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Ultrasonic position system USP

Product overview

Ultrasonic position system (USP):

Versatile and flexible

This ultrasonic position system (USP) transmits a position signal accurate to the nearest millimetre to the lift control unit. It is a contact-free and wear-free system. It does not have many components, and these are simple to assemble; it is also very easy to connect to the control unit.



Page 1-4

Parallel interface (PI):

Almost unlimited options

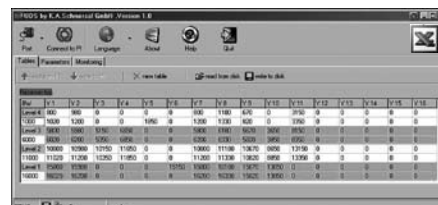
A parallel interface (PI) is available as an additional component. It can be connected up to almost all types of lift relay control systems. For lift and control unit manufacturers this means the USP can be used in pretty much all applications. Two standard shaft copies are already available for control units which use shaft copies provided by magnetic switches, individual profiles may be programmed.



Page 1-12

Up-Download-Software (UDS): Smooth input and output of the data from the PI

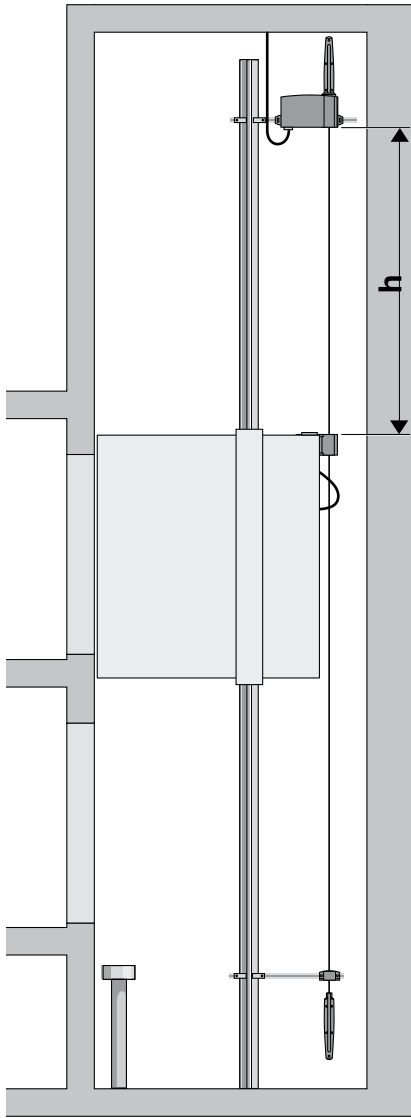
The Up-Download-Software (UDS) provides for a fast and smooth upload and download of the shaft copy data to or from the Parallel Interface. The data of the position values are directly imported from an Excel table in the Parallel Interface. The data records can also be copied and used 1:1 for other lifts.



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Ultrasonic position system USP

Technology



System function

The USP lift position system transmits contact-free an absolute position value using a magnetostrictive procedure. Its range of use is between lift heights of 1m and 130 m.

In response to a signal triggered by the receiver, the emitter feeds an ultrasonic impulse into the signal wire, which spreads in both directions, i.e. towards the shaft pit and the shaft head.

The receiver catches this signal and uses the propagation time of the signal through the signal wire to accurately calculate the DISTANCE between the transmitter and the receiver – and therefore the absolute position value of the lift car.

The USP receiver makes this position value data available to the lift controls by means of various interfaces. The signal which runs through the signal wire is neutralised by the dampers at the end of the wire.

The additional actuator and correction sensor to be fitted for the USP 100 transmit additional values for the accurate position determination at high travel speeds, thus compensating possible modifications in the shaft's height resulting from material shrinkage or elongation.

Assembly overview

The ultrasonic position system USP is installed to the guide rail of the lift car in the lift shaft.

The C profiles required for assembly must be mounted on guide rails out of the way of the cabin's route of travel. An assembly plate for mounting the transmitter is fitted on the cabin.

Receiver location

The connection between the USP receiver and the lift control unit must always be kept as short as possible.

This means that in the case of lift systems where the machine room is close to the shaft head, the USP receiver must also be fitted in the shaft head.

If the machine room is close to the shaft pit, then the USP receiver must also be fitted there.

Signal wire

This wire, which runs vertically through the shaft, is used for the transmission of the ultrasonic signal.

Dampers are fitted to each end of the signal wire to neutralize the processed ultrasonic signal and to prevent the signal from being reflected back into the signal wire. The wire is a measuring device and should be handled with care.

USP 100

The actuating magnets are fitted in the shaft at 5 positions at the most, e.g. to the doorpost. These create five "maps" of the shaft, which the USP overlays and, if necessary, corrects solely that section of the building which has compressed or expanded.

Dimensions

The USP 30 is suitable for travelling heights of up to 30 metres, USP 100 for travelling heights of up to 130 metres. When the car is at the top floor, a minimum spacing of 80 cm between the emitter and the receiver must be observed. The same applies in case of fitting in the shaft pit.




Further information

If you need any additional information about assembly or troubleshooting, please refer to our website:

www.schmersal.de/Aufzugtechnik

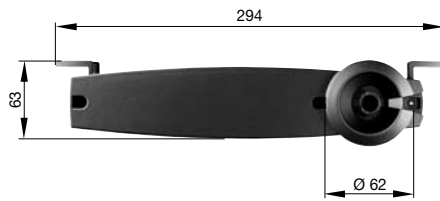
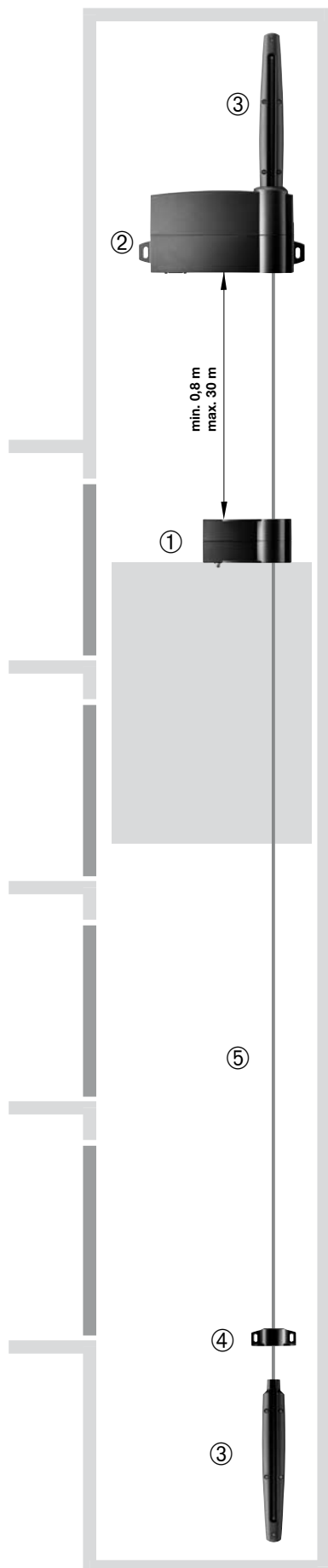
	USP 30	USP 100
h _{min}	0,8 m	0,8 m
h _{max}	30 m	130 m
v _{max}	6 m/s	6 m/s

USP overall system protection class

location of receiver	position of socket	USP receiver cable Standard / Kollmorgen / NEW / Böhnke + Partner / Weber Liffttechnik	USP receiver cable Standard IP 65 / Standard IP 65 UL	
shaft head	bottom		IP 43	IP 54
shaft pit	bottom		IP 43	IP 54
shaft pit	top		IP 40	IP 54

Ultrasonic position system USP

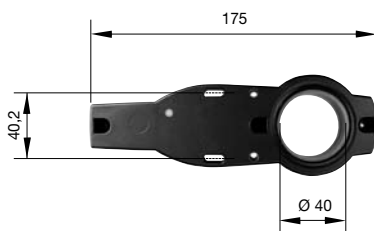
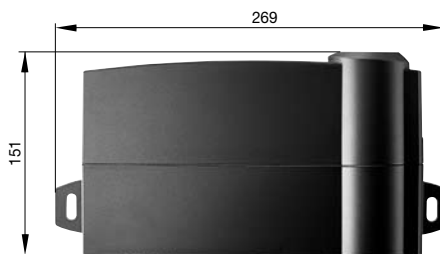
USP 30 systems and components



② Receiver

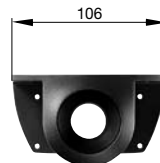
The receiver is mounted in a fixed position at the top of the shaft. It triggers the transmitter to send a signal. The transmitter signals are transmitted using ultrasonic and passed on to the control unit by the receiver as absolute values.

Alternatively, the receiver can be mounted in the shaft pit.



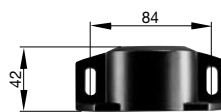
① Transmitter

The transmitter is mounted on the cabin. It enables the signal to be input into the signal wire.



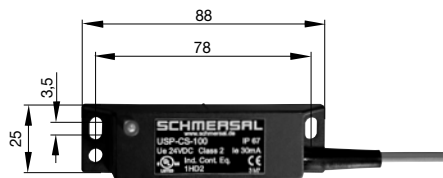
④ Swing protection

This unit protects the wire and the system against inadvertent swinging movements. If the receiver is mounted in the shaft pit, the swing protection unit is used for mounting the top damper.



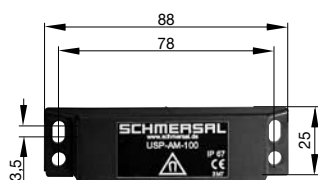
③ Dampers

A damper is fitted to each end of the wire. It neutralises the processed ultrasonic signal and stops it being reflected back into the signal wire.



⑥ Correction sensor (USP 100 only)

This sensor ensures that the USP 100 has a much higher level of accuracy and greater lifting height. It is mounted on the cabin and provides additional reference information to the receiver.



⑦ Actuating magnets (USP 100 only)

The actuating magnets are installed in the shaft at 5 positions at the most, for instance at the doorpost.

Accessories

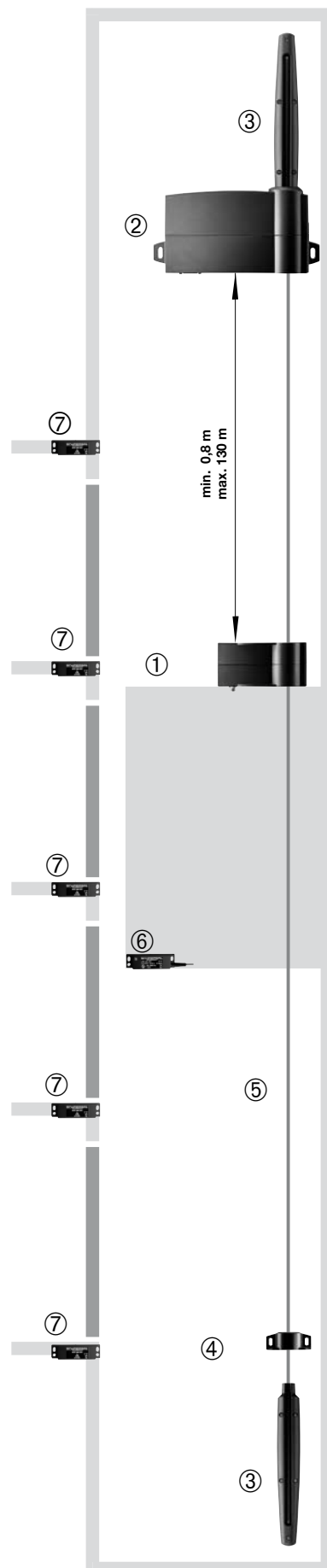
- several screws, nuts and washers
- two C profiles
- four assembly brackets
- lug for transmitter bracket

With these mounting accessories, the system components can be fitted to the guide rails in the lift shaft using ordinary tools.

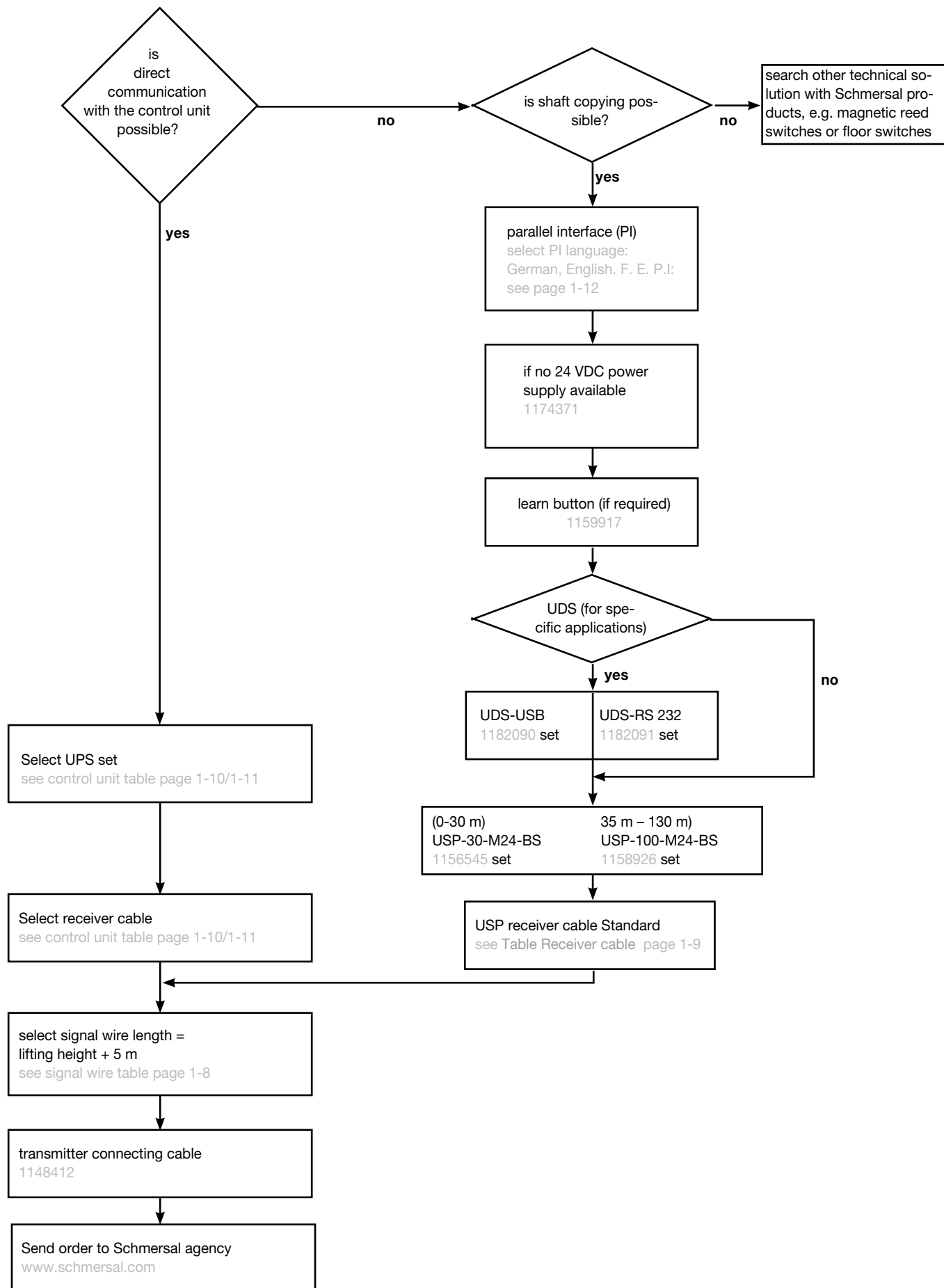


⑤ Signal wire

The wire is made of a material that has been specially developed for transmitting lift position system signals. It is available in various lengths from 10 m to 135 m in multiples of 5 m on a spool to aid installation in the shaft.




USP ordering guide



Ultrasonic position system USP

Technical data

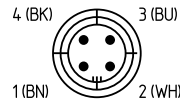
Technical data	USP 30	USP 100
Repeatability under normal shaft conditions:	+/- 3 mm	+/- 1 mm
Repeatability at calibration temperature:	+/- 1 mm	+/- 1 mm
Ambient temperature:	-10 °C ... +50 °C	-20 °C ... +60 °C
Maximum travel height:	30 m	130 m
Maximum travel velocity:	2 m/s	8 m/s
Operating voltage:	24 VDC +15 % / -10 %	
Operating current:	180 mA	
Protection class:	IP 54	
EMC emission:	EN 50081-2, EN 12015	
EMC immunity:	IEC 61000-6-2, EN 12016	
Approvals:		

Interface protocols of variants

USP 30/100 -M24BS / -M25GD / -M24BS/8

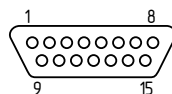
Protocol	Pin 10 = 0 V	Pin 10 = 24 V	
	(synchronous, serial interface) RS 422	(asynchronous, serial interface) RS 422	
Data length:	-	8 Bit	9 Bit
Length of data package	24 Bit / 25 Bit	32 Bit	(3 Byte position ing data + 1 Byte diagnostic data)
Position of data	right justified	rechtsbündig	
Data securing	-	No Parity	
Repetition rate	> 0,2 ms	> 4 ms	> 3 ms
Transfer rate	max. 250 kBaud	19,2 kBaud	38,4 kBaud
Direction of data	MSB first	LSB first	

Connection Transmitter with Connector M12



Pin-no.	description	type	signal
1/2	trigger	input	trigger signal / power supply transmitter
3/4	trigger-Gnd	-	ground of trigger signal

Connection Receiver with Connector Sub-D, 15-polig



Pin N°	Description	Type	Signal
1	Trigger	Output	Trigger signal / Emitter voltage supply
2	Trigger-Gnd	-	Ground of the trigger signal
3	Reserved		
4	Reserved		
5	Gnd	-	Ground supply voltage / ground correction sensor*
6	$\overline{\text{Data}} (B) / \overline{\text{T}}_X$	Output	Asynchronous data signal/SSI data signal
7	$\overline{\text{Cycle}} (B) / \overline{\text{R}}_X$	Input	SSI-cycle signal
8	CanOpen	-	Can low
9	U_b	Input	24V supply voltage
10	Select	Input	0 V: synchronous serial protocol (SSI) 24 V: asynchronous serial protocols
11	Correction sensor	Input	Correction sensor signal *
12	Reserved		
13	Data (A) / T_X	Output	Asynchronous data signal/SSI data signal
14	Cycle (A) / R_X	Input	SSI Cycle signal
15	CanOpen	-	Can high

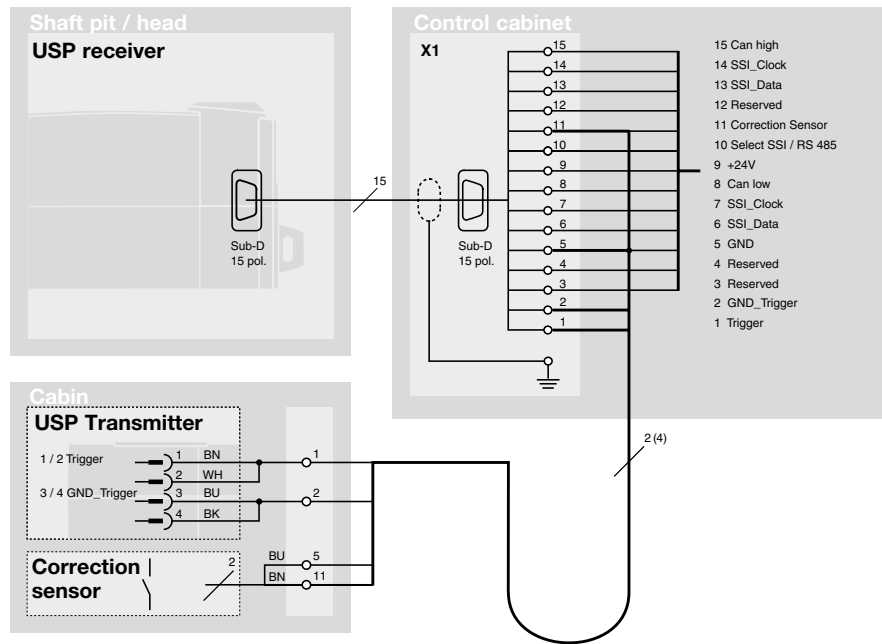
* only USP 100

Ultrasonic position system USP

Wiring diagram

Electromagnetic compliance (EMC)

You should avoid installation in the vicinity of other devices, e.g. inverters, motors, etc., which might exercise electromagnetic field on the receiver. In case of doubt, please contact us.



Signal wire

for USP 30

Length (m)	Part no.
10	1159253
15	1159254
20	1159255
25	1159256
30	1159257
35	1159258

for USP 100

Length (m)	Part no.
35	1159258
40	1159259
45	1159260
50	1159261
55	1159262
60	1159263
65	1159264
70	1159265
75	1159266

for USP 100

Length (m)	Part no.
80	1159267
85	1159268
90	1159269
95	1159270
100	1159271
110	1159273
120	1159275
130	1159277
140	1159279

Signal wire length = lifting height + 5 m

USP set

The USP set comprises:

- 1 transmitter
- 1 receiver
- 2 dampers
- 1 swing protection unit
- 2 spacer bolts to extend USP cable
- assembly accessories
- documentation

Not included

- signal wire
- transmitter cable
- receiver cable

These must be ordered separately and specifically for the application.

USP set	Part no.
USP-30-M24BS set	1156545
USP-30-M24BS/8 set	1178400
USP-30-M25GD set	1161714
USP-30-CAN OPEN set	1178037
USP-30-M25GS set	1193101
USP-100-M25GS set	1193107
USP-100-M24BS set	1158928
USP-100-M24BS/8 set	1178573
USP-100-M25GD set	1161715
USP-100-CAN OPEN set	1178038

Legend

- M = direction of transmission MSB First
- 24 = length of data packet: 24 Bit
- 25 = length of data packet: 25 Bit
- B = code: binary
- G = code: gray;
- S = single read process
- D = number of data packets read:
double (2 x); dual read process
- /8 = data length for asynchronous protocol
8 bit

Approvals



Ultrasonic position system USP

USP receiver cable

Interface	Name receiver cable	Protection class	UL	Part no.
Standard	USP receiver cable Standard	IP 40	-	1186611
Standard	USP receiver cable Standard IP 65	IP 65	-	1186608
Standard UL	UL USP receiver cable Standard IP 65 UL	IP 65	UL	1186609
Böhnke + Partner	USP receiver cable Böhnke + Partner	IP 40	-	1186605
Böhnke + Partner	USP receiver cable Standard (only CAN OPEN)	IP 40	-	1186611
Kollmorgen	USP receiver cable Kollmorgen	IP 40	-	1186606
NEW	USP receiver cable NEW FST1	IP 40	-	1186607
NEW	USP receiver cable NEW FST2	IP 40	-	1188486



- The socket and connector must be fitted with a black 15-pole sub-D cover. This cover is secured with screws, the connector is galvanised.
- Length: 10 m
- If extension is required, cables can be mated. Two spacers for strain relief are included in the mounting kit. In this way, cables lengths can be realised in 10m steps.
- The controller-specific cables can be extended by means of a standard cable.

Transmitter connecting cable



To connect the USP transmitter, the following cores:

- brown and white (1-2)
- blue and black (3-4) must be bridged.
- straight connector with prefabricated cable
- cable length 5 m
- terminals: 4 x 0.75 mm²

Transmitter cable

1148412

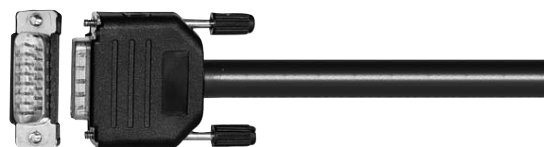
Ultrasonic position system USP

Selection of receiver cables

Control unit manufacturer	Control unit type	Receiver cable	Part no.
Böhnke + Partner	BP 117	USP receiver cable Böhnke + Partner	1186605
Böhnke + Partner	BP 302	USP receiver cable Böhnke + Partner	1186605
Böhnke + Partner	BP 304	USP receiver cable Böhnke + Partner	1186605
Böhnke + Partner	BP 306 CAN OPEN	USP receiver cable Standard	1186611
Kollmorgen	MPK 400	USP receiver cable Kollmorgen	1186606
Kollmorgen	MPK 4000	USP receiver cable Kollmorgen	1186606
Kühn	MSZ9	USP receiver cable Standard	1186611
KW Aufzugtechnik	DAVID 2005	USP receiver cable Standard	1186611
KW Aufzugtechnik	DAVID 606	USP receiver cable Standard	1186611
Langer & Laumann	LC-Liftcontroller Nano		
Langer & Laumann	LC-Liftcontroller Mikro		
Langer & Laumann	LC-Liftcontroller Mega		
NEW Lift	FST 1	USP receiver cable NEW-FST 1	1186607
NEW Lift	FST 2	USP receiver cable NEW-FST 2	1188486
Weber	webit-c		
Weber	wecon		
Weber	wecan		
Control units with magnet switch shaft copies	Paralleles Interface PI	USP receiver cable Standard	1186611

Receiver cable- to control unit

Standard



Kollmorgen/ NEW/ Böhnke+Partner

no image

Standard IP 65/ Standard IP 65 UL

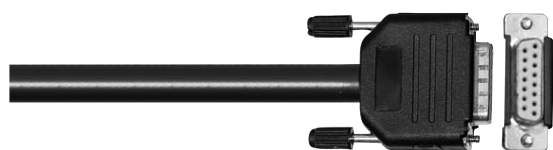
no image

Ultrasonic position system USP

Selection of USP interface

Type USP 30	Part no.	Type USP 100	Part no.
USP-30-M24-BS	1156545	USP-100-M24-BS	1158928
USP-30-M24-BS	1156545	USP-100-M24-BS	1158928
USP-30-M24-BS	1156545	USP-100-M24-BS	1158928
USP-30-CAN OPEN	1178037	USP-100-CAN OPEN	1178038
USP-30-M24-BS	1156545	USP-100-M24-BS	1158928
USP-30-M24-BS	1156545	USP-100-M24-BS	1158928
USP-30-M24-BS/8	1178400	USP-100-M24-BS/8	1178573
USP-30-M24-BS	1156545	USP-100-M24-BS	1158928
USP-30-M24-BS	1156545	USP-100-M24-BS	1158928
USP-30-CAN OPEN-2539	1185063	USP-100-CAN OPEN	1178038
USP-30-CAN OPEN-2539	1185063	USP-100-CAN OPEN	1178038
USP-30-CAN OPEN-2539	1185063	USP-100-CAN OPEN	1178038
USP-30-M25GD	1161714	USP-100-M25GD	1161715
USP-30-M25GD	1161714	USP-100-M25GD	1161715
USP-30-CAN OPEN-2583	1191299		
USP-30-CAN OPEN-2583	1191299		
USP-30-CAN OPEN-2583	1191299		
USP-30-M24-BS	1156545	USP-100-M24-BS	1158928

Receiver cable- to the USP



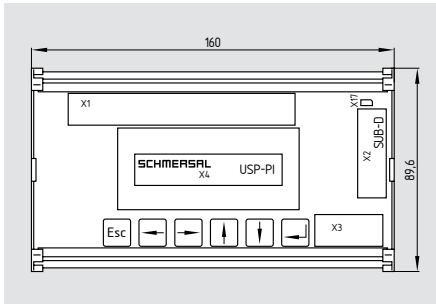
Standard/ Kollmorgen/ NEW/Böhnke+Partner



Standard IP 65/ Standard IP 65 UL

Ultrasonic position system USP

Parallel interface USP-PI



The USP-PI parallel interface converts the USP's absolute position value into 24 VDC signals, which can be used like signals from shaft copies provided by magnetic switches by means of two pre-programmed and one free programmable profile.

In this way, you can use lift controllers, which are designed for magnetic reed switch technology.

A teaching cycle is executed to input the level positions; the individual floors can be read by means of a teach button.

After input of the speeds (max. 2) and decelerations, the appropriate shaft copy is automatically calculated. The length and position of every signal then can be changed individually for fine calibration.

Approvals



Order data

USP-PI	1159354
USP-PI-2435	1171444
USP-PI-2473	1177688
USP-PI-2541	1185242
Power supply, stabilised, for USP/-PI, 24VDC 1,3A	1174371
Teach in button, illuminated, with cable, 1 m	1159917

Technical data

Standards and regulations

Housing material:
Mounting:

Screw connection:
Protection class:

U_e :
 I_e :
Input L_e :

Maximum power:
Input impedance:
Input level „1“:
Input level „0“:

Outputs Y1 – Y 16:

Max cable length:
Output voltage U_a :
Output power I_a :

Surge voltage category:

Degree of contamination:

Vibration resistance:

Shock resistance:

Ambient temperature:

Storage and transport temperature

EN 50081-1, EN 12015,
IEC 61000-6-2, EN 12016
PVC

quick-release mounting for standard rails in
accordance with EN 50022 and EN 50035

0.5 ... 1.5 mm²

IP 00

24 VDC +15% / -10%

0.15 A

teach in button

35 mA

approx 3 k to GND

10 ... 30 V

0 ... 2 V

short-circuit protected, p switching, n-switching on request

30 m

U_e – 1 V

max. 100 mA per output

III

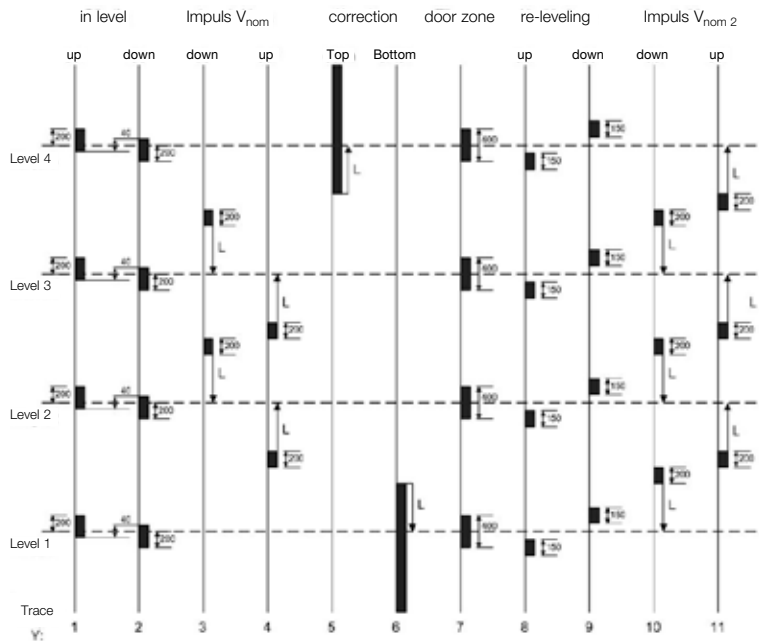
2

10 ... 55 Hz / 0.0375 mm

15 g / 11 ms

-5 °C ... +60 °C

-25 °C ... +70 °C

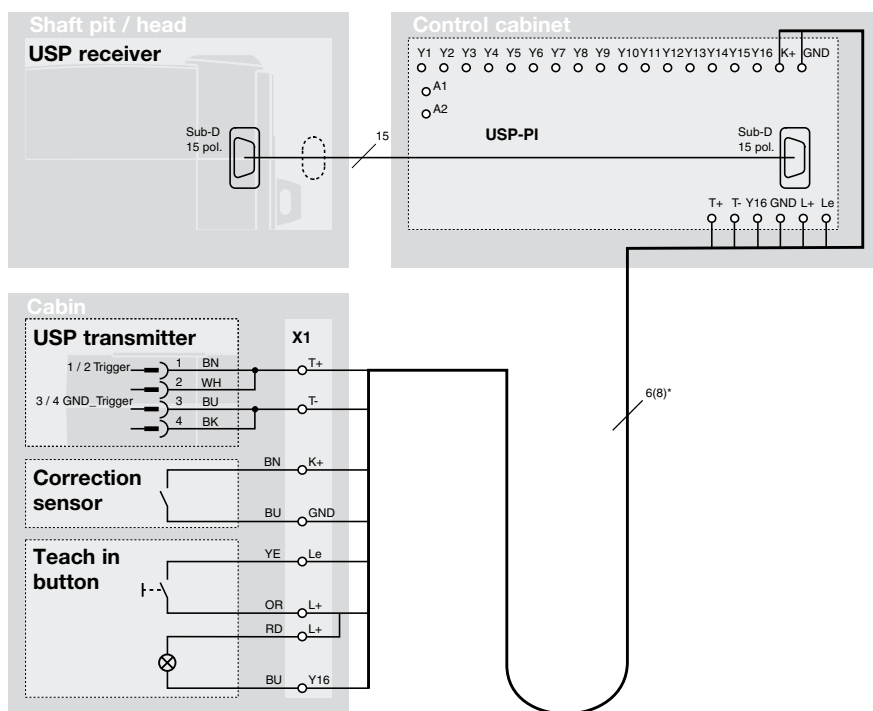


Notice

Language	DE	GB	FR	ES	IT	PT	
USP-PI	•	•	•				Standard device
USP-PI-2435		•		•	•		
USP-PI-2473		•		•		•	
USP-PI-2541	•	•	•				with direction recognition for lifts without machine room

Ultrasonic position system USP

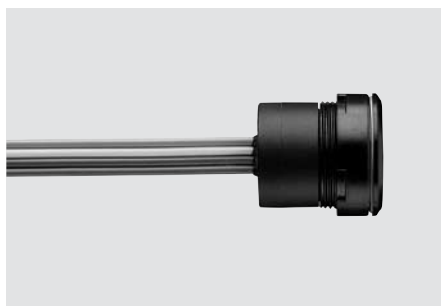
Terminal connection diagram USP-PI



Terminal layout:

- A1+, A2-:** 24 VDC power supply
- Sub-D 15 pole:** USP receiver terminal
- T+, T-:** USP transmitter terminal
- Y16, L+, Le:** learn button terminal
- Y1-Y15:** lift control unit terminal

Teach in button



- Illuminated push button with ribbon cable
- length 1 m

Teach in button, illuminated,
with cable, 1 m

1159917

Ultrasonic position system USP

Up-Download-Software UDS 1.0

Function

Up to 42 floors and 16 tracks can be processed using the USP-PI. This works out to around 2016 different values. Manually inputting this information using the PI can be very time-consuming. To make the process simpler, values can be entered into an Excel spreadsheet and transferred to the PI using a PC. Likewise, values can be loaded onto a PC from the PI for editing.

System requirements

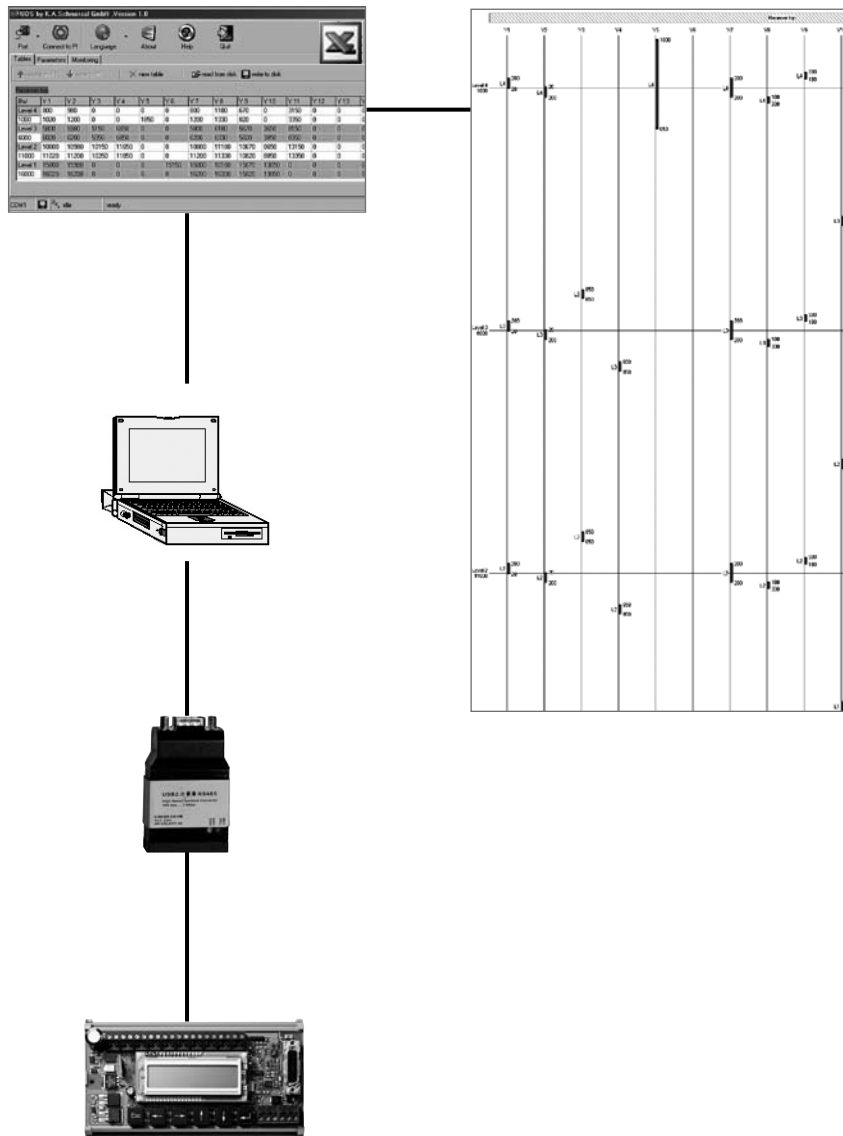
The software supports Excel 97 and Excel 2000; system requirements are Windows 98 SE, 2000 or XP. Installing and uninstalling the software is compatible with Windows; refer to the Windows help file if necessary. The program language is English. The communication between PI and PC takes place via an RS 485 / RS 232 converter or via an RS 485 / USB converter.

Data input and read out

Up-download software makes uploading and downloading shaft copy data to and from the parallel interface simple and quick. It works by uploading switching point data to the parallel interface from an Excel table – no in situ manual input of switching points and alignments required. Records can also be copied and used 1:1 for other lifts.

Up-download software (UDS) for programming the USP-PI parallel interface

- simple input and output of USP-PI data
- creation of custom profiles in Excel®
- graphic representation of shaft copy
- copying data between several USP-PI
- archiving shaft copies
- connection via USB or RS-232 interface

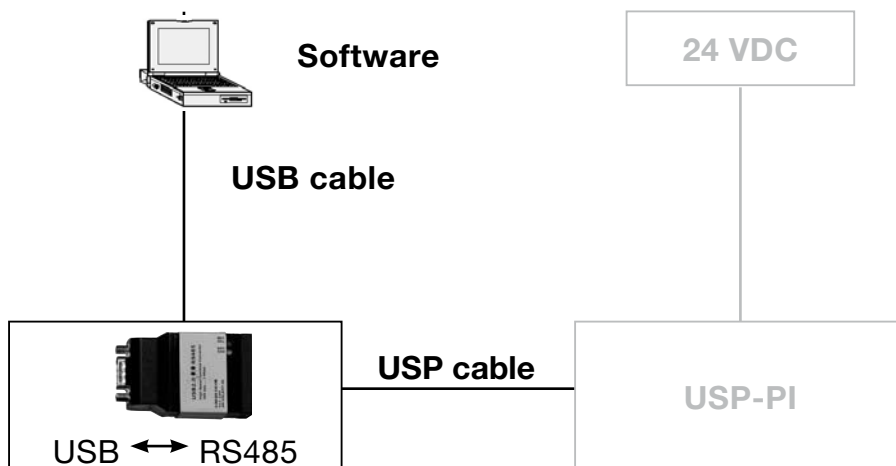


Ultrasonic position system USP

UDS-USB set

Comprises:

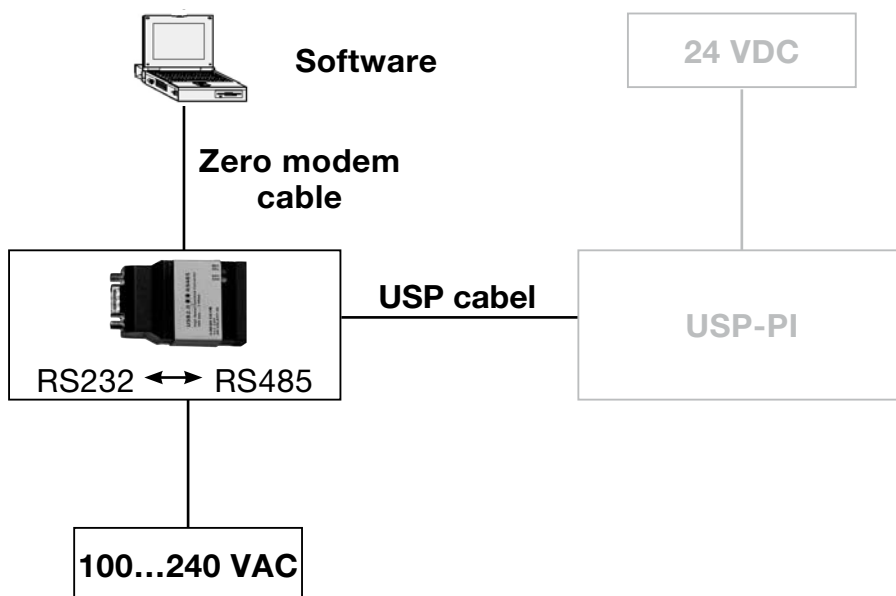
- CD-ROM (PC-software)
- USB – RS 485 converter and driver
- USB cable - converter
- cable converter-PI



Set UDS-232

Comprises:

- CD-ROM (PC-software)
- RS 485/232 converter and driver
- Power pack
- Cabel RS 232 - converter
- cable converter-PI



Order data

UDS-USB set
UDS-232 set

1182090
1182091

Note

System requirements
Microsoft Windows® 98/2000/XP

Please note that:

- in addition to the UDS set, the USP-PI also needs a smooth 24 V DC
- USP-PI is not included in the UDS set.
see pages 1-12 to 1-13

Note