution with DALI-2 devices that are application controllers and support Multi-Master functionality may now be expanded using an ecos504/505.
- Other DALI tools or DALI Multi-Master devices can now be operated in parallel.

5.2 DALI events

As of DALI-2, the DALI bus is Multi-Master-compatible. With event-based 24-bit forward telegrams (24-bit FF), multiple DALI devices can send telegrams to the bus. This is important for DALI push-buttons or presence sensors in particular, as it enables them to send their action to the bus immediately, meaning that the **event** to switch on the light or detect digital inputs is received by the application controller **quickly, without polling**.



Communication between bus units (example)

With the ecos-DALI V3, the DALI module supports receipt of these 24-bit forward frames (red arrow) from DALI devices pursuant to standard -103 (control device/input device) and device types -301, -302, -303, -304 (~DALI-2 sensors). Events from sensor instances without DALI-2 -30x function profile (such as temperature, humidity, air pressure, air quality) can be integrated with the generic event mechanism pursuant to -103.

To ensure that the DALI sensors send events by themselves, the DALI devices must have the correct parameters set. The DALI sensors generally come with good standard parameters. Some manufacturers deliver the same device types with corresponding preconfigurations. For the application example using eco-DALI, the sensors should be used as instance sensors; usually with a deactivated application controller function.

Here are some examples from manufacturers:

LUNATONE: “Instance mode” sensors

ESYLUX or NIKO: “BMS” types

STEINEL: “DALI-2 input device” (not “APC”)

As events from sensor instances can now be evaluated by ecos-DALI, these sensors must have the event mechanism activated. The sensors can send events, but the ecos-DALI Master can also continue to poll the sensor instances (as previously possible with ecos-DALI V2). Depending on the application, is it sensible to record an event, primarily for presence and push-buttons and to poll a sensor instance, perhaps for values such as light intensity (LUX) or other analogue values that do not change quickly (such as temperature).

5.2.1 DALI events – basics

The event mechanism is explained here using the example of a LUNATONE multi-sensor and its DALI tool (DALI Cockpit).

A DALI-2 sensor as the control device can be assigned in up to 32 (sensor device) groups (0); these groups can be used with events.



Device Info

Name	DALI-2 CS THP AQ	Artikelnummer	86457786-INT-AQ-LE	GTIN	9010342013546
Hersteller	Lunatone	Seriennummer	14129	FW	5.0
Device Type	-	Type	Control Device		
DALI Ver	V2.0	Short Address	(A10 ²) DALI-2 CS THP AQ	Set	

Allgemein Instanzen Übersicht

Gerätebeschreibung

DALI-2 CS allgemeine Eigenschaften

rote LED bei Bewegung einschalten

Synchronisation mit DALI CS (eDALI)

DALI-2 Steuergeräteeinstellungen

power cycle notification aktiviert

▲ Zugehörigkeit zu Gruppen für DALI-2 Steuergeräte (0)

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

A DALI (multi-)sensor can have multiple sensor instances (1) (iN: instance number or instance address).



Device Info

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Hersteller	Lunatone	Seriennummer	14129	FW	5.0
Device Type	-	Type	Control Device		
DALI Ver	V2.0	Short Address	(A10 ²) DALI-2 CS THP AQ	Set	

Allgemein Instanzen Übersicht

Instanznummer [iN]: 0 (1)

(2) Instanz Typ [iT]: (3) 3 - Occupancy sensor

Event Nachrichten aktivieren

Primäre Instanzgruppe [iG]: Keine Instanzgruppe 1 [iG]: Keine Instanzgruppe 2 [iG]: Keine

Event Schema: (4) Geräte Adressierung Event Priorität: (5b) Priorität 4

Event Filter (5a)

Besetzt

Unbesetzt

noch Besetzt/Unbesetzt

Bewegung

keine Bewegung

Timer (6)

Totzeit 0.00 s

Reportzeit 0 s

Haltezeit 1 s

Each instance is defined by an instance type [iT] (3) (type 0 = generic sensor (e.g. for temperature), type 1 = push-button, type 2 = absolute input, type 3 = presence sensor, type 4 = light sensor). To ensure that the sensor instance sends an event, the event message must be activated (2). Each instance can be assigned to an instance group (primary, iG1, iG2) (e.g. for linking multiple presence sensors for a room). Only the primary instance groups use the grouping of instances with events.

The event is sent using an event scheme (4); the sensors use the “instance addressing” scheme by default, which is not logical for our application case and is not supported by the ecos-DALI. Consequently, the instance must be set with the “device addressing” scheme (event is sent with device address and instance type) or the “device/instance addressing” scheme (event is sent with

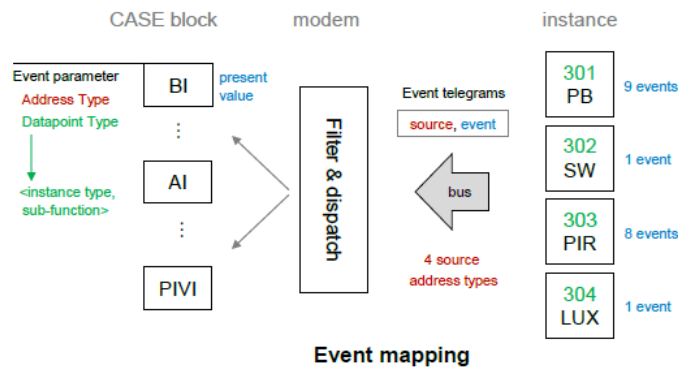
device and instance address) in the DALI devices and adjusted correspondingly in the CASE Engine plan.

Event Schema:

Geräte Adressierung	Communication direction	Read	0
Instanz Adressierung	DALI address	0	0
Geräte Adressierung	DALI address type	Event:devAddr/inst Type	0
Geräte / Instanz Adressierung	DALI2 instance address/group	Short address	0
Gerätegruppen Adressierung	Datapoint type	Event:devAddr/instAddr	0
Instanzgruppen Adressierung	Query interval[s]	Event:devGroup/inst Type	0
		Event:instGroup/inst Type	0

The other two event schemes are for advanced, sophisticated DALI sensor applications in which the event is sent with device groups or instance group addresses. The “device/instance addressing” event scheme can be used to integrate any types of sensor with the generic event mechanism (according to -103); however, for this, the instance address of the sensor must be known.

The configured event scheme for the DALI sensor must match the configuration of the DALI module and the data type in the BACnet object so that the event can be mapped by the module to the right BACnet object:



The **event filter (5a)** defines the sensor actions for which an event is sent. The **event priority (5b)** defines how quickly the DALI device, as the master, can occupy the bus and how long it must wait. We recommend leaving the manufacturer’s default settings.

Finally, the sensor parameters (6) of the respective sensor profile (-30x) still need to be set in line with the standard; the figure shows the example of a light sensor (-304) with **parameters** such as **timer** or **hystereses**.

Instanznummer [iN]: 1

Instanz Typ [iT]: 4 - Light sensor

Event Nachrichten aktivieren

Primäre Instanzgruppe [iG]: Keine

Instanzgruppe 1 [iG]: Keine

Instanzgruppe 2 [iG]: Keine

Event Schema: Geräte Adressierung

Event Priorität: Priorität 4

Event Filter: Beleuchtungsstärke

Timer: Totzeit 0.80 s

Reportzeit unused s

Hysteresis Schleife: Hysteresis Min 5 Lux

Hysteresis 5 %

Licht Sensor Kalibration...

For the application of a quick-monitored presence change, the holding period (hold timer) of a motion detector (-303) is often adjusted from the standard setting of 15 minutes to one minute or even a few seconds.

Timer	Timer
Totzeit 0.10 s	Totzeit 0.10 s
Reportzeit 0 s	Reportzeit 0 s
Haltezeit 15:00 min	Haltezeit 10 s

5.2.2 Engineering DALI events – notes

- The parameters, the event scheme and whether the sensor is used per event or with polling must be planned for the application in advance.
- The use of events enormously reduces the work of the DALI bus and can be used for quick sensor actions, such as presence, push-buttons or even accurate lighting control.

Using events makes it possible to raise the maximum number of sensors used per DALI bus from 8 to around 32. The logical maximum is 64 sensors, provided there is a sufficient DALI bus power supply. As a sensor uses 5–10 mA, a max. DALI bus power supply of 250 mA means that it would only be theoretically possible to use 25–50 sensors (without DALI ballast; 2 mA per control gear).

- The figure below shows the possible recommended event settings that can be set for a BACnet object as a DALI data point type with CASE Engine:

Multi-sensor	CASE: Data point for third-party system parameter			
Sensor instance DALI-2 profile	Data point type	Address type	Address	Instance address/ group
301 push-button	DALI-2 events BUTTON	Event:devAddr/instTyp	devAddr	instAddr
	DALI-2 events BUTTON PRESS		devAddr	
302 Absolute input device	DALI-2 events ABS IN	Event:devAddr/instAddr	devAddr	
303 Occupancy sensor	DALI-2 events MOV	Event:devGroup/instTyp	devGroup	
	DALI-2 events PIR	Event:instGroup/instTyp	instGroup	
304 Light sensor	DALI-2 events LUX			
Without profile	DALI-2 events 3xx Generic	Event:devAddr/instAddr	devAddr	instAddr

- When polling a sensor instance, the bit length of the sensor value must be known and configured in the BACnet data point type. This was already possible with ecos-DALI V2. The figure shows polling of a 14-bit lux value for the THEBEN TheRonda, with the [DALI2-sensor LUX](#) data point type.

Connection				
AI				
Module	Channel			
1 (COM) CM550	101	Import		
Name	Value	Min	Max	Description
Channel number	101	0	255	Channel number (0..255)
Communication direction	Read	0	1	Communication direction, view of AS (0=Read, 1=Write)
DALI address	0	0	63	POLLING:Short address[0..63] or group address[0..15] EVENT
DALI address type	Short address	0	6	Type of the specified DALI address or event source.
DALI2 instance address/group	I-0	0	31	POLLING:Instance address in DALI2-sensor EVENTS:instance
Datapoint type	DALI2-Sensor LUX	0	255	DALI datapoint type.
Query interval[s]	300	0	65535	Time interval [1..65535s] for DALI datapoint polling.
Query Priority	normal	0	2	Priority of DALI datapoint polling.
Data type AS [Vas]	Float32	0	2	Data type of value on automation station
Scaling[A]	1			Scaling[A] of data value - Vfs=A*Vas+B
Offset[B]	0			Offset[B] added to data value - Vfs=A*Vas+B
Resolution/Command/SmartData	14Bit Q24_301-Query REPEAT TIMER			Resolution of DALI2 device instance / DALI command opcode

- The DALI-2 light sensor **event** information (**-304**) is **always sent as a 10-bit value (0–1023)**. This event value can be read in with the [DALI2-events LUX](#) data type in the AI or PIVI object.

Event 304		304-LUX	AI, PIVI
0	Luminance Level 0	x	0
1	Luminance Level 1	x	1
...
1023	Luminance Level 1023	x	1023

Datapoint type for 304 events

Datapoint type	DALI2-Events LUX
Query interval[s]	DALI2-Sensor LUX
Query Priority	DALI2-Sensor MOV
Data type AS [Vas]	DALI2-Events BUTTON
Scaling[A]	DALI2-Events BUTTON PRESS
Offset[B]	DALI2-Events ABS IN
	DALI2-Events PIR
	DALI2-Events MOV
	DALI2-Events LUX
	DALI2-Events 3xx Generic

The resolution of the scaled LUX value may be lower and the event value must be multiplied accordingly; e.g. in the case of the THEBEN TheRonda: value multiplied by $2^4 = 16$ (max. resolution 16 lux) [Theben, [theRonda P360 DALI-2 S manual](#)]

- DALI-2 Push-Buttons (**-301**) have different values in the event information (0–15) depending on action. These values can be read into the standard BACnet objects with [DALI2-events BUTTON](#) or [DALI2-events BUTTON PRESS](#) data types.

Event 301	301-evBUT	BI, AI, PIVI	301-evPRESS	AI, PIVI, MI
0	Button released	x	0	
1	Button pressed	x	1	
2	Short press		x	2
5	Double press		x	5
9	Long press start		x	9
11	Long press repeat		x	11
12	Long press stop		x	12
14	Button free		x	14
15	Button stuck		x	15

Datapoint types for 301 events

Datapoint type	DALI2-Events BUTTON
Query interval[s]	DALI2-Events BUTTON
Query Priority	DALI2-Events BUTTON PRESS
Data type AS [Vas]	DALI2-Events ABS IN
Scaling[A]	DALI2-Events PIR
	DALI2-Events MOV
	DALI2-Events LUX
	DALI2-Events 3xx Generic

- DALI-2 absolute value input devices (**-302**) provide 10-bit values (0–1023) as event information, that are read in using the [DALI2-events ABS IN](#) data type.

Event 302	302-evABS	AI, PIVI	BI
0	Position 0	x	0
1	Position 1	x	1
...
1023	Position 1023	X	1023

Datapoint type for 302 events

- The event information (0–15) for a DALI-2 presence or motion sensor (**-303**) is mapped as follows with [DALI2-events PIR](#) or [DALI2-events MOV](#).

Event 303		poll	303-evPIR	BI	AI, PIVI	303-evMOV	AI, PIVI, MI		
0	0+0+0	Presence sensor	vacant,no move	00	X	0	0	X	1
1	0+0+1		vacant,move	55	X	0	0	X	2
4	0+4+0		still vacant,no move		X	0	0	X	1
5	0+4+1		still vacant,move		X	0	0	X	2
2	0+2+0		occupied,no move	AA	X	1	1	X	3
3	0+2+1		occupied,move	FF	X	1	1	X	4
6	0+6+0		still occupied,no move		X	1	1	X	3
7	0+6+1	still occupied,move		X	1	1	X	4	
8	8+0+0	Motion sensor	vacant,no move	00	X	0	0	X	1
9	8+0+1		vacant,move	55	X	0	0	X	2
12	8+4+0		still vacant,no move		X	0	0	X	1
13	8+4+1		still vacant,move		X	0	0	X	2
10	8+2+0		occupied,no move	AA	X	1	1	X	3
11	8+2+1		occupied,move	FF	X	1	1	X	4
14	8+6+0		still occupied, no move		X	1	1	X	3
15	8+6+1	still occupied, move		X	1	1	X	4	

Datapoint types for 303 events

- The event information from a generic event (**-103**) is also a 10-bit value (0–1023) and is mapped with [DALI2-events 3xx Generic](#). This data point type is used for DALI-2 multi-sensor instances such as temperature, CO₂ and other values. The scaling of the 10-bit value to a physical value with a unit must be done using the respective data sheet or manual from the sensor manufacturer.
- The DALI module evaluates all events efficiently and forwards the information as quickly as possible to the automation station. When an event is received that can be forwarded, the DALI module LED flashes green.
- The DALI device manufacturers often provide the option (via BT app, DALI tool, etc.) of resetting the device to factory settings.
- Additional information on DALI-2 event mechanisms can be obtained from the DALI sensor manufacturers [e.g. Lunatone [Whitepaper M0024: DALI-2 Instances](#)]

5.3 Monitoring DALI bus traffic via IP (VPort/TCP)

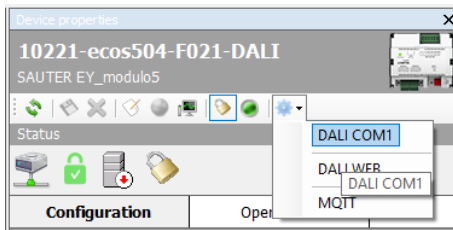
With V5.1, the familiar VPort function (as in M-Bus, Modbus) has also been tested and approved for DALI. The “command-line”-based, SAUTER listening tool known as ecoSnoopy, Version 4 (V4.0.5), has been expanded so that it can be used to monitor DALI bus communication.

The ecoSnoopy tool can be downloaded from the ecos504/505 product Extranet site. We recommend copying the `ecosnoopy.exe` file into the ecosReader tool directory already set up on the service laptop.

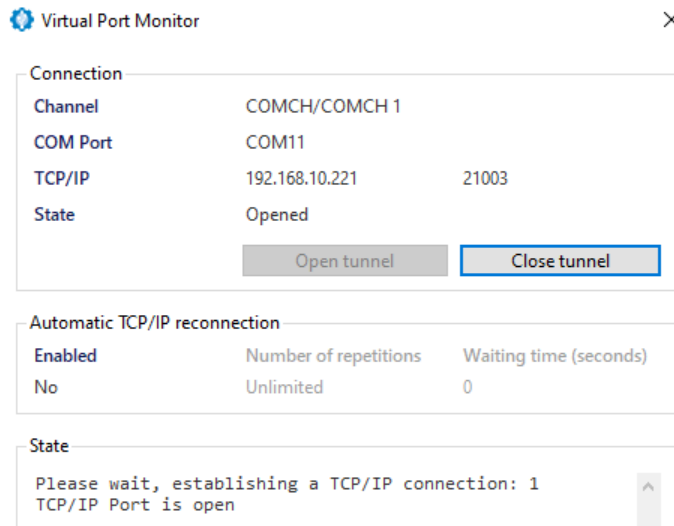
5.3.1 ecoSnoopy for DALI – a step-by-step guide

The following steps are necessary to start DALI bus monitoring with ecoSnoopy:

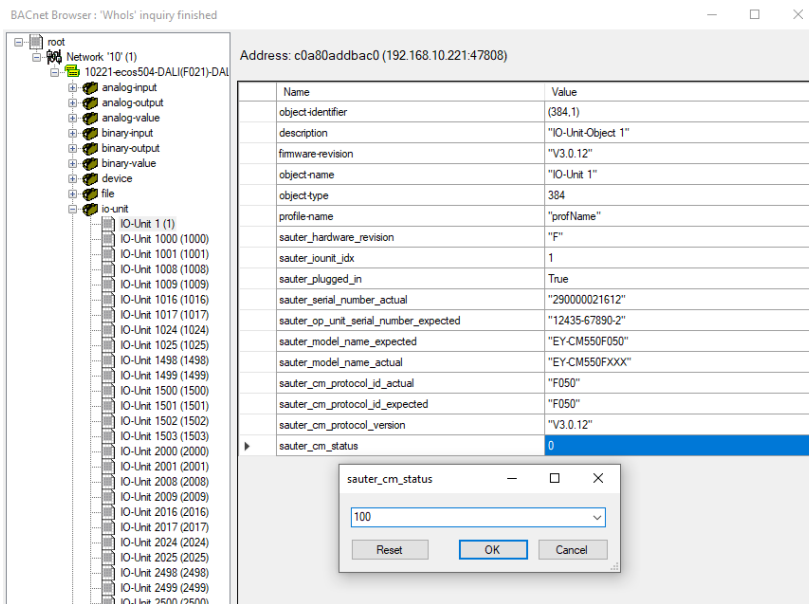
1. Launch the ecos VPort, e.g. with CASE Sun.



2. Check that the tunnel port is open.



3. Using a BACnet browser, the `sauter_cm_status` command is set to 100, meaning that monitoring via VPort/TCP tunnel (Port 20003–5) is activated. (`sauter_cm_status = 32`). Note: With command 101, monitoring via VPort/TCP tunnel is deactivated again (`sauter_cm_status = 0`).



4. Open a command prompt (`cmd.exe`, Windows Command Line window) and call up `ecoSnoopy.exe` with corresponding parameters (see `ecoSnoopy.exe -h`).

```
Sauter EcoSnoopy @COM0 ---- Press: 'q'=stop 'p'=pause 'c'=continue

| Fr. Sauter AG | EcoSnoopy | V4.00.05 | COM11 | Contact: Stefan.Lenk@ch.sauter-bc.com |
|-----|-----|-----|-----|-----|-----|
D:\bin\ecoSnoopy>ecoSnoopy.exe -h
*****
Fr.Sauter AG 2018 -- EcoSnoopy V4.00.05 -- Bus sniffer for ecos50x
*****
USAGE: EcoSnoopy -com=<nr> | -h[elp] [<options>]

<nr>      : COM port number
-h[elp]   : show this help

<options> ::= -native | -csv=<filename> | -mode=<monitor mode>
-native   : simple ASCII output instead of XML
-csv=<filename> : get channel parameters from CSV export file
-out=<filename> : output to file instead stdout
-mode=<monitor mode> : choose monitor mode
              -> MBUS: monitor mode = mode_mbus_raw|mode_mbus_debug|mode_mbus_user(default)
              -> other: no modes
*****
```

e.g. `d:\bin\DALI\ecosnoopy.exe -com=11 -native` gives

```
D:\bin\ecoSnoopy>ecoSnoopy.exe -com=11 -native

| Fr. Sauter AG | EcoSnoopy | V4.00.05 | COM11 | Contact: Stefan.Lenk@ch.sauter-bc.com |
|-----|-----|-----|-----|-----|-----|
|-XACTION/EVENT SEQUENCE-----[REQUEST/EVENT-----[RESPONSE--]-----|
| Nr |RS|ms|R|Chn| Datapoint type | [Type] | Command | Code|DeviceInst|Data |x|Res|Data |x| Errcode |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1|OK| 40|0|102|Loytec LDALI-MS2 MOV | [Std24] QUERY INPUT VALUE | 008c|A0 |INum1 | |OK| 170 aa|
| 2|OK| 54|0|111|DALI2 PIR | [Std24] QUERY INPUT VALUE | 008c|A1 |INum0 | |OK| 0 00|
| 3|E4| 98|0|112|DALI2 LUX | [Std24] QUERY INPUT VALUE | 008c|A0 |INum1 | |OK| 170 aa|
| | | | | | | [Std24] QUERY INPUT VALUE LATCH | 008d|A0 |INum1 | |NOK| NoResp| 00010000|
|--- Modem DALI @ Wed Aug 7 18:33:18 2024 --- #errors: mon=0 com[timeout=1 exception=0 buserr=1]---|
| 4|E4| 37|0|140|DALI2 MOV | [Std24] QUERY INPUT VALUE | 008c|A13|INum1 | |NOK| NoResp| 00010000|
| 5|OK| 40|0|102|Loytec LDALI-MS2 MOV | [Std24] QUERY INPUT VALUE | 008c|A0 |INum1 | |OK| 170 aa|
| 6|OK| 53|0|114|DALI2 PIR | [Std24] QUERY INPUT VALUE | 008c|A1 |INum3 | |OK| 0 00|
| 7|E4| 37|0|140|DALI2 MOV | [Std24] QUERY INPUT VALUE | 008c|A13|INum1 | |NOK| NoResp| 00010000|
| 8|OK| 40|0|102|Loytec LDALI-MS2 MOV | [Std24] QUERY INPUT VALUE | 008c|A0 |INum1 | |OK| 170 aa|
| 9|E4| 37|0|140|DALI2 MOV | [Std24] QUERY INPUT VALUE | 008c|A13|INum1 | |NOK| NoResp| 00010000|
|10|OK| 40|0|102|Loytec LDALI-MS2 MOV | [Std24] QUERY INPUT VALUE | 008c|A0 |INum1 | |OK| 255 ff|
|11|E4| 37|0|140|DALI2 MOV | [Std24] QUERY INPUT VALUE | 008c|A13|INum1 | |NOK| NoResp| 00010000|
|12|OK| 40|0|102|Loytec LDALI-MS2 MOV | [Std24] QUERY INPUT VALUE | 008c|A0 |INum1 | |OK| 255 ff|
|13|E4| 37|0|140|DALI2 MOV | [Std24] QUERY INPUT VALUE | 008c|A13|INum1 | |NOK| NoResp| 00010000|
|14|OK| 40|0|102|Loytec LDALI-MS2 MOV | [Std24] QUERY INPUT VALUE | 008c|A0 |INum1 | |OK| 255 ff|
|15|OK| 54|0|111|DALI2 PIR | [Std24] QUERY INPUT VALUE | 008c|A1 |INum0 | |OK| 0 00|
|16|E4| 98|0|112|DALI2 LUX | [Std24] QUERY INPUT VALUE | 008c|A0 |INum1 | |OK| 255 ff|
| | | | | | | [Std24] QUERY INPUT VALUE LATCH | 008d|A0 |INum1 | |NOK| NoResp| 00010000|
|17|E4| 37|0|140|DALI2 MOV | [Std24] QUERY INPUT VALUE | 008c|A13|INum1 | |NOK| NoResp| 00010000|
|18|OK| 40|0|102|Loytec LDALI-MS2 MOV | [Std24] QUERY INPUT VALUE | 008c|A0 |INum1 | |OK| 255 ff|
|19|OK| 54|0|111|DALI2 PIR | [Std24] QUERY INPUT VALUE | 008c|A1 |INum0 | |OK| 0 00|
```

This example shows: some DALI devices are not connected, as they give no response (NoResp) to a query. For support analysis, the output can be written to a file, e.g.

```
d:\bin\ecoSnoopy\ecosnoopy.exe -com=11 -native -out=dalibuslog.txt
```

```
D:\bin\ecoSnoopy>ecoSnoopy.exe -com=11 -native -out=dalibuslog.txt
Logging to file <dalibuslog.txt>
```

- The “p” button pauses the output, “c” continues it and “q” stops the output/recording.

5.3.2 Explanations of ecoSnoopy for DALI

- The ecoSnoopy for DALI is a monitor with a combined display. The tool displays:
 - a transaction initiated by the module, consisting of one or more DALI bus telegrams (queries or control commands)
 - or
 - a sequence of received events.

Note: The ecoSnoopy for DALI is not a DALI bus sniffer in the conventional sense, but rather a recorder of DALI telegrams from the station.

- The monitor displays the DALI standard telegrams (16/24 bit) as well as the proprietary eDALI25 (Tridonic) and eDALI25 (Lunatone), Helvar17 and OSRAM24 dialects.
- The red lines display a DALI communication with errors, e.g. in the event of defective or unavailable DALI devices
- The blue intermediate lines add up the errors since the start of monitoring, around every 30 seconds
- Every now and then, the header for the structured log is output:

```
-XACTION/EVENT SEQUENCE-----[REQUEST/EVENT-----[RESPONSE--]-----
Nr |RS| ms |R|Chn| Datapoint type |Type | Command Code|DeviceInst|Data x|Res|Data x| Errcode
-----
1|OK| 40|0|102|Loytec LDALI-MS2 MOV |Std24|QUERY INPUT VALUE 008c|A0 |INum1 | |OK |170 aa|
```

- The meaning of the DALI monitoring output is explained in the table below:

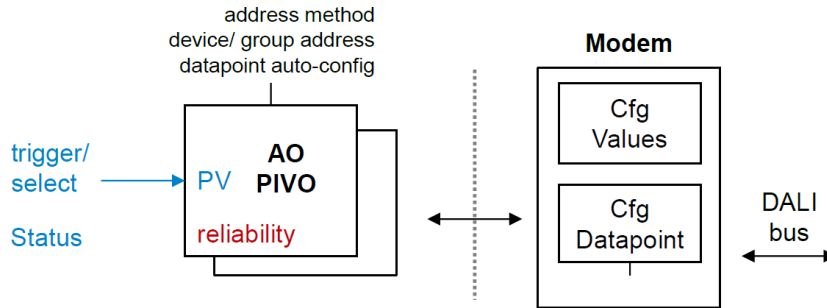
		Transaction/Telegram	Event
XACTIO/EVENT SEQUENCE	No.	Sequential number of monitoring telegram (not bus telegram!)	
	RS	Summary of outcome of a transaction (OK En] n=Error vector, Bit0=Invalid data (internal error) Bit1=Query error Bit2=Response error	OK
	ms	Duration of transaction execution in [ms]	0
	R	Retry counter for total transaction (not individual telegram)	-
	Chn	Channel number of CASE module that initiates the transaction	Number of CASE modules that receive the event.
	DPT	Data point type of CASE module	Channel numbers of receiving modules
REQUEST/EVENT	Type	Telegram type (DAPC, Std16, Spcl16, Std24, Lun25, eDALI, etc.)	Event source address scheme ev301, ev302, ev303, ev304, ev3xx
	Cmd	Command name	Address scheme A_IT, A_IN, G_IT, IGIT, ITIN
	Code	Code (Hex) for command	Description of event and three raw event bytes (hexadecimal)
	Dev/I	Device address/Instance number	Detailed source address information Ax INumy, Ax ITypy, Gx ITypy, IGx ITypy, ITx INumy
	Data x	Data value (decimal, hexadecimal)	10-bit event data value (decimal)
RESPONSE	Res	Response result [OK, NOK]	
	Data x	Response value (decimal, hexadecimal) or YES/NO	
	ErrC	Detailed error code for RS as status bit array	

- In the event of DALI bus communication problems, this recording can be analysed and the necessary measures derived from this (→ support).

5.4 Automatic configuration of DALI devices with CASE and BACnet

With ecos-DALI V3, optional automatic configuration of DALI devices has been introduced. This allows the parameters for the device types connected to the DALI bus to be set (mass configuration).

The principle can be mapped as follows.



Overview auto-configuration

The DALI configuration parameters for the respective device types (-102, -2xx) and instance types (-103, -3xx) can be sent via broadcast, group address or an individual address with a BACnet object trigger (AO, PIVO) to the DALI devices connected to the DALI network. The DALI module automatically configures the DALI devices with the preset values in the module configuration table.

5.4.1 CASE Engine DALI device parameters

In the module configuration, CASE Engine with protocol firmware V3.0 for EY-CM550 provides all the parameters for the supported device types (102, 2xx) and instance types (103, 3xx) in a global “DALI Device Parameter” table.

Configuration third-party protocol modules

Name	Default value	Min	Max	Description
DALI bus power supply	on	0	1	Turn on/off the internal DALI bus power supply (max. 116mA). ATTENTION: max. 250mA
102-groups	on			Control gear: Configuration of device groups according to groups table.
102-scenes	NoConfig			Control gear: Configuration of scenes according to scene table(not yet available).
102-powerOnLevel	Off			Control gear: Lamp light level after a power cycle [%]. Applies for all device types(2xx). Required for power-on col...
102-systemFailureLevel	1.018			Control gear:Light level after DALI system failure[%]. Applies for all device types(2xx). Required for system-failure ...
102-minLevel	0.100%			Control gear: Lamp minimum light level[%]. Possible values depend on physical minimum and the maxLevel setting.
102-maxLevel	100.0(def)			Control gear: Lamp maximum light level [%]. Possible minimum value depends on minLevel settings.
102-fadeRate	NoConfig			Control gear: Speed of a lamp fade (fade rate [dim steps/s]).
102-fadeTime	Normal: 0.7 s			Control gear: Duration of a lamp fade (normal/extended fade time).

The selected parameters for the device types are loaded into the DALI module with a CASE Engine program download as a “global” parameter table. Using a BACnet object, the configuration or parts of the configuration table can trigger the automatic parameterisation of the DALI devices.

Possible example of DALI push-button configuration (-301):

301-instanceActive	On			Push button: Instance active (events enabled).
301-eventScheme	DeviceAddr InstAddr			Push button: Source address scheme used in events.
301-eventPriority	NoConfig			Push button: Priority of events.
301-eventFilter	Press			Push button: Select which events are sent [evPress evShort evLong evLongRpt evDouble evStuck].
301-eventShortPressTimer	NoConfig			Push button: Duration of short button press (Short press timer). Minimum value depends on sensor device.
301-eventDoublePressTimer	NoConfig			Push button: Duration of double button press (Double press timer). Minimum value depends on sensor device.
301-eventRepeatLongTimer	NoConfig			Push button: Time in between repetition events for long button press (repeat timer).
301-eventStuckTimer	NoConfig			Push button: Duration of pressed button until stuck: event (Stuck timer).

Explanation: The instance mechanism is activated with the “DeviceAddr/InstAddr” event scheme, but only the “Press” event filter is used. As the DALI push-button has multiple type-301 instances, the dedicated device push-buttons can be distinguished by instance address.

Possible example of DALI presence sensor configuration (-303):

303-instanceActive	On(def)	↓		Occupancy sensor: Instance active (events enabled).
303-eventScheme	DeviceAddr/Inst.Type	↓		Occupancy sensor: Source address scheme used in events.
303-eventPriority	NoConfig	↓		Occupancy sensor: Priority of events.
303-eventOccupancyMove	NoConfig	↓		Occupancy sensor: Configuration of occupancy-, vacant-, movement-, no movement events.
303-eventDeadtime	NoConfig	↓		Occupancy sensor: Minimum time between events (deadtime timer).
303-eventHold	10s	↓		Occupancy sensor: Duration of occupancy after movement (Hold timer).
303-eventRepetition	20s(def)	↓		Occupancy sensor: Repetition of occupied and vacant events (still vacant, still occupied).
303-detectionRange	NoConfig	↓		Occupancy sensor: Detection range [%] (optional).
303-detectionSensitivity	NoConfig	↓		Occupancy sensor: Detection sensitivity [%] (optional).
303-acousticSensitivityLoytec	NoConfig	↓		Loytec Occupancy sensor: Acoustic detection sensitivity [%].

Explanation: The holding period is set to 10s, the instance mechanism is activated with the “DeviceAddr/InstType” event scheme.

Notes:

- The pull-down menus have fixed values that correspond to the enumeration and values of the DALI standard. This saves a lot of memory space and resources on the DALI module.
- All parameters with the value “NoConfig” are not changed.
- Values with added text “(def)” (“=default”) are the standard parameter values of the DALI standard.

5.4.2 Configuration trigger, configuration status, addressing, reliability

The auto-configuration is controlled by function modules in a CASE plan. [A BACnet output module \(AO, PIVO\) enables the triggering](#) of the device configuration by writing a current value (PV). The PV selects [which parts of the parameter table](#) are to be configured. The [device addressing specified](#) in an auto-configuration output module (AO, PIVO) determines which DALI devices the configuration is actually programmed for.

The “DALI address type” and “DALI address” parameters of the output object allow for the following addressing schemes:

- Device Broadcast: All devices are programmed.
- Individual device address: Only devices with a specific address are programmed.
- Group addressing: Only devices in the specified group are programmed.

The screenshot shows the 'Properties - PIV_1' dialog box. The 'Third-party connection' section is active, showing a connection to module '1 (COM) CM550' on channel '199'. The parameter table below is as follows:

Name	Value	Min	Max	Description
Channel number	199	0	255	Channel number (0..255)
Communication direction	Write	0	1	Communication direction, view of AS (0=Read, 1=Write)
DALI address	0	0	63	POLLING: Short address[0..63] or group address[0..15] EVENTS: Short address[0..63] or sensor device group[0..31].
DALI address type	Broadcast	0	6	Type of the specified DALI address or event source.
DALI2 instance address/group	I-0	0	31	POLLING: instance address in DALI2-sensor EVENTS: instance address or -group. (e.g. polling for generic DALI2 PIR/LUX/MOV, Theb
Datapoint type	Auto-Config	0	255	DALI datapoint type.
Query interval[s]	0	0	65535	Time interval [1..65535s] for DALI datapoint polling.
Query Priority	normal	0	2	Priority of DALI datapoint polling.
Data type AS [Vas]	Unsigned32	0	2	Data type of value on automation station
Scaling[A]	1			Scaling[A] of data value - Vfs=A*Vas+B
Offset[B]	0			Offset[B] added to data value - Vfs=A*Vas+B
Resolution/Command/SmartData	Undefined			Resolution of DALI2 device instance / DALI command opcode used in generic Query-16Bit or Query-24Bit/ Smart data value selector. F

Below the parameter table is a table for trigger conditions:

Parameter	Value	Unit
Trigger Condition	on-update	
interval	0	ms
minimal interval	100	ms

Notes:

- In the case of individual and group addressing, the module uses the specified address for both operating devices (control gears) and for control devices/input devices.
- The user must ensure that they select the desired address space with the corresponding PV values for triggering.
- Group addressing requires the groups to have been programmed in advance.

The “reliability” of the output block shows whether a PV trigger has successfully launched a device configuration. The “reliability” of an auto-configuration output module indicates incorrect usage. This can be a non-specified PV value or a trigger that continues to run during a configuration. In these cases, the reliability shows COM_ERROR rather than COM_OK.

The table below shows which PV values can be used to trigger the corresponding configuration parameters:

	Trigger	PV	Configure:
Combined			
	All	0	All parameters 101, 102...304, 104
	All system	1	ignored
	All control gear	2	All control gear parameters 102, 201...209,220
	All control device	3	All control device parameters 103, 301...309
	All wireless	4	ignored
	All control gear profiles 2xx	200	All control gear profile parameters 201...209,220
	All instance types 3xx	300	All instance parameters
System			
	101	101	No configuration parameters
Control gear			
IEC 62386	102	102	Basic control gears
	201	201	Fluorescent lamps
	202	202	Self-contained emergency lighting
	203	203	Discharge lamps
	204	204	Low voltage halogen lamps
	205	205	Supply voltage controller for incandescent lamps
	206	206	Conversion from digital signal into d.c. voltage
	207	207	LED modules
	208	208	Switching function
	209	209	Colour control
220	220	Central emergency lighting	
Control devices			
IEC 62386	103	103	Basic control devices
	301	301	Push-button instances
	302	302	Absolute input instances
	303	303	Occupancy sensor instances
	304	304	Lighting sensor instances
Wireless			
	104	104	No configuration parameters

Configuration trigger values

Auto-configuration enables the triggering of the programming of basic parameters for operating devices (-102) and control devices (-103) and of parameters for operating device profiles (-20x) and control device instance types (-30x). Combined triggers trigger the programming of multiple parameter sets. Non-specified, non-supported trigger values are ignored (grey in the table).

A CASE plan can contain multiple auto-configuration output modules for different configuration purposes. The configuration programming is, however, mutually exclusive, i.e. triggers can only start programming if no prior programming is in progress; otherwise, the triggers will be ignored by the module. There is no feedback on programming status and no check as to whether the programming process was successful.

5.4.3 Important additional information

- Configurations that are triggered from various tools, an ecos connected to a DALI line or another DALI tool are not synchronised. In this case, the user is responsible for ensuring that the various configurations do not disrupt one another.
- We recommend following these simple steps:
 1. Install DALI devices
 2. Address DALI (e.g. ecos-DALI-CT or DALI Cockpit)
 3. Set parameters for DALI devices (e.g. DALI Cockpit or ecos-AutoConfig trigger with ecos special plan)
 4. Programming of BACnet/DALI application (CASE Engine)

- Not all parameters can be individually programmed according to the standard: the DALI commands must be sent in a specific sequence (e.g. “PowerOn Level” of colour lamps).

Configuration third-party protocol modules

Protocol		DALI Master			V3.0.14	
Name	Default value	Min	Max	Description		
DALI bus power supply	on	0	1	Turn on/off the internal DALI bus power supply (max. 116mA). ATTENTION: max. 250mA		
102-groups	on			Control gear: Configuration of device groups according to groups table.		
102-scenes	NoConfig			Control gear: Configuration of scenes according to scene table(not yet available).		
102-powerOnLevel	1.018			Control gear: Lamp light level after a power cycle [%]. Applies for all device types(2xx). Required for power-on colour settings.		
102-systemFailureLevel	1.018			Control gear:Light level after DALI system failure[%]. Applies for all device types(2xx). Required for system-failure colour settings.		
102-minLevel	0.100%			Control gear: Lamp minimum light level[%]. Possible values depend on physical minimum and the maxLevel setting.		
102-maxLevel	100.0(def)			Control gear: Lamp maximum light level [%]. Possible minimum value depends on minLevel settings.		
102-fadeRate	NoConfig			Control gear: Speed of a lamp fade (fade rate [dim steps/s]).		
208-downOffThreshold	NoConfig			Switching function: Hysteresis Down switch-off threshold [%].		
208-errorHoldOffTime	NoConfig			Switching function: Minimum load-error time until error is signalled [10s].		
209-powerOnColourType	Tunable white			Colour control: Select the active colour type set after power-on. Programmed together with power-on level.		
209-powerOnColour	Red			Colour control: PowerOn colour for colour type RGBWAF.		
209-powerOnColourTemperature	2000			Colour control: PowerOn colour for colour type tunable white [warm 1000...cold 8000°K].		
209-systemFailureColourType	RGBWAF			Colour control: Select the active colour type set after system failure. Programmed together with system-failure level.		
209-systemFailureColour	Red			Colour control: Colour in case of system failure for colour type RGBWAF.		
209-systemFailureColourTemperature	4000			Colour control: Colour temperature in case of system failure for colour type tunable white.		
209-minColourTemperature	NoConfig			Colour control: Minimum colour temperature [K].		
209-maxColourTemperature	NoConfig			Colour control: Maximum colour temperature [K].		

- A comprehensive list of support parameters and the corresponding DALI commands used in accordance with the standard can be provided where required.
- If required, manufacturer-specific parameters can also be configured for specific DALI devices. As an example, the “acousticSensitivityLoytec” parameter was implemented for LDALI-MS2/4 sensors from LOYTEC.

5.5 Generic reading of all parameters

The DALI module with V3 enables all properties of DALI devices to be read at a lower level with the help of general read commands. They can be used if the module does not offer any specific commands. The table below shows the various types of DALI device properties and the data point types for reading these properties. The data point types (DPTs) in blue are implemented in DALI-V3 and also added to the DPTs in black. DPTs in grey are not supported due to the limited memory of the DALI module.

Device Property		Datapoint type	Parameters
Control gear	Basic device 102	Query-16bit	DevAddr, OpCode
	Application extended 2xx	Query-16bit-ext	DevAddr, OpCode, DevType
	Memory bank	Query-16bit-bank	Bank, Offset, Size
Input device	Basic device 103	Query-24bit	DevAddr, 0xFE, OpCode
	Basic instance 103	Query-24bit	DevAddr, InstAddr, OpCode
	Application extended 3xx	Query-24bit-ext	DevAddr, InstAddr, OpCode, DevType
	Memory bank	Query-24bit-bank	Bank, Offset, Size

Device properties and generic read commands

These queries can be executed with AI, PIVI BACnet objects. The corresponding, supported OpCode parameters are stored as a list in the “Resolution/Command/SmartData” parameter. If required, a comprehensive list can be provided.

Block Definitions Connection Display Parameter Inputs Data source Data target Trend Logs Time profiles

AS<->AS
 Third-party connection

Third-party connection

Real feedback

Connection	Module	Channel
PIV	CM550	166

Module: 1 (COM) CM550 Channel: 166 Import

Name	Value	Min	Max	Description
Channel number	166	0	255	Channel number (0..255)
Communication direction	Read	0	1	Communication direction, view of AS (0=Read, 1=Write)
DALI address	0	0	63	POLLING:Short address[0..63] or group address[0..15] EVENTS:Short address[0..63] or sensor device group[0..15]
DALI address type	Short address	0	6	Type of the specified DALI address or event source.
DALI2 instance address/group	I-0	0	31	POLLING:Instance address in DALI2-sensor EVENTS:instance address or -group. (e.g. polling for generic DALI2-sensor)
Datapoint type	Query-24Bit	0	255	DALI datapoint type.
Query interval[s]	Tridonic MSensor02 5DPI - LUX Helvar312 - LUX	0	65535	Time interval [1..65535s] for DALI datapoint polling.
Query Priority	Query-24Bit	0	2	Priority of DALI datapoint polling.
Data type AS [Vas]	Query-16Bit SmartDataValue	0	2	Data type of value on automation station
Scaling[A]	1			Scaling[A] of data value - Vfs=A*Vas+B
Offset[B]	0			Offset[B] added to data value - Vfs=A*Vas+B
Resolution/Command/SmartData	Undefined			Resolution of DALI2 device instance / DALI command opcode used in generic Query-16Bit or Query-24Bit/ SmartDataValue

Q16_SCENE_LEVEL_15
Q16_GROUPS_0_7 | Smart206-LightSrc_StartCoun
Q16_GROUPS_8_15 | Smart206-LightSrc_StartCoun
Q16_RANDOM_ADDRESS_H | Smart206-LightSrc
Q16_RANDOM_ADDRESS_M | Smart206-LightSrc
Q16_RANDOM_ADDRESS_L | Smart206-LightSrc
Q24_DEVICE_STATUS
Q24_APPLICATION_CONTROLLER_ERROR
Q24_INPUT_DEVICE_ERROR
Q24_MISSING_SHORT_ADDRESS
Q24_VERSION_NUMBER
Q24_NUMBER_OF_INSTANCES
Q24_CONTENT_DTR

This “Generic reading of all DALI device parameters” function forms the basis for a future CASE DALI tool. This function is not required with a customary lighting application.

5.6 Reading of smart data values

The DALI standard defines different types of informative data via the ballast, light source and lamp. The following smart data categories are defined:

- IEC62386-102 Basic Operating Device and Lighting Information (Bank 0 and 1)
- IEC62386-251 Lighting Data for Asset Management (DT50 - Bank1-Expansion)
- IEC62386-252 Energy Reporting Data (DT51 – Bank 202–204)
- IEC62386-253 Diagnostics and Preventive Maintenance Data (DT52, Bank 205–207)

whereby the definitions for the maintenance data relate to a separate IEC standard for luminaire performance IEC62722.

The data in each category is saved in a series of device memory banks. Not all data is mandatory; there are optional and mandatory memory banks. The smart data is provided by a device with a minimum refresh rate of 30s.

The DALI standard defines possible units and value ranges for all data. The data units are determined for a specific device, i.e. different devices can provide data in different units, but the units provided by a device cannot change over time. In order to ensure secure reading of smart data from a memory bank, the DALI standard defines different mechanisms (latching, MASK, TMASK).

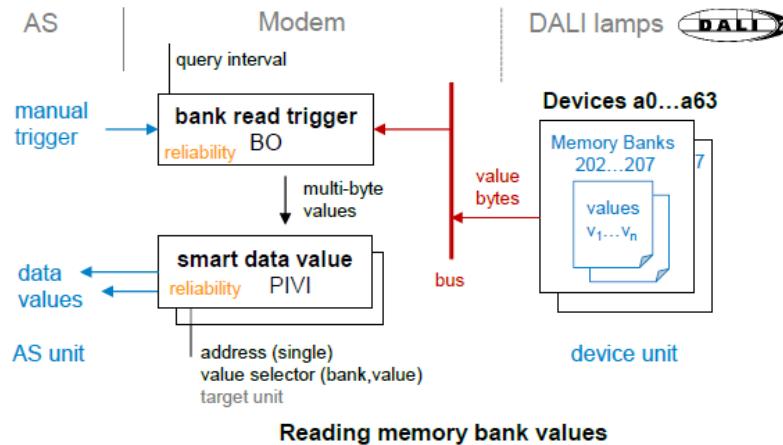
The smart data is used to monitor energy consumption and the technical status of the DALI devices. As such, they are not part of the actual lighting control function and have lower priority. The following assumptions are made for using DALI smart data:

- **Low frequency:** The reading of smart data is not required very frequently, generally daily.
- **Not time critical:** There are no strict time requirements as to when smart data readout results are available.

- **Triggered in real time:** Readings are always required at a specific point in time (e.g. always at midnight). Therefore, the readings are only triggered by the application. Readings are not retrieved automatically on a regular basis; they can be retrieved with a BACnet scheduler at application level.
- **Simultaneousness:** The values for a category are recorded at the same time in all devices.
- **Non-intrusive:** The reading of smart data should not, as far as possible, impair lighting control functionality.

5.6.1 Smart data reading with ecos-DALI V3

The figure shows the functional principle for reading smart data implemented with ecos-DALI V3:



The reading of smart data is manually triggered by a “SmartDataReadTrigger” module (BO). A function module triggers the one-off reading of all values in all memory banks in all devices that are actually referenced in the CASE plan (via smart data input modules). The “SmartDataReadTrigger” locks the memory banks in all devices using broadcast commands. The query interval parameter reflects the time between the memory bank read accesses.

Connection				
BO				
Module	Channel			
1 (COM) CM550	4	Import		
Name	Value	Min	Max	Description
Channel number	4	0	255	Channel number (0..255)
Communication direction	Write	0	1	Communication direction, view of AS (0=Read, 1=Write)
DALI address	0	0	63	POLLING:Short address[0..63] or group address[0..15]
DALI address type	Broadcast	0	6	Type of the specified DALI address or event source.
DALI2 instance address/group	!-0	0	31	POLLING:Instance address in DALI2-sensor EVENTS
Datapoint type	SmartDataReadTrigger	0	255	DALI datapoint type.
Query interval[s]	15	0	65535	Time interval [1..65535s] for DALI datapoint polling.
Query Priority	normal	0	2	Priority of DALI datapoint polling.
Data type AS [Vas]	Boolean	0	2	Data type of value on automation station
Scaling[A]	1			Scaling[A] of data value - Vfs=A*Vas+B
Offset[B]	0			Offset[B] added to data value - Vfs=A*Vas+B
Resolution/Command/SmartData	Undefined			Resolution of DALI2 device instance / DALI command c

“Smart Data Value” input modules (PIVI) each select a specific value from a part of the smart data of a specific device (with given address). The “SmartData” parameter selects the desired “SmartXXX-YYY” value.

Third-party connection

Real feedback

Connection

PIV

Module: 1 (COM) CM550 Channel: 221 Import

Name	Value	Min	Max	Description
Channel number	221	0	255	Channel number (0..255)
Communication direction	Read		1	Communication direction, view of AS (0=Read, 1=Write)
DALI address	0	0	63	POLLING:Short address[0..63] or group address[0..15] EVENTS:Short address[0..63] or sensor device group[0..31].
DALI address type	Short address		6	Type of the specified DALI address or event source.
DALI2 instance address/group	I-0	0	31	POLLING:Instance address in DALI2-sensor EVENTS:Instance address or -group. (e.g. polling for generic DALI2 PIR/LUX/MOV. The
Datapoint type	SmartDataValue		255	DALI datapoint type.
Query interval[s]	65	0	65535	Time interval [1..65535s] for DALI datapoint polling.
Query Priority	normal		2	Priority of DALI datapoint polling.
Data type AS [Vas]	Unsigned32		2	Data type of value on automation station
Scaling[A]	1			Scaling[A] of data value - Vfs=A*Vas+B
Offset[B]	0			Offset[B] added to data value - Vfs=A*Vas+B
Resolution/Command /SmartData	Smart205-ControlGear_OperatingTime			Resolution of DALI2 device instance / DALI command opcode used in generic Query-16Bit or Query-24Bit / Smart data value selector.

Resolution/Command /SmartData dropdown menu items:

- Q24_303-Query REPORT TIMER
- Q24_303-Query CATCHING
- Q24_304-Query HYSTERESIS MIN
- Q24_304-Query DEADTIME TIMER
- Q24_304-Query REPORT TIMER
- Q24_304-Query HYSTERESIS
- Smart202-ActiveEnergy
- Smart202-ActivePower
- Smart203-ApparentEnergy
- Smart203-ApparentPower
- Smart204-LoadsideEnergy
- Smart204-LoadsidePower
- Smart205-ControlGear_OperatingTime
- Smart205-ControlGear_StartCounter
- Smart205-ControlGear_ExternalSupplyVoltage
- Smart205-ControlGear_ExternalSupplyVoltageFrequency
- Smart205-ControlGear_PowerFactor
- Smart205-ControlGear_Temperature
- Smart205-ControlGear_OutputCurrentPercent
- Smart206-LightSrc_StartCounterRst
- Smart206-LightSrc_StartCounter
- Smart206-LightSrc_OnTimeRst
- Smart206-LightSrc_OnTime
- Smart206-LightSrc_Voltage
- Smart206-LightSrc_Current
- Smart206-LightSrc_Temperature
- Smart207-RatedMedianUsefulLifeLuminaire
- Smart207-InternalCgReference Temperature
- Smart207-RatedMedianUsefulLightSourceStarts
- Undefined

The input blocks are updated via the Read Trigger module. The values are transferred as raw values with ecos-DALI V3.0. A target unit parameter for the desired unit for the automation station is not implemented.

The reliability parameter displays the successful reading of smart data. The reliability value of a Read Trigger is “communication ok”, if all data in all reference devices has been successfully read; otherwise, it is a “communication error”. The reliability value of a “Smart Data Value” input module is “communication ok”, if the referenced value has been successfully read; otherwise, it is a “communication error”.

The table below shows the six different types of smart data that are read by a trigger:

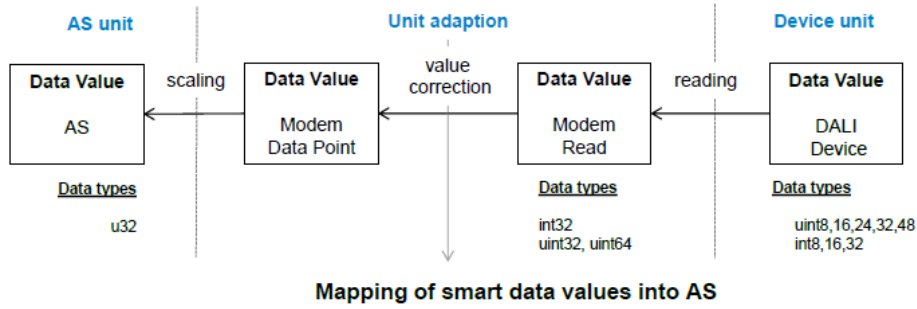
IEC 62386	Bank	Smart Data		
		Bank	Function	Supported
252	Bank 202	Energy reporting	Active	X
	Bank 203	Energy reporting	Apparent	X
	Bank 204	Energy reporting	Load-side	X
	Bank 205	Diagnostic & Maintenance	Control gear operation	X
	Bank 205	Diagnostic & Maintenance	Control gear faults	
	Bank 206	Diagnostic & Maintenance	Light source operation	X
253	Bank 206	Diagnostic & Maintenance	Light source faults	
	Bank 207	Diagnostic & Maintenance	Luminaire predictive data	X

Triggerable smart data parts

The two error diagnostic functions (control gear fault and light source faults) are not supported in DALI V3.0 for memory reasons. The standard flags for operating device and lamp errors from -102 already provide summaries of these individual error flags.

5.6.2 Mapping DALI smart data to the AS

The DALI module must read the smart data values from the DALI device and assign them to data values in the automation station (AS). The figure shows the mapping steps:



The DALI standard defines different data types for smart data values. Numerical data types are in the formats uint8, uint16, uint24, uint32, uint48, int8, int16 and int32. The DALI device also gives the physical unit for each smart data value. The bool, 32-bit integer without prefix sign (u32) and 32-bit floating point (f32) data types are theoretically available on the AS page. The DALI module maps the data values in the following steps:

1. The module must temporarily save multi-byte values in the memory bank and read in the data values in module-internal variables (max. uint64 or int32). This reading remains accurate.
2. The module applies mapping of the unit on the DALI device to the unit on the AS (if applicable). (Not implemented with ecos-DALI V3.0)
3. The module applies scaling and offset channel parameters to these values.
4. The resulting value is mapped to the channel AS data type (U32). This may possibly lead to a value restriction and loss of accuracy.

Data values are assigned in the order that ensures optimal accuracy.

5.6.3 Supported DALI smart data with V3.0

The table below with the green X shows the supported smart data values that can be read with ecos-DALI V3.0.

	Data	dtype	Range	Units	V3	AS Target Units	AS dtype
262 energy reports	Bank 202 active energy and power (mandatory)						
	ActiveEnergy	u48	0...281474976710653	[10 ⁶ ...10 ⁶ Wh]	X	[raw, 10 ³ , 10 ⁰ , 10 ³ , 10 ⁶ Wh]	u32
	ActivePower	u32	0...4294967293	[10 ⁶ ...10 ⁶ W]	X	[raw, 10 ³ , 10 ⁰ , 10 ³ , 10 ⁶ W]	u32
	Bank 203 apparent energy and power (optional)						
	ApparentEnergy	u48	0...281474976710653	[10 ⁶ ...10 ⁶ VAh]	X	[raw, 10 ³ , 10 ⁰ , 10 ³ , 10 ⁶ VAh]	u32
	ApparentPower	u32	0...4294967293	[10 ⁶ ...10 ⁶ VA]	X	[raw, 10 ³ , 10 ⁰ , 10 ³ , 10 ⁶ VA]	u32
	Bank 204 load side energy and power (optional)						
	ActiveEnergyLoadside	u48	0...281474976710653	[10 ⁶ ...10 ⁶ Wh]	X	[raw, 10 ³ , 10 ⁰ , 10 ³ , 10 ⁶ Wh]	u32
ActivePowerLoadside	u32	0...4294967293	[10 ⁶ ...10 ⁶ W]	X	[raw, 10 ³ , 10 ⁰ , 10 ³ , 10 ⁶ W]	u32	

Energy Reporting Data IEC62386-252

Note: AS target unit selection is not implemented in ecos-DALI V3.0. The values must be read into the BACnet object PIVI “raw” or with module-side “scaling”.

	Data	dtyp	Range	Units	V3	AS target units	AS dtyp
253 diagnostics and maintenance	Bank 205, control gear (mandatory)						
	OperatingTime	u32	0...4294967293	[s]	X	[s]	u32
	StartCounter	u24	0...16777213		X		u32
	ExternalSupplyVoltage	u16	0...65533	[0.1 V _{rms}]	X	[0.1 V _{rms}]	u32
	ExternalSupplyVoltageFrequency	u8	0...253	[Hz]	X	[Hz]	u32
	PowerFactor	u8	0...100	[0.01]	X	[0.01]	u32
	OverallFailureCondition	u8	0,1			== CG-Failure	
	OverallFailureConditionCounter	u8	0...253				
	ExternalSupplyUndervoltage	u8	0,1				
	ExternalSupplyUndervoltageCounter	u8	0...253				
	ExternalSupplyOvervoltage	u8	0,1				
	ExternalSupplyOvervoltageCounter	u8	0...253				
	OutputPowerLimitation	u8	0,1				
	OutputPowerLimitationCounter	u8	0...253				
	ThermalDerating	u8	0,1				
	ThermalDeratingCounter	u8	0...253				
	ThermalShutdown	u8	0,1				
	ThermalShutdownCounter	u8	0...253				
	Temperature	u8	0...253	[°C-60]	X	[°C-60]	u32
	OutputCurrentPercent	u8	0...100	[%]	X	[%]	u32
	Bank 206, light source (mandatory)						
	StartCounterResettable	u24	0...16777213		X		u32
	StartCounter	u24	0...16777213		X		u32
	OnTimeResettable	u32	0...4294967293	[s]	X	[s]	u32
	OnTime	u32	0...4294967293	[s]	X	[s]	u32
	Voltage	u16	0...65533	[0.1V]	X	[0.1V]	u32
	Current	u16	0...65533	[mA]	X	[mA]	u32
	OverallFailureCondition	u8	0,1			== Lamp-Failure	
	OverallFailureConditionCounter	u8	0...253				
	ShortCircuit	u8	0,1				
	ShortCircuitCounter	u8	0...253				
	OpenCircuit	u8	0,1				
	OpenCircuitCounter	u8	0...253				
	ThermalDerating	u8	0,1				
	ThermalDeratingCounter	u8	0...253				
	ThermalShutdown	u8	0,1				
	ThermalShutdownCounter	u8	0...253				
	Temperature	u8	0...253	[°C-60]	X	[°C-60]	u32
	Bank 207 luminaire maintenance (predictive) /13/ (mandatory)						
	RatedMedianUsefulLifeOfLuminaire	u8	0...253	[10 ³ h]	X	[10 ³ h]	u32
	InternalCGReferenceTemperature	u8	0...253	[°C-60]	X	[°C-60]	u32
	RatedMedianUsefulLightSourceStart	u16	0...65533	[100]	X	[100]	u32

Diagnostic and maintenance data IEC62386-253

Comment:

The smart data categories

- IEC62386-102 Basic Operating Device and Lighting Information (Bank 0 and 1)
- IEC62386-251 Lighting Data for Asset Management (DT50 - Bank1-Expansion)

are supported with ecos-DALI V3.0. This data information often only contains statistical values or even text values, which are of less interest or are more difficult to map in BACnet.

5.7 Controlling emergency lights

The DALI standard distinguishes between two types of emergency lighting:

- Autonomous emergency lights: IEC62386-202 (DT1)
- Centrally powered emergency lights: IEC62386-220 (DT19)

Autonomous emergency lights have their own local battery and integrated regular function tests. Centrally powered lights are fed and tested by an external (central) system.

Important:

- The two standards are mutually exclusive, i.e. an emergency light can be either DT1 or DT19.
- The module only allows for the programming of emergency lighting control in CASE. It cannot guarantee correct functioning of the emergency lighting system.

5.7.1 DALI emergency lights in accordance with -202 (DT1)

IEC62386-202 defines a profile for battery-powered or battery-supported emergency lighting. The most significant innovation in the emergency lighting are the mandatory self-tests, which are integrated into a light and guarantee functionality. European standard IEC62034 determines the requirements for self-tests.

Two [types of test](#) are implemented in a light:

- Operational check: Checks the functionality of the emergency lighting.
- Long-term check: Checks the status of the emergency power system (battery) in order to ensure a minimum emergency lighting duration.

The profile distinguishes between two different [self-test sequence variations](#):

- Automatic self-tests: The tests are planned by the light itself. The scheduler must be programmed. The status and outcomes of test execution can be called up by the light.
- Manual self-test: The test runs are planned by a DALI application controller assisted by DALI commands.

An emergency light can be operated in [various modes](#):

- Normal mode: Normal operation of an emergency light. Emergency lights fall into two lighting categories: “non-/maintained” and “switched/dimmable”.
- Emergency mode: Emergency situation detected (power failure).
- Idle mode: Switched off, even if an emergency situation arises.
- “Inhibit” mode: Normal operation, even if an emergency situation arises.
- Expanded emergency: Extended emergency mode.
- Test mode: Self-test in progress

A DALI application controller can control switching between the modes. The DALI module offers data point types for calling up tests, reading status and outcomes, and controlling the light operating modes in a CASE plan. Configuration of parameters via CASE plan function modules is not supported.

The table below specifies (with an X) the control commands implemented in ecos-DALI V3.0 and the property queries for -202 emergency lighting for use in a CASE plan. CASE input and output modules enable corresponding data point types to be selected:

Command	Support	Property	Support
REST	X	QUERY BATTERY CHARGE	X
INHIBIT	X	QUERY SELECTED VARIABLE	
RE-LIGHT/RESET INHIBIT	X	QUERY DURATION TEST RESULT	X
REQUEST FUNCTION TEST	X	QUERY LAMP EMERGENCY TIME	
REQUEST DURATION TEST	X	QUERY LAMP TOTAL OPERATION TIME	
STOP TEST	X	QUERY EMERGENCY LEVEL	
RESET FUNCTION TEST DONE FLAG	X	QUERY EMERGENCY MIN LEVEL	
RESET DURATION TEST DONE FLAG	X	QUERY EMERGENCY MAX LEVEL	
RESET LAMP TIME		QUERY RATED DURATION	
STORE EMERGENCY LEVEL		QUERY EMERGENCY MODE	X
STORE TEST DELAY TIME(/H/L)		QUERY FEATURES	
STORE FUNCTION TEST INTERVAL		QUERY FAILURE STATUS	X
STORE DURATION TEST INTERVAL		QUERY EMERGENCY STATUS	X
STORE TEST EXECUTION TIMEOUT			
STORE PROLONG TIME			
PERFORM SELECTED FUNCTION			

Supported commands and queries for emergency lighting 202

Note:

- The remaining commands and properties relating to the configuration of parameters are only used in auto-configuration.

Field	ID	Typ	V	Remark
202-emergencyLevel	0	u8	Y	Emergency lighting: Emergency light level [%]
202-prolongTime	0	u8	Y	Emergency lighting: Emergency mode prolong time [s, min]
202-functionTestDelay	0	u16	Y	Emergency lighting: Function test delay time 0...682.6days [15min]
202-functionTestInterval	0	u8	Y	Emergency lighting: Function test interval [NoRepeat,1...254days]
202-durationTestDelay	0	u16	y	Emergency lighting: Duration test delay time 0...682.6days [15min]
202-durationTestInterval	0	u8	y	Emergency lighting: Duration test interval [0=NoRepeat, 1...97weeks]
202-testExecutionTimeout	0	u8	Y	Emergency lighting: Test execution timeout [15min,1... 254days]"

5.7.2 DALI emergency lights in accordance with -220 (DT19)

IEC62386-220 defines a profile for centrally powered and operated emergency lighting. A central control device implements the majority of the emergency lighting functions. Therefore, the 220-lights only have a few emergency lighting functions (unlike the 202-lights).

A 220-emergency light can either be in normal mode or emergency mode. The lamp detects an emergency condition either through the type of power supply (AC/DC) or via a DALI bus error (power failure or system error). If an emergency condition arises, the light switches to the configured emergency lighting level. The emergency lighting level can be tested during commissioning, for example.

The standard -220 determines how to configure an emergency light and how to monitor the current status, errors and mode. It also allows the configuration of emergency lighting parameters to be locked with a pin in order to protect the light against unwanted configuration via the DALI bus. There are two different types of locking: finite locking and infinite locking. Finite locking can be unlocked via the bus with the right pin code. Infinite locking cannot be unlocked via the bus. In this case, the unlocking mechanism is specific to the manufacturer.

The table below specifies (with an x) the control commands implemented in ecos-DALI V3.0 and the property queries for -220 emergency lighting for use in a CASE plan. CASE input and output modules enable corresponding data point types to be selected.

Command	Support	Property	Support
SET EMERGENCY LEVEL		QUERY EMERGENCY LEVEL	
SET EMERGENCY CONDITION SUPPLY		QUERY EMERGENCY CONDITION SUPPLY	
SET EMERGENCY CONDITION BUS		QUERY EMERGENCY CONDITION BUS	
TEST EMERGENCY LEVEL	x	QUERY EMERGENCY PHYSICAL MAXIMUM	
SET EMERGENCY PARAMETER LOCK	x	QUERY EMERGENCY STATUS	x

Supported commands and queries for emergency lighting 220

Notes:

- The remaining commands and properties relate to the configuration of parameters.

Field	ID	Typ	V	Remark
220-emergencyLevel	0	u8	y	Central Emergency lighting: Set the emergency level
220-emergencyCondition	0	u8	y	Central Emergency lighting: Set the emergency detection method [supply, bus]

- The locking, unlocking and infinite locking of a configuration can be controlled via corresponding output data points in a CASE plan. This requires the application of a pin code (as current value PV).

5.8 ecos-DALI commissioning tool with ecos-DALI V3

The ecos-DALI commissioning tool (web-based [ecos-DALI-CT](#)) has been adapted to the ecos-DALI protocol firmware V3 and [simplified](#):

- Detects the installed ecos-DALI V3 and adapts the user interface.
 - No support for searching for and addressing proprietary DALI sensors (eDALI from Tridonic, Lunatone, Loytec; OSRAM).
 - No view or changing of DALI parameters (information) is possible.
 - No parameterisation of DALI groups or scenes.
 - No creating of new locator tags, as only top-down (CE>CT) commissioning (addressing of DALI devices) is supported.
- Searches for and finds all device types of DALI control gears and all DALI-2 input devices that can be addressed via locator tag list.
- Allows, via "Light Update", the current status and light levels of DALI lights to be read back.
- When searching again, detects defective DALI lights and can re-address these individually using another one available.

6. ecos-DALI V3 – engineering workflow

The programmable BACnet room automation station ecos504/505 and the planned DALI lighting solution must be compatible with the BACnet and DALI parameters. With the ecos-DALI V3, SAUTER has laid the foundations for creating new and more efficient lighting solutions. As parameterisation with DALI-2 devices can be very comprehensive and varying, these parameters for the DALI-2 devices must be preset via the CASE programmer or CASE library creator. For this, SAUTER now offers the “global auto-configuration for DALI devices” mechanism. This mechanism is not suitable for all requirements. If individual device parameters are required for individual DALI devices, SAUTER recommends using the tools of the DALI device manufacturer for commissioning.

The SAUTER [engineering workflow for DALI projects](#) (top-down workflow) may contain the following steps:

DALI planning

- a) Planning of the lighting application with the range of DALI devices to be used (ballasts, sensors, push-buttons, etc.) for the BACnet room automation station ecos504/505
- b) Definition of the detailed programming with predefined BACnet objects (BO, AO, LO, etc., and BI, AI, PIVI, etc.) and corresponding DALI parameters

DALI addressing

- c) Creation of the DALI device table (CE) for the DALI devices to be installed with assignment of DALI individual addresses, any DALI group assignment and allocation of locator tags (installation location tag)
- d) Export of DALI configuration for manual import into the ecos-DALI-CT or download to available ecos (updated ecos-DALI FW V3.0 on ecos is required)
- e) Startup of ecos-DALI-CT with import of configuration (address/locator/group)
- f) Search for all DALI devices and...
- g) ...then assignment of DALI address/locator combination to physical DALI device by installation location.

Comment: By addressing the DALI devices, DALI groups are no longer configured with ecos-DALI-CT for ecos-DALI V3.

Note: (optional) – DALI device addressing (steps d) to g)) can also be performed using a DALI device manufacturer tool with corresponding DALI interface.

DALI parameterisation

- h) (optional, temporary) CASE Engine plan creation with a DALI parameterisation plan for parameterisation of DALI devices with the new AutoConfig function
- i) (optional, alternatively) DALI parameterisation of DALI devices with DALI tool from DALI device manufacturer

DALI/BACnet programming

- j) CASE Engine plan creation for the final lighting application

Application, function and communication tests (DALI/BACnet)

- k) BACnet integration and DALI function test with BACnet Client and CASE Engine
- l) (optional) DALI bus monitoring to check DALI communication with ecoSnoopy or other DALI tools
- m) (recommended) Activation of ecos firewall on handover of room automation to the operator

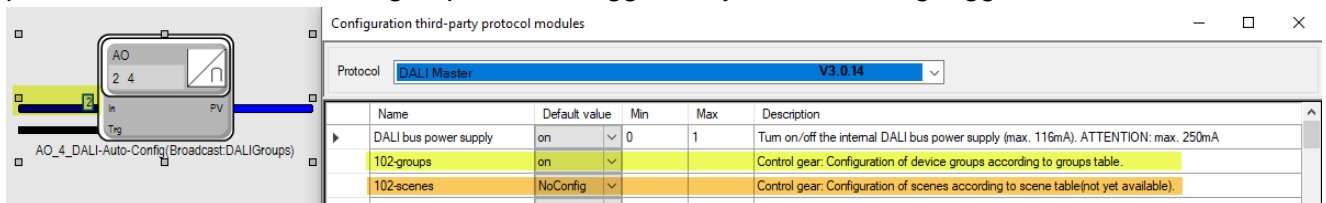
7. ecos-DALI V3 – technical notes

As the scope of all these new DALI functions is very broad, not everything is explained here in detail. Please see the manufacturer documentation on the DALI devices to be integrated.

7.1 Tips and notes

Please find below a list of notes and tips found during development and primarily during internal testing. (Please note, we do not guarantee that this list is complete.)

- The ecos-DALI-CT (V5.1) with ecos-DALI V3 should only be used as a DALI addressing tool. Only the “top-down” workflow is supported. Currently, no new locators can be created in the CT and, consequently, a “bottom-up” workflow is not supported.
- The DALI parameterisation of all the various DALI-2 devices can be performed either with the ecos and the new DALI AutoConfig function or DALI tools from DALI device manufacturers can be used with their DALI access units.
Comment: SAUTER Basel and its various subsidiaries also successfully use the LUNATONE DALI Cockpit with a corresponding DALI access unit (DALI USB mouse).
- For licensing reasons, the VPort/Tunnel mechanism may not be used for third-party COM-based DALI tools. The idea that the LUNATONE DALI Cockpit functions directly with the ecos without a DALI USB interface could not be implemented.
- After commissioning and handover of the project, it is recommended for security reasons that the ecos firewall be switched to “Standard” with CASE Sun. In this case, however, the ecos-DALI-CT and the VPort/Tunnel function are also deactivated or no longer accessible.
- The parameters for certain DALI device functions can only be set on the devices with the manufacturer-specific tool. It is recommended that the manufacturer’s DALI tools and DALI access interfaces be used for device parameterisation.
- The ecos-DALI-CT no longer sets the parameters for any DALI groups for ballasts. The parameterisation of the DALI groups can be triggered by an AutoConfig trigger:



- The parameterisation of DALI scenes for colour lamps (in accordance with -209) must be performed using external tools.

7.2 Mapping DALI data types to BACnet objects – overview

The table below shows the new data points that have been introduced with ecos-DALI V3.0. The data points for ecos-DALI V1 and V2 remain valid.

Modem Data Point Type	Input/Output				Addressing			Query		CASE objects
	Data Type AS	Values (for Scaling=1.0, Offset=0.0)	Scaling	Offset	Addr type	Address	Instance address	Interval	Priority	
21 DT1-Read Battery Charge [%] Periodically queries the battery charge level of a DT1 emergency light.	F32 U32	Battery level [%]: 0..100	X X	X X	0	0.63	--	>0	X	AI PIVI
22 DT1-Read Duration Test Result [min] Periodically queries the battery duration test result of a DT1 emergency light.	F32 U32	Duration [minutes]: 0...512	X X	X X	0	0.63	--	>0	X	AI PIVI
23 DT1-Read Emergency Failure Status Periodically queries the emergency failure status bits of a DT1 emergency light.	F32 U32	Status bits: 0...255	X X	X X	0	0.63	--	>0	X	AI PIVI
24 DT1-Read Emergency Mode Periodically queries the emergency mode bits of a DT1 emergency light.	F32 U32	Mode bits: 0...255	X X	X X	0	0.63	--	>0	X	AI PIVI
25 DT1-Read Emergency Status Periodically queries the emergency status bits of a DT1 emergency light.	F32 U32	Status bits: 0...255	X X	X X	0	0.63	--	>0	X	AI PIVI
28 DT19-Read Emergency Status Periodically queries the emergency status bits of a DT19 emergency light.	F32 U32	Status bits: 0...255	X X	X X	0	0.63	--	>0	X	AI PIVI
26 DT1-Set Mode Sets the mode of a DT1 emergency light.	F32 U32	Mode values: 1= REST mode 2= INHIBIT mode 3= RELIGHT mode	X X	X X	0 1 2	0.63 0.15 --	--	>0	X	AO MO PIVO
27 DT1-Control Test Control the test execution of a DT1 emergency light.	F32 U32	Test control values: 1=Start Function Test 2=Start Duration Test 3=Stop Test 4=Reset Function Test Flag 5=Reset Duration Test Flag	X X	X X	0 1 2	0.63 0.15 --	--	>0	X	AO MO PIVO
29 DT19-Test emergency level Turns on DT19 emergency light using the configured emergency level.	Bool	State [0=off 1=on]	--	--	0 1 2	0.63 0.15 --	--	>0	X	BO
30 DT19-Lock Configuration Locks the device configuration in a DT19 emergency light using a pin code.	U32	16-bit Pin code	X	X	0 1 2	0.63 0.15 --	--	>0	X	PIVO
31 DT19-Unlock Configuration Unlocks the device configuration in a DT19 emergency light using a pin code.	U32	16bit Pin code	X	X	0 1 2	0.63 0.15 --	--	>0	X	PIVO
80 Smart data read trigger Triggers the one-time reading of smart data values from banks. Query interval denotes the time in between reading the individual values.	Bool	1= Trigger reading	--	--	2	--	--	>0	--	BO
81 Smart data value Reads a particular smart data value from the specified bank.	U32	Smart data values	X	X	0	0.63	--	--	--	PIVI
95 Auto-Config Triggers the download of DALI device configuration as specified in the modem protocol parameters.	F32 U32	Trigger values:	X X	X X	0 1 2	0.63 0.15 --	--	--	--	AO PIVO
220 DALI2-Events 3xx Generic Receives events from a DALI-2 sensor instance.	F32 U32	Sensor value: [0...1023]	X X	X X	4	0.63	0.31	--	--	AI PIVI
225 DALI2-Events BUTTON Receives raw button events from 301 push-button sensor instance(s).	F32 U32 Bool	Presence: [0=no,1=yes]	X X --	X X --	3 4 5 6	0.63 0.63 -- --	-- 0.31 0.31 0.31	--	--	AI PIVI BI
226 DALI2-Events BUTTON PRESS Receives button press events from 301 push-button sensor instance(s).	F32 U32	Button Press:	X X	X X	3 4 5 6	0.63 0.63 -- --	-- 0.31 0.31 0.31	--	--	AI MI PIVI
230 DALI2-Events ABS IN Receives events from 302 absolute input sensor instance(s).	F32 U32 Bool	Sensor value: [0...1023] value!=0	X X --	X X --	3 4 5 6	0.63 0.63 -- --	-- 0.31 0.31 0.31	--	--	AI PIVI BI
235 DALI2-Events PIR Receives events from 303 occupancy sensor instance(s).	F32 U32 Bool	Presence: [0=no,1=yes]	X X --	X X --	3 4 5 6	0.63 0.63 -- --	-- 0.31 0.31 0.31	--	--	AI PIVI BI
236 DALI2-Events MOV Receives events from 303 occupancy sensor instance(s).	F32 U32	Sensor value: 1=Vacant_noMovement 2=Vacant Movement, 3=Occupied noMovement 4=Occupied Movement	X X	X X	3 4 5 6	0.63 0.63 -- --	-- 0.31 0.31 0.31	--	--	AI MI PIVI
240 DALI2-Events LUX Receives events from 304 lighting sensor instance(s).	F32 U32	Sensor value: [0...1023]	X X	X X	3 4 5 6	0.63 0.63 -- --	-- 0.31 0.31 0.31	--	--	AI PIVI

New modem data point types in DALI-V3

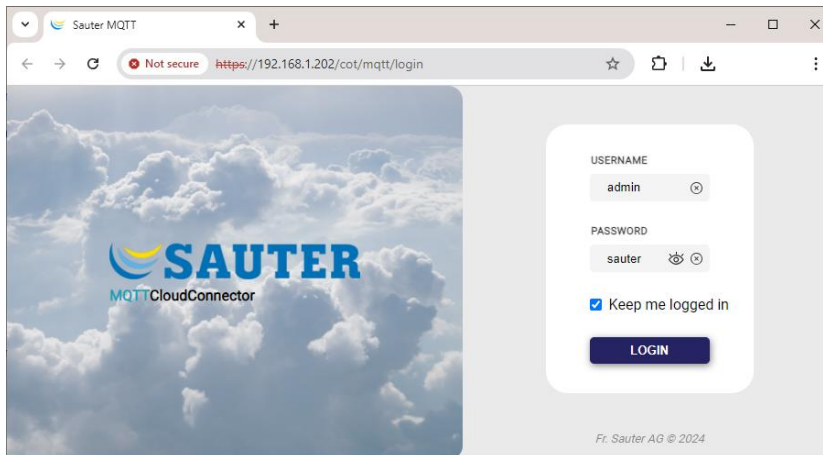
8. MQTT – Cloud Connector

With Version 5.1, the web-based configurator has been made more stable. The BACnet MQTT Gateway functionality and the MQTT-API have not been changed in the background.

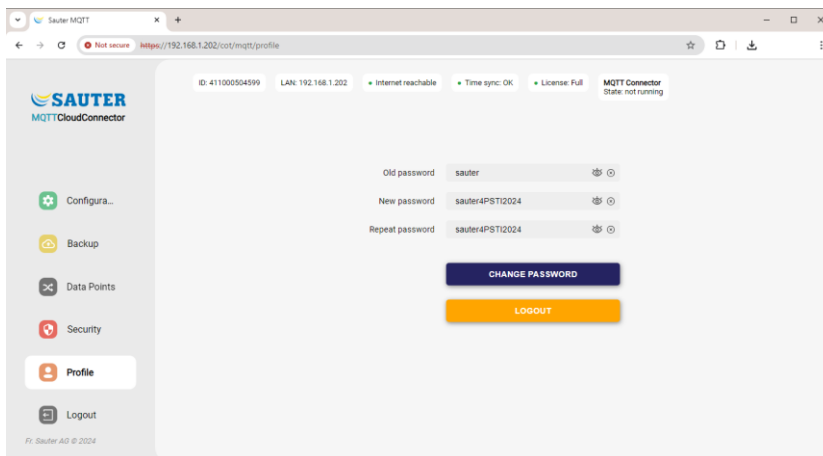
8.1 MQTT functional expansions

The MQTT functionality with the IoT/Cloud Connector (BACnet MQTT Gateway) has been expanded/adjusted with the following changes:

- The login for the “MQTTCloudConnector” commissioning tool remains the same with the administrator username and initial password (admin/sauter).



For security reasons, the password must be individually changed after the first login under “Profile”.



- The MQTT commissioning tool (web-CT) has been refined. The planned, but not implemented, external MQTT Broker connections (Google, Amazon, AWS) have been removed. As Google IoT (GCP) has stopped its services, the Google Cloud connection was also removed. Only external (remote) connections can be created to a “standard” MQTT Broker (such as a

Mosquitto broker).

- The MQTT-CT allows for automatic generation of a random Client ID (character length 23 with leading characters “Sauter”).

- The MQTT-CT has an extended status header that displays the most important information and feedback on the status of the CloudConnector.

- Changes in configuration that require the MQTT connector to be restarted are shown with corresponding pop-up notes:

- Arguably the most interesting expansion was primarily implemented for modulo 6 with up to 3200 BACnet objects. To ensure that not all BACnet objects are automatically published on the broker as MQTT topics, the corresponding BACnet objects can now be activated for publication or deactivated in the “Data Points” menu.

There are three modes for data point activation:

- *All*: Always publishes all BACnet objects to the broker as MQTT topics
- *None*: Publishes no BACnet objects to the broker
- *Manual*: Each individual BACnet object can be activated for publication or deactivated

With the number of data points to be displayed per page (1) and the filter options (2), the list can be reduced and the displayed data points can then be activated (“Select Page”) or deactivated (“Deselect Page”) (3) all at once and then applied (“Apply”) (4):

8.2 Good to know/known peculiarities

- Depending on the web browser used, the page may not automatically refresh after data point configuration. A webpage refresh must be performed manually (F5).
- The number of data points to be displayed per page may be automatically reduced for a more efficient display.
- If you only want to activate a small number of BACnet objects, you can, for example, proceed as follows:
 - Go to “Manual” mode
 - Display all data points (“All”)
 - Deactivate a data point or press “Deselect Page”, then
 - Use different filter strings to search for and activate the data points
 - If the “Active” and “Inactive” selections are complete, click “Apply” to activate “Manual” mode

9. BACnet and other functions

The following functions are supported with V5.1 and function index 24:

- BACnet protocol revision 24
- BACnet network port object in accordance with BACnet PR 24 (hierarchically nested with PHYSICAL, PROTOCOL, APPLICATION)
- With CASE Suite 5.2SR1, the FMS1xx function module contains additional CO₂ parameters (COV, RT, DT) and an output to use viaSens117/197 in pilot systems (smart sensor

FMS117/197 with additional CO₂ sensor element)

Properties - FMS1xx_1

Block Definitions | Connection Display | Parameter | Inputs

Parameter CO2DT

Value entry 5m

Name	Value	Description
NodeID	1	Node ID
NetID	1	Network ID
OcpDetHT	30	Presence detection hold period (s)
OcpDetSens	Medium	Presence detection sensitivity (%)
TmpSrc	TFIR	Temperature measuring source
OcpMode	PIR	Presence detection mode
TDigOfs	0	Temperature offset in °C when TmpSrc=TDIG
CellTyp	Other	Celling type
LghtCalSI	1	Light correction gradient
LghtCalOfs	0	Light correction offset
IBcnTxFwr	0	iBeacon TX Power
TmpIREmis	90	Infrared temperature emissivity in %
TmpCOV	0.2	Temperature COV in °C
TmpRT	15m	Temperature reporting time
TmpDT	5m	Temperature dead time
HumCOV	5	Humidity COV
HumRT	15m	Humidity reporting time
HumDT	5m	Humidity dead time
VOCCOV	30	VOC index COV
VOCRT	15m	VOC index reporting time
VOCDT	5m	VOC index dead time
CO2COV	50	CO2 COV
CO2RT	15m	CO2 reporting time
CO2DT	5m	CO2 dead time
IlmCOV	50	Illuminance COV
IlmRT	15m	Illuminance reporting time
IlmDT	5m	Illuminance dead time
SPLCOV	5	Sound pressure level COV
SPLRT	15m	Sound pressure level reporting time
SPLDT	5m	Sound pressure level dead time

This functional expansion has now been introduced with function index 24 from ecos-FW V5.1 ([RQ:35785/RQ:35568](#)) for pilot systems.

- Together with CASE Engine V5.2SR2, the standardised BACnet event/alarm parameters (Enable, Inhibit) can now be parameterised for the BACnet I/O/V objects and uploaded for download. (see PI-28-853 – CASE Suite V5.2SR2)

10. Fixed functions

The following critical problems reported from the field have been rectified (references from QMP and SPIRA):

Category	QMP	NSO	SPIRA	Comment
BACnet	CBON-D4EJRF	variou s	IN:50597	BBMD is no longer operational
System/BSP	DTOF-D7MCSY	SCU	IN:50783	EY-RC505F081 will not be properly updated from FW V4.x to FW V5.0, due to mistake in WSDL8 (since V5.0) definition, which cannot be handled properly with CASE Sun 5.2.
KNX (BSP)	DTOF-D27B2M	variou s	IN:49866	KNX Tunnel does not work anymore, due to Linux OS update with V5.0.
RU_TOUCH	DTOF-CFT8XT	variou s	IN:26267	RU Touch Download and Default values

10.1 Outstanding items/information

The following outstanding items are known behaviour or restrictions (known issues):

Category	NSO	SPIRA	Comment
ecos-DALI-CT	SBA	IN:50666	Reset scan with modem version V3 doesn't delete groups anymore
<u>Note:</u> intended behaviour – “all” DALI parameters, incl. DALI groups, are set by a DALI tool or by the CASE DALI Config Trigger; “Incident” is closed			
ecos-DALI-CT	SBA	IN:50701	Cannot find Tridonic DALI-RM/S 4x10A and DALI-3-RM-C
<u>Note:</u> For some reason, these DALI ballasts could not be found by ecos-DALI-CT; as a workaround, we recommend addressing and configuring these devices with TRIDONIC's DALI masterCONFIGURATOR			
ecos-DALI-CT	SBA	IN:50700	External bus power not detected
<u>Note:</u> The DALI bus power can only be controlled in DALI-CT (green Power LED) by logging in to the DALI-CT or if the internal bus power supply is changed.			
IMPORTANT: The internal power supply must not be switched on if the max. DALI voltage (250 mA) is already externally wired. The interconnection of multiple smart DALI power supplies (with short-circuit monitoring) is not permitted: an ecos505 with the two integrated DALI power supplies is the only exception.			
ecos-IoT-CT	SBA	IN:50651	MQTT-CT shows MQTT connector not running, however everything works in Client mode (connected to external Broker)
<u>Note:</u> Only the MQTT-CT UI (user interface) may, under certain circumstances, not be synchronised with the current mode (Client/Broker) and the connector status. The function is, however, ensured.			

11. General notes on release

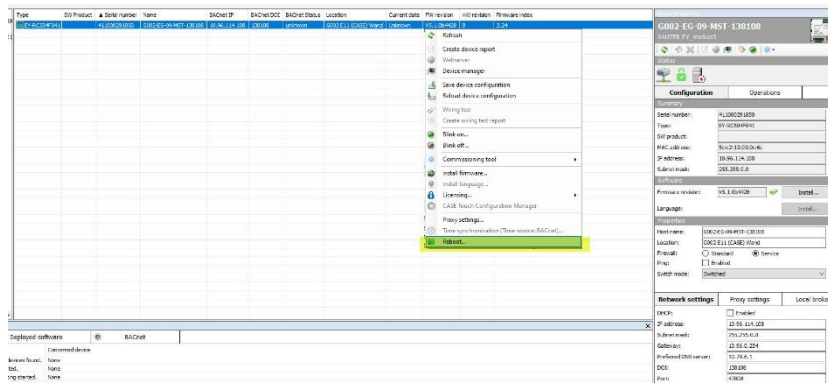
11.1 General notes on FW V5.1

There are no further notes that need to be observed when using V5.1 beyond the information for firmware V5.0.x from previous product information announcements.

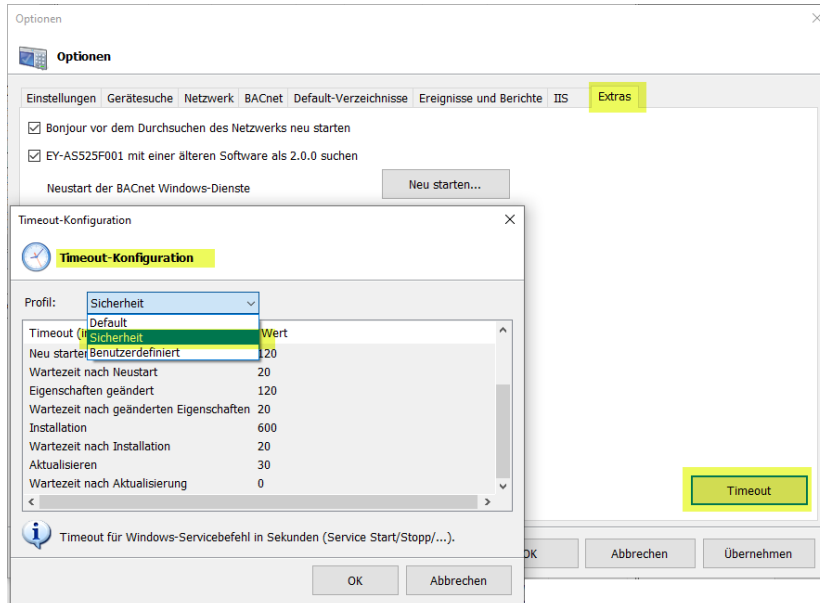
As always, it is of course recommended that the latest versions (ecos FW V5.1.0 with ecos-DALI V3.0.16) be used in projects and systems.

11.2 Note on firmware update with CASE Sun 5.2SR2

When updating the firmware from V5.0.1 to V5.1.0 with CASE Sun 5.2SR2, the reboot trigger from CASE Sun may not arrive at the station. CASE Sun displays the station with the BACnet status 'unknown'. In this case, it is recommended to manually trigger a device reboot from CASE Sun or to switch the station off/on.



In order to minimise this, it is recommended to use the timeout configuration with the 'Security' profile in CASE Sun, especially for large networks.



11.3 ecos-DALI – training and documentation

The product data sheet for the ecos504/505 is currently being supplemented with the new DALI-2 functions. This will be available on the website by the end of October.

With the release of these comprehensive DALI functions, Product Management is aiming to summarise the technical information as a technical presentation in a DALI document. An invitation to a WebEx video tutorial for SAUTER technicians, in which the most important new DALI functions from this product information will be shown, will be sent out soon.

For those interested in DALI, there are various websites offering good explanations of DALI and DALI-2 functions. DALI device manufacturers provide manuals, data sheets and useful tips and FAQs for your devices.

IMPORTANT: Before using a DALI device together with the ecos as the DALI Master and the BACnet application, it is recommended that a compatibility test be carried out with the corresponding function plan for the ecos-DALI. SBA will gladly provide advice if you would like to use a corresponding device.

11.4 ecos-DALI – pilot projects with DALI-2 functions

No DALI pilot project could be found for this release. Nevertheless, these new DALI functions can be successfully used in projects.

SBA Product Management is happy to receive feedback on successful DALI-2 integrations from real projects in order to expand the ecos-DALI compatibility list.

11.5 ecos-DALI – application and function libraries

As the CASE Suite solution library does not yet use any of these new functions, the library creators for CASE room automation solutions are reliant on examples developed from projects. These CASE Engine plans can then be integrated into the library as standard solutions. Further information can be provided by the contact persons for the German, Austrian and Swiss libraries of the CASE group of SAUTER Deutschland (Sauter Cumulus GmbH, case@de.sauter-bc.com).

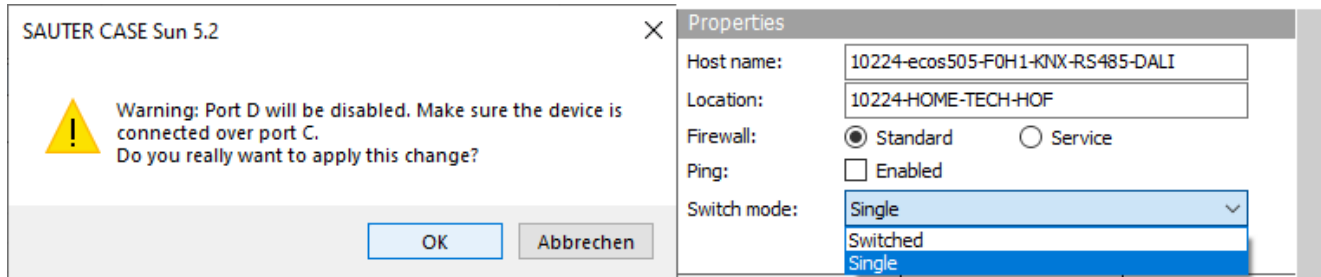
Solutions or smaller examples can also be uploaded to the ADI server ([Alien Device Intranet](#)) or provided to Product Management (e.g. as FAQs).

SBA Product Management is happy to provide assistance in creating a library.

11.6 RADIUS functionality

Since ecos firmware V5.0 and CASE Sun V5.2, the RADIUS function can be activated with a licence (YY-FX503F001). The scope of functions is the same as that for implementation on the modulo 6 automation station. The licensing and parameterisation of the RADIUS function is carried out using CASE Sun or the CASE Sun licence manager.

IMPORTANT: As the RADIUS function requires a smart RADIUS switch, the switch function can and must no longer be used on the ecos (→ no Ethernet daisy chain). Ethernet port D must be deactivated using “Switch Mode” “Single”.

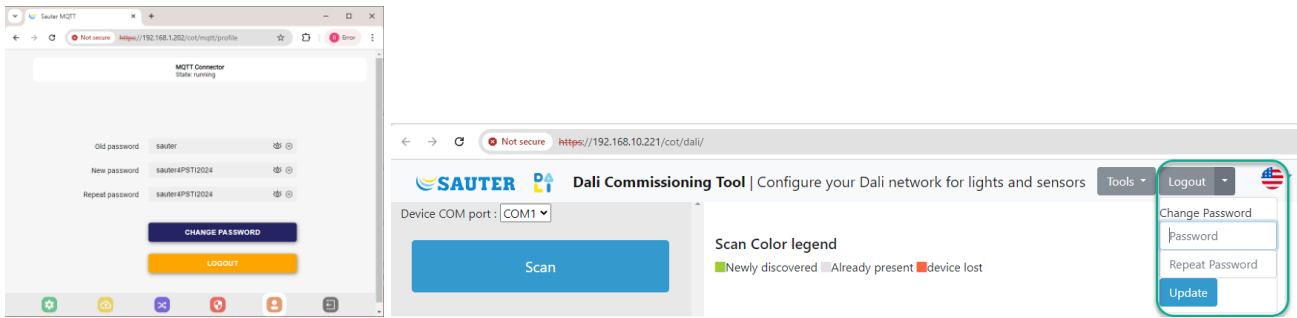


12. Notes on cyber security


As described in previous product information announcements, all TCP/UDP ports that are not in use should be deactivated using the integrated “standard” firewall setting. With V5.1, both web-based ecos-CTs (for DALI and for MQTT) are deactivated with the “standard” firewall setting.

If there is a wish for the station to respond to an ICMP query (ping) despite being in “standard” mode, this can be activated in CASE Sun (see, in image above, “Ping: Enabled”).

It is also recommended that the ecos-CT standard passwords for MQTT (admin/sauter) and DALI (my_password) be changed on first login.



With firmware version 5.1, vulnerabilities in the MQTT-CT and DALI-CT components as well as in the firmware update process have been identified, fixed or minimised as part of continuous improvement measures. It is important to note that especially devices with an active MQTT licence (YY-FX502F00*) and without adequate protection (no firewall, allowed incoming traffic, direct access to the device, etc.) were at risk.

 We recommend updating to the latest version. As a consequence of these improvements to cybersecurity vulnerabilities (especially for MQTT), all previous versions on the deployment server are classified as 'Not recommended'.

13. Availability and outlook

Both firmware versions are now available on the deployment server. The ecos504/505 delivered from stock come with older firmware versions. It is strongly recommended that the firmware be updated to the latest version using CASE Sun and CASE Engine before commissioning.

The DALI modules in the SBA stock have protocol version 1.4, which is no longer compatible with the ecos-DALI-CT as of firmware V3.4 (see PI-19-680). Therefore, the protocol firmware must be updated to the latest V3.0 or a more up-to-date V2.x before the ecos-DALI-CT can be started.

The foundation for efficient DALI engineering has been laid – ecos-DALI V3 - Step1. SAUTER is keen to take the next step with a larger DALI module (more memory) and its own CASE DALI configuration tool. For this, we need as much feedback as possible on these new functions from the projects. Please send this feedback to SAUTER Product Management.

In the meantime, as described above, manufacturer-specific DALI configuration tools and their DALI interfaces must be used, particularly for configuring DALI devices. SAUTER Basel has had positive experiences with LUNATONE's DALI Cockpit and its DALI access units (RS232, USB) and recommends using these for commissioning for extensive DALI projects. Negotiations with LUNATONE to use their tool directly in the ecos504/505 are not yet finalised, which means that a LUNATONE DALI mouse must currently be used with V5.1 and V3.0.

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