LSS

PowerSwitch
12 x 20A

Twelvefold switching actuator 20A (4600VA) for DMX512 and Profibus

User Manual

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The Licht-, Steuer- und Schaltanlagenbau GmbH is certified member of the Profibus User Organization PNO.

The ESTA-Manufacturer-ID of Licht-, Steuer- und Schaltanlagenbau GmbH is „LS“ (76,83 / 4Ch,53h).

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Introduction

How to use this manual

This manual provides advices and information's about the function and configuration of the *PowerSwitch 12 x 20A*.

Like all devices of LSS GmbH the *PowerSwitch 12 x 20A* is constantly evolving technology. It is therefore possible that this manual does not explain later development forms.

This manual uses the following symbols to indicate important information for your safety and for configuration.

Here you get additional information's.

Attention alerts you to situations in which decisions can provoke to technical problems with the equipment or losing data.

A Warning statement indicates situations in which can result in injury or damage to life and limb.

Safety advices

Proper care of the *PowerSwitch 12 x 20A* is not dangerous. However please note the following:

- Authorized personnel must install the device!
- Never operate with visibly damaged devices!
- If the suspect prior to a defect, immediately disconnect the device from the power supply! Secure the device to restart!
- Employees of the LSS GmbH may only make repairs!

Instructions fore use PowerSwich 12 x 20A

The *PowerSwitch 12 x 20A* is designed for continuous operation. However please note the following:

- Use the device only for its intended purpose!
- Avoid extreme mechanical loads!
- Avoid direct exposure to moisture and excessive heat on the device!

Typical applications

Typical applications of the *PowerSwitch 12 x 20A*

The *PowerSwitch 12 x 20A* is a switch assembly with bistable, poled relays in a compact de- sign. With it up to twelve independent resistive, inductive or capacitive loads can be switched. Each channel can supply loads up to 4600VA at 230V. Every switching status of each channel can be read directly on the switch actuator.

The input control of the *PowerSwitch 12 x 20A* is done with Profibus (IEC 61158 / IEC 61784) or DMX512. So the switching actuator supports the two most popular control protocols in lighting and wiring installation. The *PowerSwitch 12 x 20A* is also equipped with a comfortable configura- tion. The front panel configuration switches will be set the DMX / Profibus start addresses, the switching behaviour at DMX signal loss and the termination of Profibus. In addition, the switching relays can also be switched manually directly on the device.

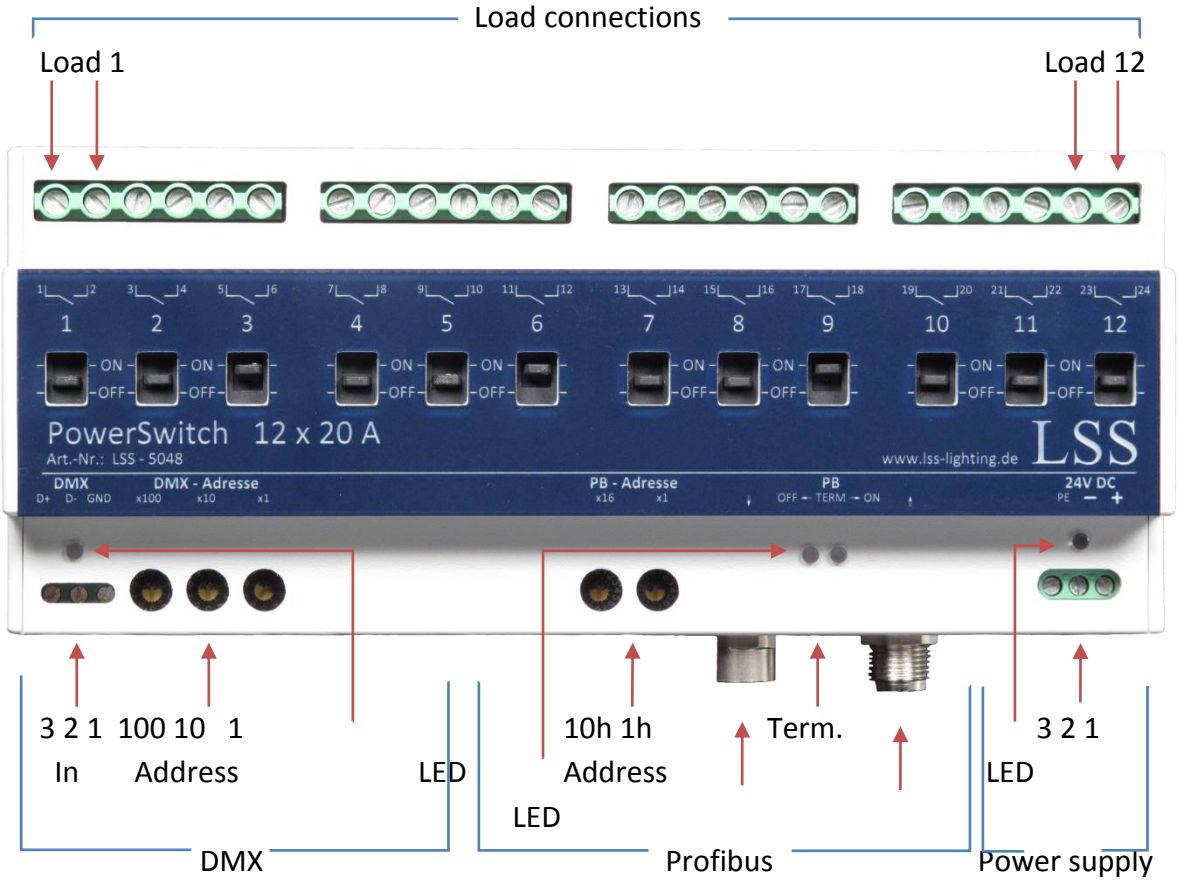
The *PowerSwitch 12 x 20A* is designed for installation in electrical control cabinets and junc- tion boxes. For that he is equipped with a socket for DIN rail.

Functional survey

Ports and Operating

Device overview

The configuration options of *PowerSwitch 12 x 20A* are situated on the front side. Electricals loads are connected at the top of the device, data ports und power supply at the underside.



Data Ports

DMX

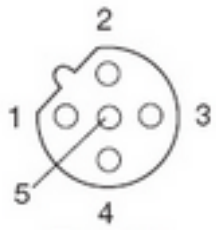
The DMX port is optically isolated and has an extensive EMC filter. DMX is connected as shown in the table:

3	2	1
Data +	Data -	GND

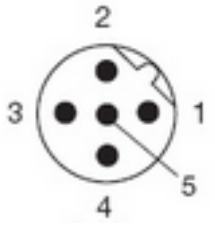
Profibus

Profibus is supplied via M12 connector (male & female) and forwarded. Using pre-assembled cables can save a lot of time during the installation of several power switches next to each other. The cable shield is loop through the metal sleeve.

PIN-Assignment



M12-B femal



M12-B male

1	2	3	4	5
not connected	A (green)	not connected	B (red)	not connected

The Ground is looped on the metal sleeve.

Baud rate

The *PowerSwitch 12 x 20A* support Profibus DP (Decentralized Peripherals) with full baud rate. A standard GSD file is available.

Power Supply

The switch actuator requires 24V DC, which must be connected to the 3-pin 5.08mm terminal:

3	2	1
PE	GND	+24V

The current consumption of the *PowerSwitch 12 x 20A* in rest is about 70 mA, in the switching with all 12 relays for the duration of the switching pulse about 2A. The switch pulse is about 30ms. The maximum switching rate is about 60ms (30ms pulse, 30 ms off).

Relays

The load is connected to 7.62 mm terminal strip. As shown in the image, two adjacent terminals are the closer of one relay. The following image shows the switching status of a relay:

Off	**On**
◘	◘

LED reports

Overview

The LEDs have the following meanings from left to right:

LED	Colour	Meaning
DMX	Green	DMX reports, see below
Profibus	Yellow	Profibus is in data exchange, Profibus is running
Profibus	Green	Profibus reports, see below
Power	Green	24V DC power supply ON

DMX LED

DMX LED shows following reports:

Signal	Meaning
Off	No incoming DMX signal present
Short-time flash	DMX test adresses 901…904 are adjusted
Cyclical flash	Incoming DMX signal incorrect (Data + / - reversed; wrong timing or level; false start code) or incoming RDM signals
Permanently on	Incoming DMX signal, HOLD is not active
On and flashes at 1s time-lag	No incoming DMX or Profibus signal present, HOLD is active

Profibus LED

The green Profibus LED indicates the following reports:

Signal	Meaning
Off	No Profibus signal present (A/B reversed?)
Short flash 1x	Profibus signal present, data exchange impossible (false address, address not included into the master, cable A/B reversed)
Blinking 1x	Hardware failure, module is defective
Blinking 2x	Parameterization error. Check master programming!
Blinking 3x	Configuration error. Check master programming!
Blinking 4x	Hardware failure, module is defective
Permanently on	Data exchange ok, Profibus ok, no watchdog, HOLD active in case of data loss
On and flashes at 1s time-lag	Data exchange ok, Profibus ok, watchdog ok, in case of data loss all data will be erased

In addition, the following condition can occur:

DMX and Profibus LEDs flashing quickly	CPU clock incorrect (PLL error) due to extreme disturbances in the power supply or hardware failure, PowerSwitch 12 x 20A is defective

Configuration

Priority of Data Signals

PowerSwitch 12 x 20A can receive DMX and Profibus signals simultaneously. The Profibus has always priority over DMX when the device is in the state of data exchange. This means there is no merging of data.

Certain Profibus global control commands during the Data Exchange, e.g. PLC in STOP, cause an Off of all relays or, if HOLD is set, holding the last relay position.

Without Data Exchange the control is on DMX. If the DMX signal is missing and depending of the HOLD settings, all relays are turned off or holding the last state. Is the incoming DMX signal switched off the DMX timeout of 2 seconds take effect.

If the device is switched off and on again, the last switching state will be received for the first 3 seconds after the switch. Is HOLD active and none of the two input signals is present, the switching state is also obtained in addition. Otherwise, the relays will be switched in depending of the input signal or switched off when no input signal is present.

PowerSwitch 12 x 20A is not able to detect the switching state of manually switched relays itself. These relays maintain their switching status until they are contacted directly by changing "their" bit or DMX circuit.

DMX Settings

DMX adress

Three decimal rotary switches sets the DMX address.

From left to right: 100, 10, 1

Only addresses from 001 to 501 and test addresses m901 to 904 will be evaluated. All other addresses are invalid and their DMX data will be ignored.

DMX signal

PowerSwitch 12 x 20A uses the 12 circuits from the set address. Is the incoming value ≥50% (≥128) the relay is switched on. The timeout when no input signal is present is 2 seconds. Faulty protocols will be ignored.

HOLD can be activated by using a higher Profibus switch (address ≥ 80h). The description of this follows in the "Profibus settings"

Self-test

A self-test can be activated with the DMX addresses 901 to 904:

901 = On/Off test of all relays with about 1 second
902 = On/Off test of all relays with about 60ms
903 = Running light with about 1 second
904 = Displays the firmware version with relays (1 = 1, 2 = 2,etc.)

Never run the self-test with connected loads!

Profibus Settings

Profibus address

Two hexadecimal rotary switches set the Profibus address.

From left to right: 10h, 1h

The addresses 00h to 7Eh are evaluated for Profibus. Addresses 80h to FEh are evaluated just as the addresses 00h to 7Eh but in addition, the HOLD function is activated.

Example: Setting „0“ „4“ = DP-address 04h (4 decimal)
Setting „9“ „C“ = DP-address 1Ch (28 decimal) and HOLD active

Profibus termination

Is *PowerSwitch 12 x 20A* located at the end of a Profibus bus segment; a slide switch can terminate the bus.

Profibus signal

The *PowerSwitch 12 x 20A* uses 4 Byte Out and 4 Byte In (4DO, 4DI). Parameter setting is not necessary. GSD file and bitmaps are present.

I/O	Byte	Bit	Meaning
Out	0	0…7	Relay switching Bits 1…8
	1	0…3 4…7	Relay switching Bits 9…12 Reserved
	2	0…7	Reserved
	3	0…7	Reserved
In	0	0…7	Relay Feedback 1…8
	1	0…3 4…7	Relay Feedback 9…12 reserviert
	2, 3	 0…11 12 13 + 14 15	1 word DMX diagnoses set DMX address (0…999) =1: DMX task is running Both =0: DMX signal is not present Both =1: DMX-Signal ok Or else frame error / polarity-reversed wire HOLD active
	3	0…7	Relay Feedback 1…8

HOLD can be activated in two ways for Profibus failure:

1. With response

   When response is active, the green Profibus LED flashes unsteadiness.

   When response is not active (so HOLD is active), the green Profibus LED flashes permanently.

2. With the larger Profibus addresses (≥ 80h):

   At the input must be applied no DMX signal!

   The Profibus data will be hold in the DMX memory.

Simatic STEP7

Watchdog:	its a checkbox at the Profibus settings
GSD file:	Copy the GSD file to …\STEP7\S7DATA\GSD
Bitmap file:	Copy the Bitmap file to …\Step7\S7DATA\NSBMP

Update the catalogue. The *PowerSwitch 12 x 20A* appears in "Profibus-DP - Additional Field Devices - IO - LSS".

Appendix A

Technical Data

General technical data

Design type:	housed hardware module for DIN-Rail
Setting elements:	rotary switches
Dimensions:	B x D x H (in mm) 217 x 63 x 90
Power supply:	10...30 V DC
Quiescent current:	0,1A
Operation current:	2,0A
Electric consumption:	2W
Weight:	0,8kg
Security standards:	IEC/EN 60950, UL/cUL 1950 (File E141988)
RoHS-conform:	yes
Order number:	5048

Ports

Profibus:	*Binder* Series 766 5-BU-LP und 5-ST-LP
DMX:	*Phoenix* MKDSN1,5/3-5,08
24V:	*Phoenix* MKDS2,5/3-5,08
Schaltausgänge:	*Phoenix* MKDS5/2-7,62

Relays

Switch contacts:	$AgSnO_2$
Minimum mechanical circle:	1.000.000
Maximum switching current:	20 A
Maximum switching power:	440 V AC
Maximum switching capacity:	10 kVA / 15 kVA
Proof voltage:	1500 V eff.

Switching capacity

Filament lamp:	4800 VA
Luminescent screen tabs uncomp.:	5000 VA
Luminescent screen tabs parallel comp.:	2500 VA / 200 µF
Halogen lamp (230V AC):	5000 VA
Low voltage halogen lamp with transformer:	2000 VA
Sodium/mercury vapour lamp:	5000 VA
Dulux Compact Luminescent screen tabs uncomp.:	4000 VA
Dulux Compact Luminescent screen tabs parallel comp.:	3000 VA / 200 µF

(Information for 30.000 operations)

DMX

Number of Inputs:	1
	Isolated ANSI E1.11 A1
Electrical isolator:	Optocoupler
Isolation volate:	1000V DC
EMC:	Filter switching
Standards:	USITT 1990, DIN 56930-2, ANSI E1.11
Baud rate:	250 kbps
Start code:	0
Minimum protocol length:	Start code only
Maximum protocol length:	Start code + 512 values (values over 512 will be lost)
Minimum cycle delay:	44 µs
Maximum cycle delay:	22,5 ms
Reception timeout:	2 s
Max. distance between 2 packets:	2 s
Minimum realized break length:	48 µs
Maximum valid break length:	1,95 s

Profibus

Supported Baud rates:	9,6 kBit/s...12 MBit/s
Station address:	0...126
TSDRmin:	11 Bit times
PNO-Identnumber:	0C51h
GSD file:	available
Diagnosis:	1 Byte external diagnosis (parametrical)
Slave type:	Compact slave
Slave character:	FREEZE, SYNC, AUTOBAUD supported
Length output:	4 Byte
Lenght input:	4 Byte
Summary of Input/Output bytes:	8 Byte
Profibus chip:	SPC3
Length user parameterization:	1 Byte (SPC3 specific)
Number of modules:	1