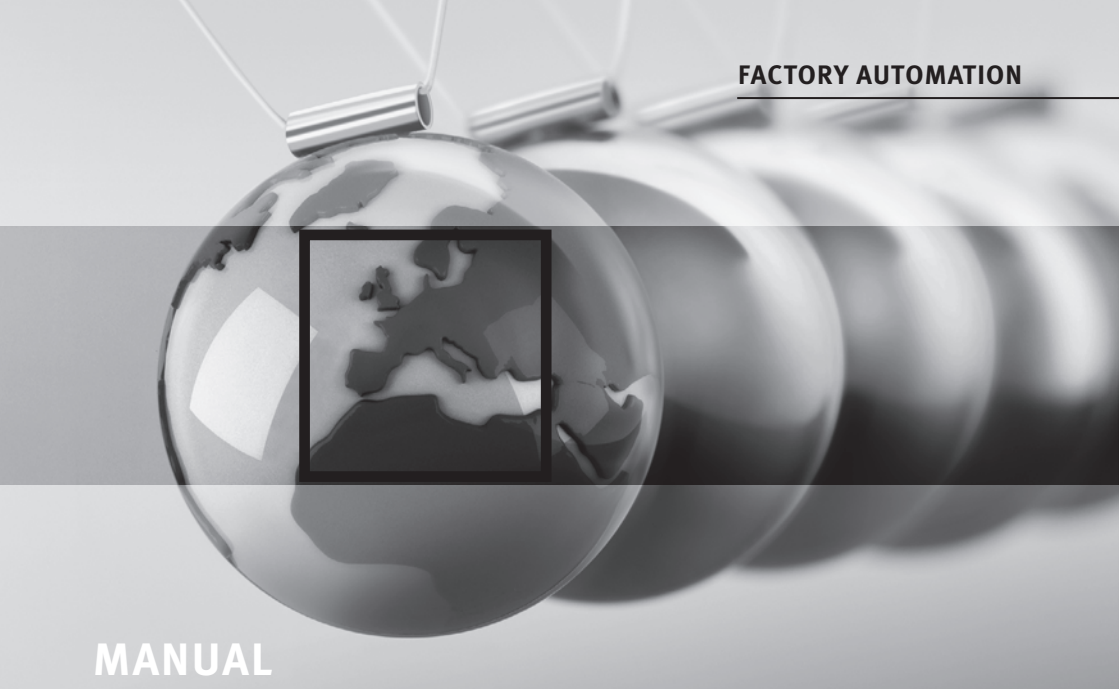

MANUAL

Optical data coupler LS600-DA-IBS

InterBus

CE

PEPPERL+FUCHS
SENSING YOUR NEEDS

With regard to the supply of products, the current issue of the following document is applicable:

The General Terms of Delivery for Products and Services of the Electrical Industry, published by the Central Association of the Electrical Industry (Zentralverband Elektrotechnik und Elektroindustrie (ZVEI) e.V.)

in its most recent version as well as the supplementary clause: "Expanded reservation of proprietorship"

Part No. 220570
07/28/2009
Date of issue

PEPPERL+FUCHS

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1 Introduction

Congratulations!

You have chosen a device from Pepperl+Fuchs. Pepperl+Fuchs develops, produces, and markets electronic sensors and interface components for the automation technology market worldwide.

Contact

If you have questions about the device, accessories, or other functions, please contact:

Pepperl+Fuchs GmbH
Lilienthalstraße 200
68307 Mannheim
Phone: +49 621 776-4411
Fax: +49 621 776-274411
E-mail: fa-info@pepperl-fuchs.com

1.1. Warranty

Pepperl+Fuchs manufactures its hardware products according to recognized industrial standards. Pepperl+Fuchs guarantees its products to be free of defects in material and workmanship provided the products are used under the normal operating conditions specified by the manufacturer. The warranty applies only to the original owner and is not transferable. All accompanying exclusions of liability, restrictions, and other conditions of this section apply to this warranty.

Exclusions of liability

No warranty obtained or granted hereby shall apply to products that:

- have been repaired, modified, or tampered with unless explicitly performed or approved by Pepperl+Fuchs
- have not been serviced in accordance with the Operating and Handling Instructions provided by Pepperl+Fuchs
- have been exposed to unusual physical or electrical loads, immersed in liquids, or exposed to any one of the following circumstances:
    - breakdown
    - crushing
    - improper use
    - misuse
    - low current
    - unsuitable power supply
    - reverse polarity
    - negligence or accident
- has been used for any purpose other than what is described in the Operating and Handling Instructions

Preventive maintenance is the customer's responsibility and is not covered by this warranty.

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General

With the exception of the warranties noted above, Pepperl+Fuchs offers no warranties for products delivered below in any form whatsoever, whether explicit or implicit, including, but not limited to implicit defect warranty services and guarantee of suitability for a specific purpose, and absence of injury. The explicit warranties noted above shall satisfy all obligations and liabilities of Pepperl+Fuchs for damages, including but not limited to concrete damages, indirect damages or consequential damages in connection with the use or design of the product. The seller's liability to the buyer and other persons (regardless of the origin of liability, whether it be based on contract, warranty, impermissible handling, misuse, and/or other origin) in connection with the use of a product shall in no case exceed the original purchase price of the product. Pepperl+Fuchs shall in no event be liable for consequential damages, concrete and indirect damages, secondary damages or penalties, or lost profits, sales, or loss of data, even if Pepperl+Fuchs had been made aware of this possibility.

2 Declaration of Conformity

We, Pepperl+Fuchs GmbH, hereby declare on our sole responsibility that the

LS600 Optical data coupler

and all models of this product to which this declaration refers are in conformity with the following standards and other regulatory documents

EN 60947-5-2

Product family standard: Electromagnetic Compatibility (EMC for light industry and industry)

	A corresponding Declaration of Conformity may be requested from the manufacturer.

Pepperl+Fuchs GmbH in D-68301 Mannheim has a certified quality assurance system in conformity with ISO 9001.

CE

ISO**9001**

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3 Safety

3.1. Symbols used

Safety-related symbols

	**Danger!** This symbol identifies an immediate and present danger. Failure to observe this warning may result in personal injury or even death.
	**Warning!** This symbol warns of a possible malfunction or hazard. Failure to observe this warning may result in personal injury or extensive damage to property.
	**Caution!** This symbol warns of a possible malfunction. If the instruction given in this warning is not heeded, the device and any plant or systems connected to it could develop a fault or even fail completely.

Informative symbols

Note!
This symbol draws your attention to important information.

3.2. General safety instructions

The following basic instructions must be observed in all cases:

- The device must not be placed in service until the manual has been read and understood
- The power device for generating the power supply voltage must be reliably insulated electrically by means of double insulation and a safety transformer according to DIN VDE 0551 (corresponds to IEC 742).
- The device must not be used outside the specification without suitable protective measures
- No unauthorized tampering with the device is permitted
- Do not point the device directly at the sun or measure into the sun
- Do not remove the warning instructions or rating plates

The radiation emitted by a Class 1 laser is harmless. This type of laser instrument can be operated by anyone.

The system operator is responsible for planning, assembly, commissioning, operation, and maintenance of the system.

Installation and commissioning of all devices must only be performed by personnel specially trained for that purpose.

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The protection of the system and operating personnel is not ensured if the module is not used according to its intended purpose.

Observe the applicable laws and regulations for use and for the intended purpose. The devices are only approved for proper use in accordance with intended purpose. Any other use voids all warrantee claims and manufacturer's responsibility.

Use only recommended original accessories.

If you are unable to eliminate malfunctions, take the device out of operation. Secure the device against accidental operation. Return the device to Pepperl+Fuchs for repair. Own interventions and modifications are potentially hazardous, and any guarantee and manufacturer's liability shall become void.

Dispose of the useless device in keeping with the applicable national legal regulations.

For example, you can take the sensor to the designated collection point for electronic scrap.

The LS600 corresponds to the laser protection class 1 and is eye-safe according to DIN EN 60825-1.

	*In applications with shelf distances and moving carriages, care must always be taken to observe the applicable safety regulations. Failure to do so will result in grave danger to life and limb!*

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4 Identification

- Optical data transmission for InterBus-S.
- Range: 0.5 m ... 200 m; /RT: 0.5 m ... 100m
- Galvanically isolated interface
- Baud Rate: 500 kBaud
- Indication of status and functionreserve by LED´s
- Large-scaled alignment aid, red flashing
- Integrated telescopic sight
- Input for switching off the transmitter
- Power supply: 24 V DC ± 25%
- Function reserve outputs, P-switching

The LS 600-DA-IBS is a two-part light beam system for the serial infrared data transmission over a range of 200 m with a baud rate of up to 500 kbaud.
The devices contain each one transmitter and receiver so that to built one full duplex path just one pair of devices is required. The transmission takes place in real time and is protocol free. The bus driver termination is due to InterBus-S.

4.1 Data transmission

The data are transmitted in full duplex mode. They are carried by infrared light beams. The light is modulated by frequency shift keying (FSK).
To avoid interference, for both directions of transmission are chosen two different center-frequencies F1 and F2, i.e. the transmitter in the unit LS 600-DA/ F1 works with frequency F1, the receiver in the same housing works with F2, and vice versa on the opposite side.
The red function indicator LED under the covering of the viewfinder on top of the housing illuminates, when the signal strength is just sufficient for operation. (function reserve factor 1). The data transmission is only released after having passed this signal level.
When signal strength reaches the double value of that level, the green function indicator LED illuminates and shows a sufficient function reserve. The indication of function reserve is independent from data transmission.
An additional optical system was integrated besides the receiver-lens to ease the alignment. It flashes red, after switching power on. This grants the receiver to be perceptible even on a long distance.
After adjusting the devices on at least signal level of factor two, this indication goes out.

4.2 Interface

The LS 600-DA-IBS has a data refreshing circuitry as well as data flow circuits being galvanically isolated from the power supply.
For indicating bus-activity there is a yellow LED for receiving data, a green one for transmitting data.
In case of light beam interruption, the idle-state level "low" is automatically activated due to falling below the level of function reserve factor 1.
It is very likely that data messages are destroyed in the moment of turning to complete interruption. This can only be avoided if the interruption is avised with a maintenance signal, which is usually used for switching off the transmitter.
The InterBus-signal RBST (BCI) is not served.

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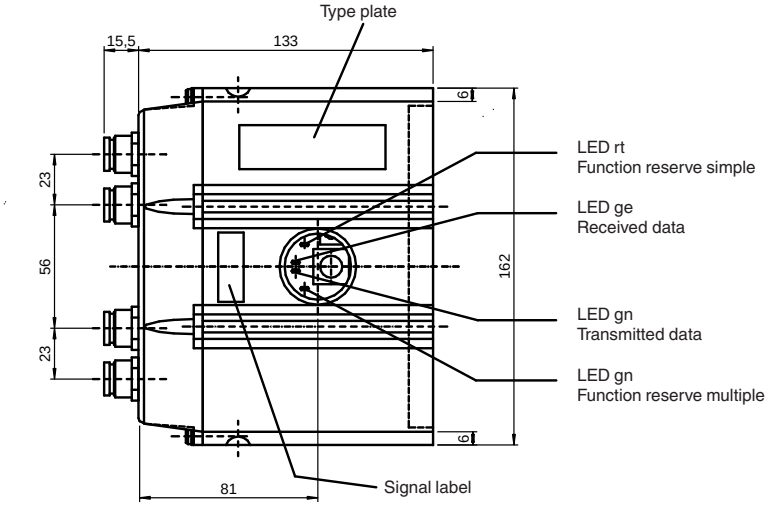
4.3 Function indicators:



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5 Mounting/Alignment

The units are fixed into position by means of the mounting-bracket.

On the upper side of the housing is a viewfinder for the telescopic sight which can be used for approximate alignment. The receivers lens of the opposite unit should be sighted so that it lies next to the marked center.

The housings, as opposed to the mounting bracket, are adjustable vertically and horizontally.

The horizontal adjustment angle is ± 4°,

the vertical adjustment angle is ± 90°.

The alignement should be done preferably at the maximum distance but at least in a distance of 7 to 10 meters. The device has to be adjusted until the red flashing light of the opposite side become extinct. After doing the same procedure on the opposite side the alignement is completed. The alignement must not be changed at low distances.

Note that within the short range the optical receiver is overdrived so a correct adjustment based on signal strength display is not possible.

If the minimum distance is as short as 2 meters the optical connection between the devices must be accomplished by special kind of mounting:

1. The view of sight can be expanded up to less than 1m by performing a parallel shift of the optical axis of app. 40 mm. The telescope pointer is to aligne to the middle of the appropriate transmitter lens.
2. The head-first mounting of one device provides a short distance range of less than 500 mm. Good results of adjustment are obtainable if the top of telescope pointer making coincide the middle of the receiver optics. Helpfully in this case is to power off the devices to prevent glaring by the red flashing light.

The desired orientation (90°, 180°, -90°) can be accomplished by unfixing the four allen screws at the bottom plate and relocating the flange to the appropriate side of housing.

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5.1 Electrical connection

Pin	Name	Description
1	DI*	(Data+) receiver (bus cable)
2	/DI*	(Data-) receiver (bus cable)
3	GNDI*	Data Ground insulated
4	DO*	(Data+) driver (bus cable)
5	/DO*	(Data-) driver (bus cable)
6	GNDI*	Data Ground insulated
14	/TX-DIS	Emitter deactivation for 0 ... 1 V
15	FRES1	Stability control output, simple, PNP 0.1 A/ 30 V DC
16	FRES2	Stability control output, double, PNP 0.1 A/30 V DC
21	UB+	Supply voltage U+
22	UB+	Supply voltage U+
23	UB-	Supply voltage 0 V
24	UB-	Supply voltage 0 V

Table 5.1: Electrical connection

* : are galvanically isolated from all other pins

Data inputs and outputs refer to the potental GNDI.
Not described pins are not internally connected but should not be used.

The double connections GNDI (3, 6), UB+ (21, 22) and UB- (23, 24) are connected on the pc-board.

The switches S2 + S3 behind the terminal block cover can be closed (position ON), so that the incoming and outgoing data lines are linked. That provides signal looping during the installation, as long as the data transmission units are not yet mounted.

Before placing the optoelectronic device onto the terminal block, these switches must be set into the "OFF" position.

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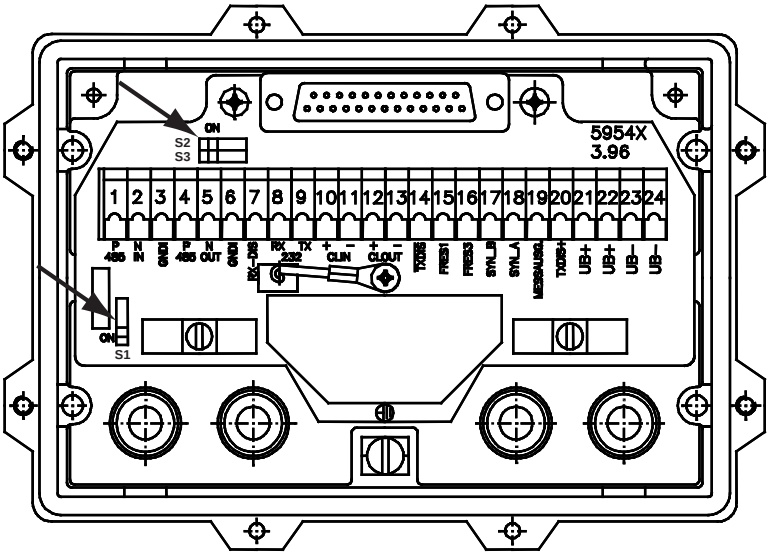
5.2 Terminal box



Switch positions:

S1	ON	Shielding galvanically on ground potential housing
	OFF	capacitive coupling to ground potential / housing
S2 and S3	ON	data inputs and outputs linked
	OFF	normal operation mode

Table 5.2: Switch positions

Before mounting the optoelectronic device these switches must be off!

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6 Application notes

The data transmission unit causes a signal delay of 4 ... 5 µsec. This fact has to be taken into consideration, when calculating the responsetime of a device being connected with the LS600-DA-IBS to the bus-system, which will be delayed, i.e. of 8 ... 10 µsec.

The switch S1 inside the clamp block connects the shielding of the data-cable directly galvanically (ON) or with capactive coupling (OFF) via an capacitor 10 nF/630 V to housing potential. The last might be necessary in case of unavoidable low frequent noise on ground potential.

To obtain the expected performance of the data transmission unit it requires regular working conditions as permanent powering the devices and the absence of mirrors or strange optical activities within the field of view. If it is inevitable to power off only the carside device it is recommended to arrange the devices as shown in the application example.

The switches S2 + S3 behind the terminal block cover can be closed (position ON), so that the incoming and outgoing data lines are linked. That provides signal looping during the installation, as long as the data transmission units are not yet mounted.

Before placing the optoelectronic device onto the terminal block, these switches must be set into the "OFF" position.

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7 Appendix

7.1 Technical data

General specifications		
Effective detection range		0,5 ... 200 m (layout for operating range < 2 m see installation note)
Option /35		0,5 ... 230 m
Option /RT		0,5 ... 100 m
Light source Option /RT		IRED LED
Approvals		CE
Alignment aid		Telescopic sight, frontal red LED flashing, off with Signal > sufficient stability control
Transmission mode		FSK
Light type Option /RT		infrared, alternating light red, alternating light
Diameter of the light spot		2500 mm at a distance of 100 m
Angle of diverence		1,4 °
Ambient light limit		1000 Lux
Indicators/operating means		
Data flow display		LED green: emitter LED yellow: receiver
Function display		LED red: 1-fold stability control LED green: Sufficient stability control
Electrical specifications		
Operating voltage	U_B	24 V DC ± 25 %
Operation frequency		
		F1 = 8,5 MHz ± 250 kHz
		F2 = 13,5 MHz ± 250 kHz
No-load supply current Option /GUF	I_0	450 mA max. 1.5 A
Interface		
Interface		RS 422, galvanically isolated
Bus load		180 Ω at receiver input
Signal delay		app. 5 µs
Output		
Output of the pre-fault indication		2 pnp-outputs, short-circuit proof, 30 V DC 0.1 A activated for single or sufficient stability control
Standard conformity		
Standards		EN 60947-5-2

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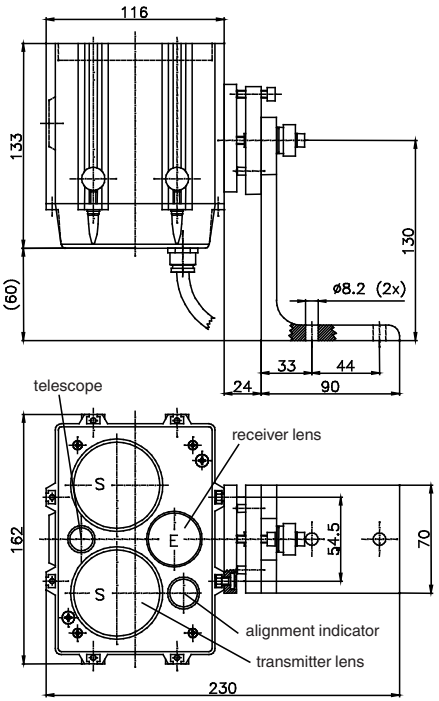
Ambient conditions	
Ambient temperature	-20 ... 50 °C (253 ... 323 K)
Option /GUF	-35 ... 50 °C (238 ... 323 K) with heated housing
Storage temperature	-20 ... 75 °C (253 ... 348 K)
Mechanical specifications	
Protection degree	IP65 to DIN 40050
Connection	4 PG9 screwed connections , spring-loaded terminals in the terminal compartment
Material	
Housing	Aluminium, black, lacquered
Optical face	Glass screen
Weight:	2000 g

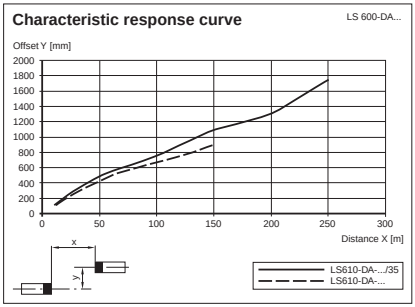
Table 7.1: Technical data

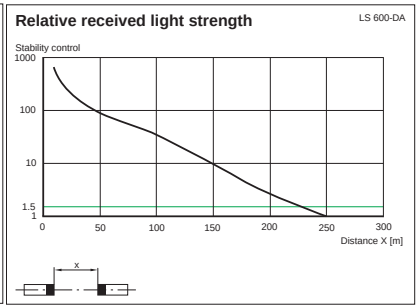
7.2 Dimensions with mounting bracket



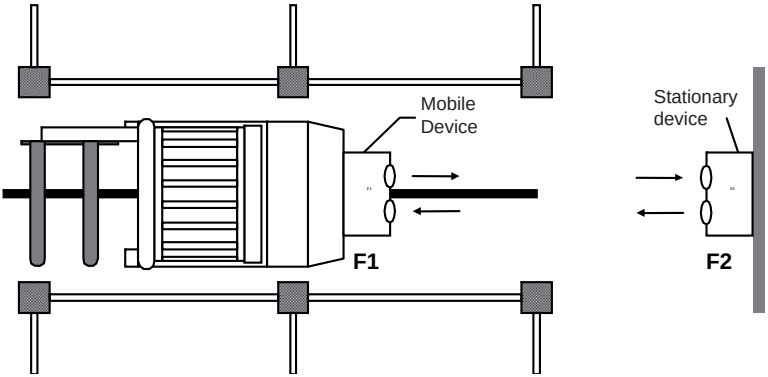
Picture 7.2: Dimensions with mounting bracket

7.3 Diagrams





7.4 Arrangement example of shelf causing advice



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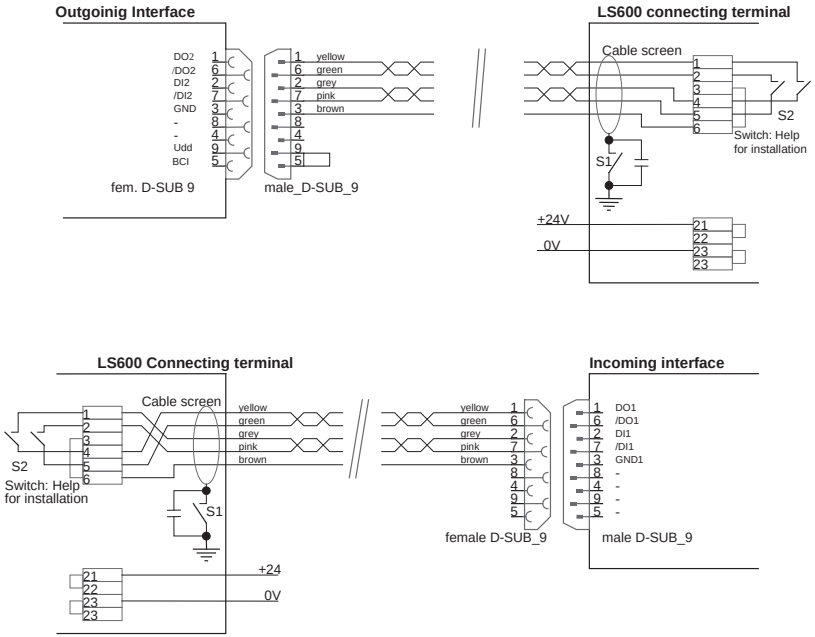
7.5 Wiring example



Connecting the INTERBUS-S interface according to DIN 19 258 part 2 Page48ff

7.6 Model number

Model number	Feature
LS600-DA-IBS/F1	200 m
LS600-DA-IBS/F2	200 m
LS600-DA-IBS/35/F1	230 m, max. 30°C
LS600-DA-IBS/35/F2	230 m, max. 30°C
LS600-DA-IBS-GUF/F1	200 m, -35°C
LS600-DA-IBS-GUF/F2	200 m, -35°C
LS600-DA-IBS-RT/F1	100 m, rot
LS600-DA-IBS-RT/F2	100 m, rot

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8 Notes

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