Installation and Operating Instructions

Light grid controller DLVE-ALX

Function

DLVE controllers are control devices for light grids type LI. They control the measuring process, convert signals and analyze measurement data. Additionally, they functions as input terminals for supply voltages as well as switching signal outputs and inputs. Configurable parameter sets support the device setup. The expansions module ALX adds two analog voltage outputs.

Intended use

DLVE-ALX controllers are used in combination with LI light grids for the detection of objects in defined control areas as part of a higher-level overall system.

Conformity

The product complies with the following standards:

EC Directive	2004/108/EC
EMC Emissions	EN 50011
EMC Immunity	EN 61000-4-3/6
IP Rating	EN 60529
cCSAus	UL 61010-1 (Third Edition):2012-05; CAN/CSA-C22.2 No. 61010-1-1

The manufacturer possesses a certified quality management system in accordance with DIN EN ISO 9001:2008.

Safety and legal notice

Please see the separate printout.

Assembly

The controller shall be mounted on a DIN-rail which shall be positioned in the control cabinet.

Technical data

Number of profile pairs	1 (Type LI)
max. number of beams	500 beams (diagonal beams are counted), 600 beams with special SW
Cycle time	~ 30µs/beam, depending in range and parameterization
Range	0.25…6.0 m (with standard profiles)
Operating voltage	24 VDC (18…30 VDC) with 5% ripple
⎓ (DC voltage)	*For CSA:* The device has to be used together with an external fuse. Specification: 32 Vdc, 3 A, Fast-Acting, 50A (interrupting rating), ANSI/UL 248-1 and ANSI/UL 248-14
Power consumption	4.6 W
Serial communication	9 pin D-Sub connector
Inputs DLVE	24 VDC, 12 mA, 3 kHz
Outputs DLVE	24 VDC, 0,25 A, PNP, short-circuit-proof
Outputs ALX	Short-circuit protected: one output continuous Load resistance: min. 1 kΩ, loads only to 0 V
Temperature	-25 …+40 °C
Humidity	Up to 90% relative, non-condensing

Enclosure

Type	DIN rail module
Weight	160g
Dimensions	124mm (L), 126mm (W), 60mm (H)
IP class	IP00, interior usage
Altitude	< 2000 m
Pollution index	2

Terminal block pin assignments DLVE

Terminal	Reference	Description / function
1	+24 VDC	
2	GND	
7	OUT 1	Switching output 1
8	IN 3/ OUT 2	combined IO: Input 3; Output 2
9	IN 2 / OUT 3	combined IO: Input 2; Output 3
10	IN 1 / OUT 4	combined IO: Input 1; Output 4
11	IN 1	Input 1

Terminal block pin assignments ALX

Klemme	Bezeichnung	Bemerkung / Funktion
51	+24 VDC	
52	+24 VDC	
53	GND	
54	Analog 1	Output 0…10 VDC
55	Analog 2	Output 0…10 VDC

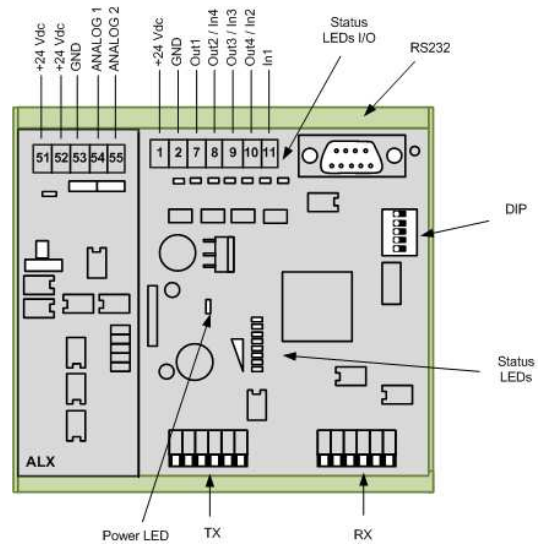
Interfaces

RS232

Baudrate:
300…115200 (configurable), 8n1

PIN	Description
1, 4, 6-9	-
2	RxD
3	TxD
5	GND

Drawing



DIP-switch

At delivery and in normal mode all DIP switches are in OFF state.

Functions

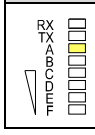
DIP 1: ON	Firmware update
DIP 2: ON	Command mode
DIP 3: ON	Calibration
DIP 4 – DIP 7	for special use
DIP 8	Free run during use of incremental encoder

Status LEDs DLVE

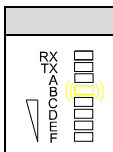
The LVX indicates operational errors and faults via the eight adjacent LEDs RX, TX, A… F. If the status is normal, LEDs C, D, E, F indicate the signal strength.

Please note that errors cannot be localized with 100% accuracy. The LEDs only provide you with a good idea of where to start looking.

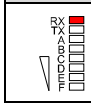
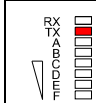
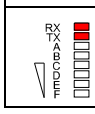
LED A

	Signal	Status	Possible causes
	A (yellow) illuminated	Warning	Blanked beams, watchdog.

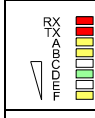
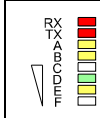
LED B

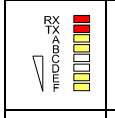
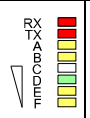
	Signal	Status
	Even flashing (approx. 2 Hz)	Normal operation
	Double-flash	Configuration mode
	continuously ON or OFF	Sync error, serial communication "crashed", defective

Error-LEDs

	Signal	Error
	RX (red) on	Receiver A
	TX (red) on	Transmitter A
	RX & TX on	Controller; SyncError

Special LED combinations

	Description
	Hardware fault, please inform manufacturer
	Parameter outside of permitted limit values => correct in configuration mode (reset to defaults if necessary)

	Description
	Hardware fault, please inform manufacturer
	Length of connected profiles does not correspond with stored values => perform calibration

Command-mode

Connect the controller to the PC via a null modem cable. Use the follwing terminal program settings for establishing communication with the controller:

Baud rate	115200bps
Priority	none
Data bits per Byte	8
Number of Stoppbits	1
Flow control	None
Delay	50 ms

Please verify that the correct COMprot is selected.

Activate Command mode

Set DIP-switch 2 to "on". The light grid will respond with a status message, a line prompt and any available error messages.

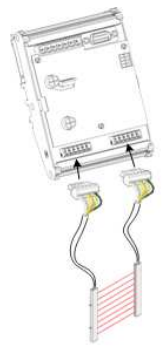
```
LVXE HW=X100 FW=X281 HS311, 500 beams, S/N ……, cycle
time 0us
command mode (h for help)

 ->
```

Now the controller can be queried and configured with corresponding commands. Refer to details in the parameterization document.

Installation DLVE

1. Mount the light grids according to the installation instructions.
2. Snap the controller onto the DIN rail.
3. Connect the transmitter and receiver to the corresponding connectors.
4. Connect the interfaces.
5. Connect all I/Os as necessary for the application.
6. Connect the supply voltage to the corresponding terminals.
7. Turn on the device by connecting the supplies.
8. Execute a calibration sequence.



Calibration

During calibration the controller sets up the correct signal gain for the light grid profiles, stores the profile configuration and executes an error-test. The calibration has to be done with an uninterrupted monitoring area. (Exceptions: see chapter auto blanking in the parameterization documentation).

Procedure:

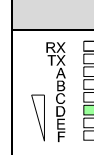
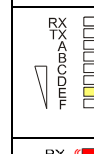
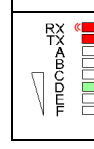
1. Supply voltage must not be turned on. The device has to be turned off.
2. Set DIP3 to ON. → **Calibration cycle started**
3. Power up the device.
4. Signal-LED D is green. → **Calibration successful**
5. Set DIP3 to OFF. → **Sensitivity data and configuration data are stored**

=> If you don't want to save the settings: turn off the device while DIP3 is still in „ON" position.

Note:

If the device is turned off while saving is in progress (before LED "B" flashes), unexpected beam blankings could occur.

LED-display during calibration

	LED D	LED E	LED Rx, Tx	Description
	On	Off	Off	Calibration OK.
	Off	On	Off	Calibration acceptable, but signal strength not ideal → Reduce profile distance, remove contamination, …,
	On or Off	On or Off	On or flashing	Calibration failed Individual beams have been recognized as faulty. Only limited functionality available!

ALX installation notes

The extension board is electrically isolated from the LVX base-board and must be connected separately.

The operating current of approx. 30mA in the "0V" supply line causes a drop in voltage which influences the measurement results.

Therefore, you should be sure to:

- run this line directly to the reference potential of the signal sink (e.g. PLC).
- connect no other consumers.
- use a sufficient wire gauge. A line resistance of 1 Ohm causes a measurement error of 30mV and requires 0.75 mm² wire cross-section for a 40 m cable.

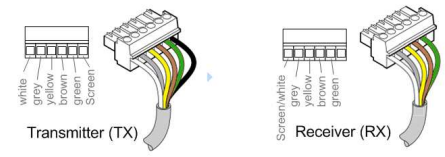
Connecting light grids

All wiring and connections have to be done in an EMC-compatible manner! Take special notice that unshielded parts of a cable shall not exceed 2cm.

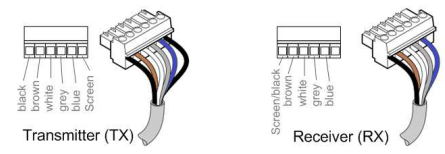
Don't mix up assignments! The light grid profiles can be damaged as a result of mixed up pin-assignments.

Special connector cables often differ in the pin-assignment. In case of doubt please call our technical service for information.

Standard:



M12 extension:



Parameterization

The shipped module has a factory installed configuration according to the discussed functionality. Refer to details in the parameterization document. Should it be necessar to change this parameterization then follw the the instruction ind the parameterization documentation.

V1.1 09.17