Inline Terminal
ILT DALI/PWR,
IB IL DALI/PWR-PAC

Device Description

This manual is intended to provide support for installation and usage of the device. The information is believed to be accurate and reliable. However, SysMik GmbH Dresden assumes no responsibility for possible mistakes and deviations in the technical specifications. SysMik GmbH Dresden reserves the right to make modifications in the interest of technical progress to improve our modules and software or to correct mistakes.

We are grateful to you for criticism and suggestions. Further information (device description, available software) can be found on our homepage www.sysmik.de. Please ask for latest information.

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Content

1 Overview

The terminal ILT DALI/PWR is a modular DALI master for use with SysMik devices ICS-500 and Scalibur.

It is used to control lamps via DALI ballasts according to IEC 60929 and IEC 62386. As defined in these DALI standards, up to 64 ballasts can be individually addressed.

The integrated DALI bus supply requires a 24 V DC supply, which can be feed in by the potential routing contact U_M or via connector 1.

Features:

- DALI master with integrated DALI bus supply
- designed for single master operation
- safe insulation of the DALI bus
- DALI bus protected against mistakenly connecting mains (up to 250 V AC)
- extensible by up to 3 terminals ILT DALI (part no. 1225-100252-05-3) or IB IL DALI-PAC (part. no. 2897910)
- indicators for diagnostics, transmission and reception

Note: This description is only valid in association with the manual “SysMik User’s Guide Inline” (see [1]).

2 Order Information

Device	Part number
ILT DALI/PWR	1225-100251-05-6
IB IL DALI/PWR-PAC	2897813

Table 2.1: Order Information

3 Connections

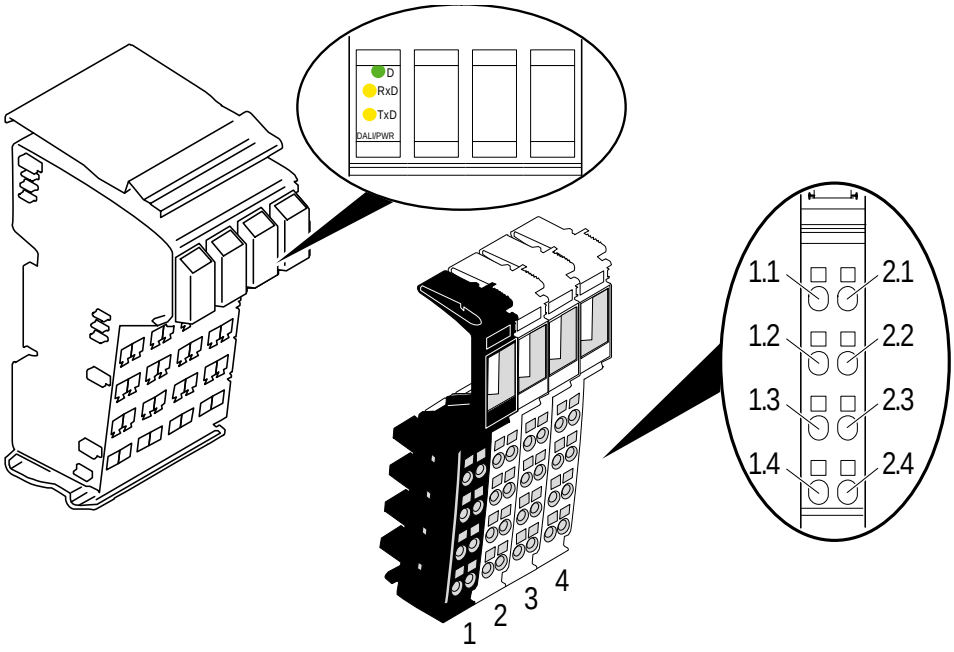


Fig. 3.1: Terminal connections

Indicator	Color	Descriptiong
D	green	Bus diagnostics
RxD	yellow	Terminal is receiving data from DALI bus
TxD	yellow	Terminal is sending data to DALI bus

Table 3.1: Local diagnostic and status indicators

Terminal point	Signal	Assignment
Connector 1		
1.2, 2.2	U_M	+24 V supply, internally connected to potential routing contact U_M
1.3, 2.3	GND	ground of 24 V supply
1.4, 2.4	FE	functional earth, internally connected to potential routing contact FE
Connector 2 and 3		
unused		
Connector 4		
1.2, 2.2	DA+	DALI bus (positive)
1.3, 2.3	DA-	DALI bus (negative)

Table 3.2: Terminal assignment

Terminal points not defined in table 3.2 must not be used.

Terminal points 1.2, 1.3, 2.2 and 2.3 are internally connected to FE by capacitors (see fig. 3.2).

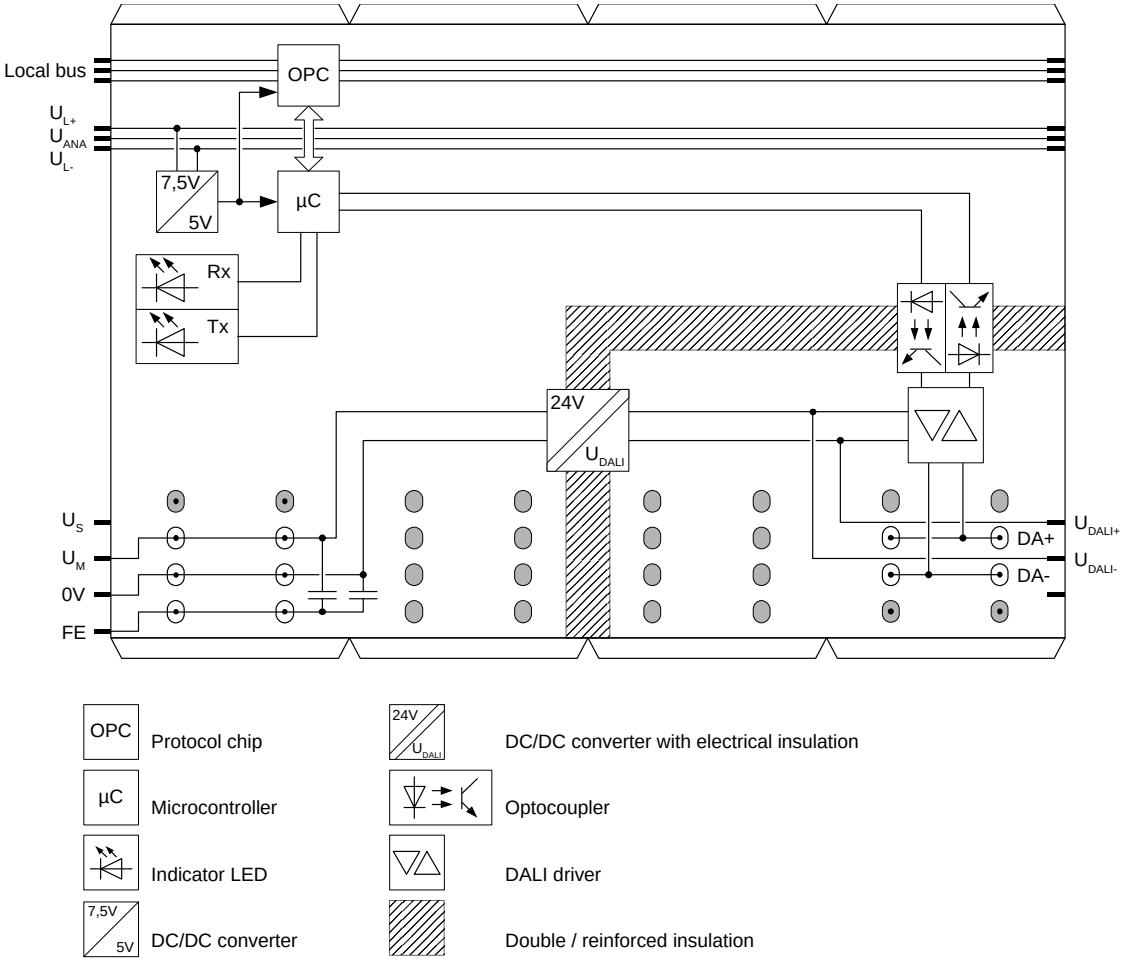


Fig. 3.2: Functional overview

3.1 Wiring Guidelines

The voltage drop between transmitter and receiver on the DALI bus must not exceed 2 V at 250 mA. Table 3.1.1 shows wiring recommendations. The maximum lead length between two connected DALI devices should not exceed 300 m.

Lead length	Minimum cross section
< 100 m	0.5 mm² (AWG 20)
100 m to 150 m	0.75 mm² (AWG 18)
> 150 m	1.5 mm² (AWG 15)

Table 3.1.1: Recommended cross sections of DALI bus wiring

Special bus cables (twisted or shielded) are not needed. Linear, star shaped and mixed structures are applicable. Ring shaped structures should be avoided.

DALI interface insulation of the electronic ballasts fulfills the requirements of base insulation only. Therefore, SELV (Safety Extra Low Voltage) is not granted on the DALI bus, despite the safe insulation of the ILT DALI/PWR.

Note: The terminal ILT DALI/PWR is not suited when the DALI bus is externally supplied, e.g. by other devices on the bus. In this case the terminal IL DALI (part no. 1225-100252-05-3) has to be used instead.

3.2 Wiring Example

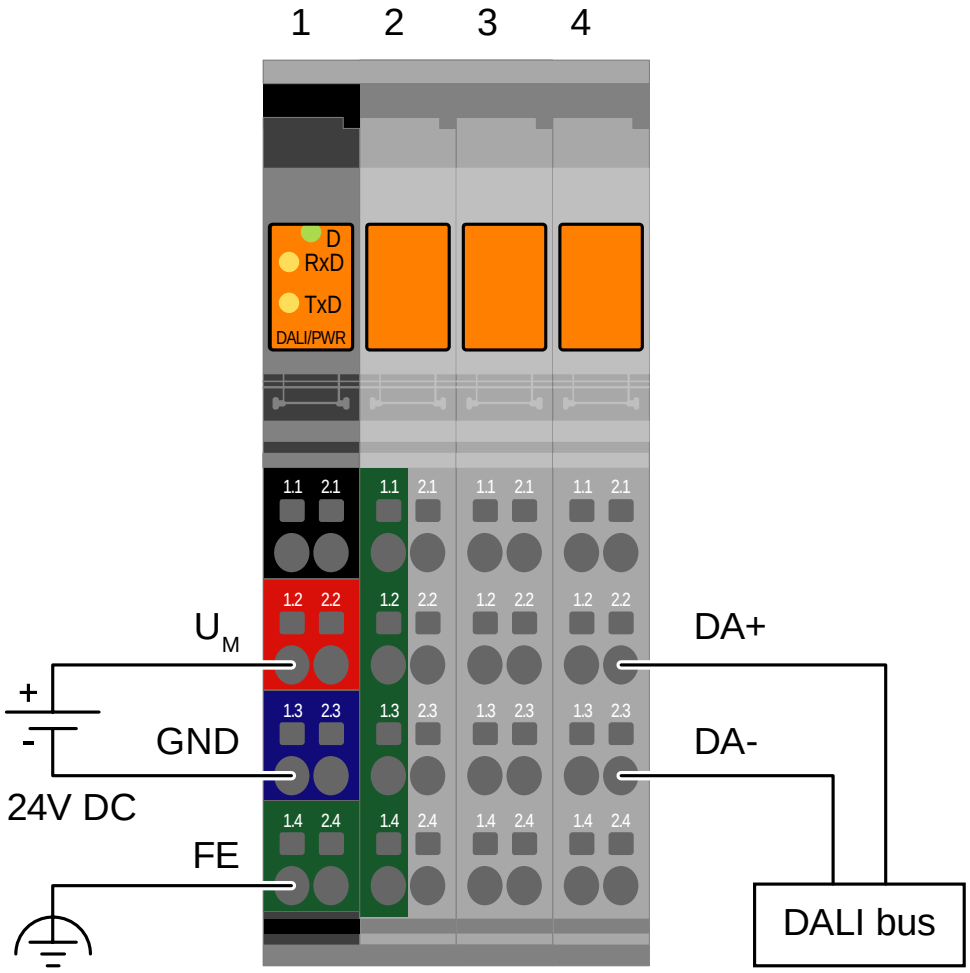


Fig. 3.2.1: Wiring example (without end terminal)

Note: The terminal must be supplied either via the potential routing contact U_M or via connector 1 (not both)!

For example, when the DALI/PWR terminal follows a 24 V section, the power is automatically supplied via the potential routing contact U_M – power supply via connector 1 is not allowed then.

3.3 Typical Terminal Arrangement

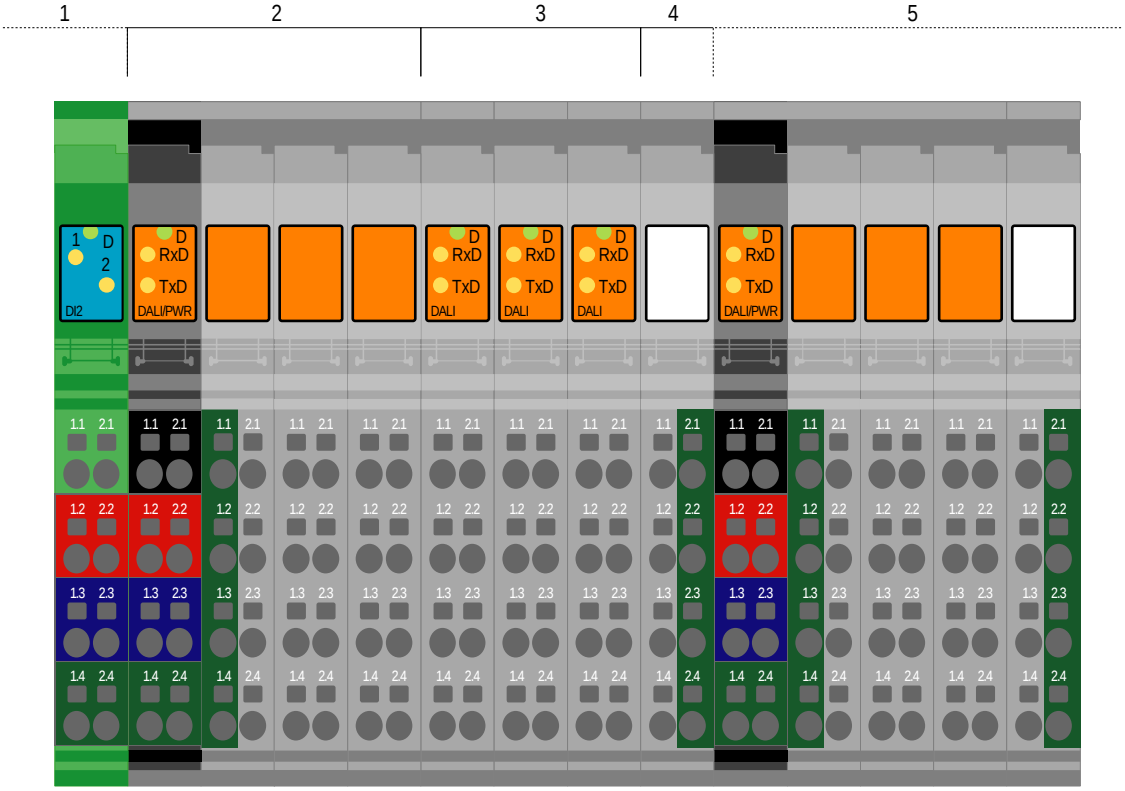


Fig. 3.3.1: Typical Inline station with several DALI terminals

Figure 3.3.1 shows a typical station using DALI terminals. The station consists of several sections:

1. 24 V section
2. Terminal ILT DALI/PWR. The DALI bus supply is fed from the preceding 24 V section via the potential routing contact (U_M). U_M and GND of connector 1 are not used.
3. Up to 3 extension terminals ILT DALI. The DALI bus supply of these DALI masters is fed from the preceding terminal ILT DALI/PWR via the potential routing contacts U_{DALI}.
4. Separation terminal of the DALI section as end terminal. The separation terminal is included in delivery of terminal ILT DALI/PWR. In any case this end terminal is required for proper termination of this DALI section – no matter how many extension terminals (0-3) are used!
5. Next DALI section, starting with terminal ILT DALI/PWR, in example without extension terminals. Because this terminal is not preceded by a 24 V section (that is, no 24 V DC is available via the potential routing contact U_M) the DALI bus supply must be fed via terminal points 1.2 and 1.3 (or 2.2 and 2.3) of connector 1. The necessary 24 V DC could be tapped at connector 1 of section 2 (observe max. allowed currents). Of course, this DALI section has to be terminated by an separation terminal as end terminal, too.

Important: Every DALI section has to be terminated by the end terminal (included in delivery of terminal ILT DALI/PWR). Otherwise the electrical insulation between U_M / U_S and the DALI bus might be compromised!

Note: The DALI busses of section 2 and 3 in fig. 3.3.1 are electrically not insulated among one another. Normally this is no problem. However, if such an insulation is required, the terminal ILT DALI/PWR can not be extended by terminals ILT DALI.

On the other hand, the DALI busses of sections 2 and 3 are electrically insulated from the DALI bus in section 5, even if all sections use the same 24 V DC supply U_M.

4 Technical Data

General data		
Housing dimensions (width x height x depth)		48.8 mm x 120 mm x 71.5 mm (1.921 in. x 4.724 in. x 2.815 in.)
Weight with connectors		235 g (190 g without End terminal)
Permissible temperature	operation	-25 °C to +55 °C (-13 °F to +131 °F)
	storage / transport	-25 °C to +85 °C (-13 °F to +185 °F)
Permissible humidity		75% on average, 85% occasionally (non condensing)
Permissible air pressure	operation	80 kPa to 106 kPa (up to 2000 m / 6562 ft.above sea level)
	storage / transport	70 kPa to 106 kPa (up to 3000 m / 9843 ft. above sea level)
Degree of protection		IP20 according to IEC 60529
Inline connector		
Connection type		spring-clamp
Rated cross sectioin		0,2 mm² to 1,5 mm², AWG 24 - 16
Insulation stripping length		8 mm

Interfaces	
DALI	
Bus supply	typ. 14 V
Output current in short circuit	≤ 250 mA
max. bus load	128 mA, observe derating when using DALI extension terminals
Data rate	1200 Bit/s
Protection	bus protected up to 250 V AC

Power consumption	
Communications power U_L	7.5 V DC
Current consumption at U_L	≤ 38 mA
Main power U_M	24 V DC
Current consumption at U_M	$I_M \approx 0.86 \times \sum I_{DALI}$ $\sum I_{DALI}$ sum of DALI bus loads, including all DALI extension terminals

Power dissipation

Equation to calculate the power dissipation in the terminal

$P_{EL} = P_{BUS} + P_{DRV} + P_{SUPPLY}$

$P_{BUS} = 0.27$ W

$P_{DRV\ max} = 0.56$ W + I_{DALI1} (I_{DALI1} x 3.85 Ω + 0.47 V)

$P_{DRV\_ICS} = 0.37$ W + I_{DALI1} (I_{DALI1} x 4.7 Ω + 0.58 V)

$P_{SUPPLY} = \sum I_{DALI}$ x 3.6 V

$\sum I_{DALI} = I_{DALI1} + I_{DALI2} + I_{DALI3} + I_{DALI4}$

$\sum I_{DALI} \approx N$ x 2 mA

Where

P_{EL} total power dissipation in the terminal

P_{BUS} power dissipation through bus operation

P_{DRV} power dissipation through DALI bus-driver, depends on DALI bus load and bus activity (idle, transmit, receive)

P_{DRV_ICS} typical power dissipation of bus driver, when using buscontrollers of the Inline Control Server family ICS

P_{SUPPLY} power dissipation through DALI power supply

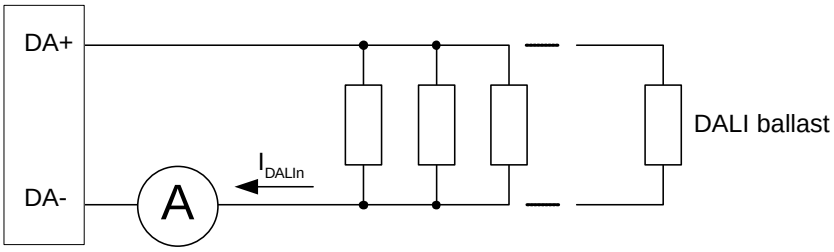
I_{DALIn} DALI bus load of a particular terminal

I_{DALI1} DALI bus load of the terminal ILT DALI/PWR

$\sum I_{DALI}$ load of the DALI power supply, including all DALI extension terminals

N number of all DALI ballasts which are connected to the DALI/PWR terminal and it´s up to three DALI extension terminals
$0 \leq N \leq 256$

The above approximation of the DALI bus load $\sum I_{DALI}$ refers to the maximum value of 2 mA per ballast as described in the DALI standard. For precise values use the technical data of your ballasts or measure the actual load.



The complete load is the sum of all measured currents I_{DALIn} at the terminal ILT DALI/PWR and all extension terminals ILT DALI that are connected to it.

Limitation of simultaneity, derating

Max. allowed sum current $\sum I_{DALI}$ dependent on ambient temperature T_{amb}

T_{amb}	$\sum I_{DALI}$	Number of ballasts (example)
up to 45 °C	≤ 512 mA	4 x 64
up to 50 °C	≤ 400 mA	3 x 64
up to 55 °C	≤ 330 mA	3 x 55

Protective equipment	
Overvoltage protection on DALI bus	varistor 275 V
Short circuit on DALI bus	electronic fuse, no time limit

Electrical Isolation / Isolation of the voltage areas	
Common potentials	
The 24 V main voltage U_M, and GND have the same potential. FE is a separate potential area.	
Separate potentials in the terminal ILT DALI/PWR	
Test distance	**Test voltage**
7.5 V supply (bus logic) vs. 24 V supply (peripherals) and FE	500 V AC, 50 Hz, 1 min
7.5 V supply (bus logic) vs. DALI bus routine test	2500 V AC, 50 Hz, 1 min 1200 V AC, 50 Hz, 1 min
24 V supply (peripherals) and FE vs. DALI bus routine test	2500 V AC, 50 Hz, 1 min 1200 V AC, 50 Hz, 1 min

Error messages to higher-level control system
Peripheral error in case of DALI supply error or short circuit of DALI bus

Table 4.1: Technical data

5 Literature

[1] SysMik User's Guide Inline

[2] DALI Manual, DALI AG, www.dali-ag.org

[3] www.sysmik.de