Langer & Laumann
Ingenieurbüro GmbH

Langer & Laumann Ingenieurbüro GmbH *48356 Nordwalde Wallgraben 30* *+49 (02573) 9 55 99 0* ***http://www.LuL-Ing.de***
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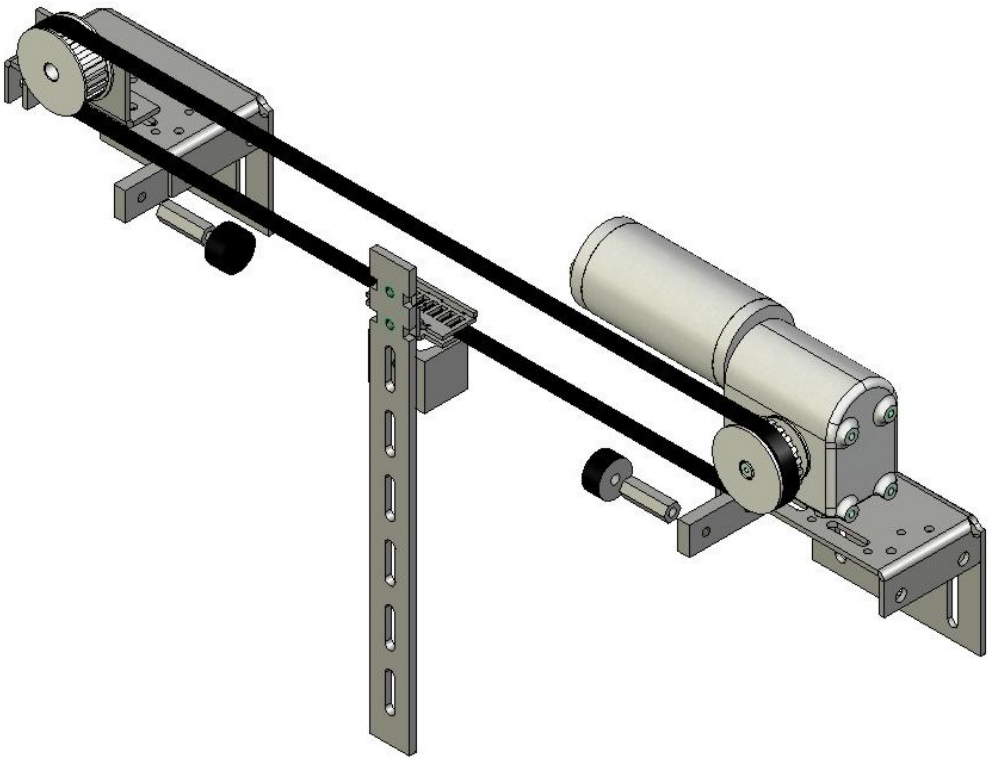
User manual

for the

Door Operator

TSG 200
TSG 400
TSG 750



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1 Complete Door-Control Unit Conversion Package

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There is a range of complete conversion packages in addition to the standard door-control unit (TSG) packages:

Abb. 1: TSG 200/400 Standard

Abb. 2: TSG 400 for Thyssen M2 doors

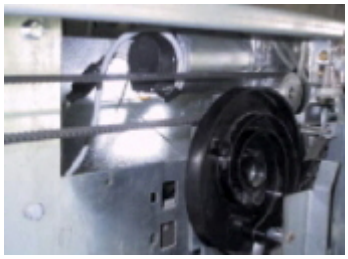

Abb. 3: TSG 200 Thyssen D6C doors

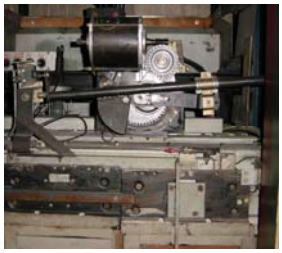

Abb. 4: TSG200 for OTIS 9550

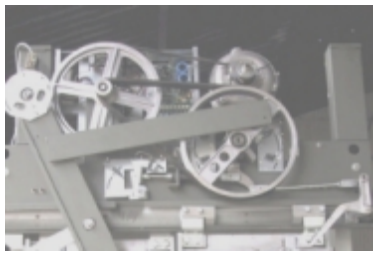

Abb. 5: TSG 400 for Schindler QKS9 doors

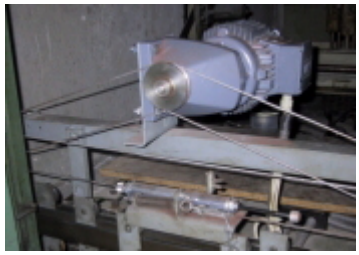

Abb. 6: TSG 400 for Thyssen M3 TK doors

Abb. 7: TSG 400 for Sematic doors

If your door is not listed, call us at

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or send us an e-mail

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TSG	*Item No.*
TSG 200 complete package for conversion up to approx. 900 [mm] door width	9.20.00200
TSG 400 complete package for conversion up to approx. 400 [Kg] door panel weights	9.20.00400
TSG 400 IP 54 splash-proof	9.20.00454
TSG Thyssen D6C	9.20.10200
TSG Thyssen M2	9.20.10400
TSG Thyssen M3 TK	9.20.10405
TSG Sematic	9.20.11400
TSG Otis Y9550	9.20.12200
TSG Meiller TTK5	9.20.12250
TSG Meiller Spindeltür	9.20.00400
Accessories	*Item No.*
TSG Option Contactors 24 VDC	8.20.00110
Wiring set to Schindler Miconic E	8.20.00115
Wiring set to Thyssen „Stahl“	8.20.00120
Wiring set to Thyssen „LS2“	8.20.00125
Wiring set to Tepper „TCC“	8.20.00135
Emergency-power evacuation extension incl. storage battery	8.20.00130

file: 1.20.91005_TSG_User_Manual_English.doc

print date: 03/03/2008 16:27:00

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2 Safety Instructions

The TSG door-control unit is designed solely for the control of cabin door drives and for installation on the cabin roof. The TSG door-control unit conducts dangerous electrical voltages and controls moving mechanical parts. Failure to adhere to the instructions in this operating manual can lead to death, serious physical injuries or major damage to property.

2.1 Safety and Accident-Prevention Regulations

Observe legally specified safety and accident-prevention regulations in addition to the instructions in this operating manual. Those persons responsible for the safety of the installation must guarantee the following:

- Only appropriately qualified personnel may work on and with the TSG door-control unit.
- All personnel who work with the TSG door-control unit must be familiar with all warning instructions and measures identified in this description for the installation, operation and working of the TSG door-control unit.
- Unqualified personnel must be prohibited from working on the TSG door-control unit.
- Personnel must possess knowledge both of first-aid measures and of local rescue facilities.

2.2 Qualified Personnel in Accordance with VDE 0105

Qualified personnel are understood to be those persons who, on the basis of their training, experience, received instructions as well as their knowledge of relevant standards, provisions, accident-prevention regulations and operating conditions, have been authorised by those responsible for plant safety to perform the respective, necessary activities.

2.3 Exclusion of any Guarantee in the Event of Changes or Conversions

The TSG door-control unit must always be disconnected from the mains power supply prior to any intervention in the electrical or mechanical part of the system. Unauthorised changes or conversions on or in the TSG door-control unit, its components or accessories will automatically exclude any guarantee. These safety-related instructions do not constitute a claim of completeness. The manufacturer does not accept any liability for damage or operational down-time, which might result from failure to adhere to these operating instructions.

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3 *TSG Field of Application*

The TSG field of application is broken down into the following groups:

1. TSG 200: to door panel weight of approx 180...200kg
2. TSG 400: to door panel weight of approx. 350...400kg
3. TSG 750: door panel weights between 400kg and approx. 750kg (special model)

When calculating the door panel weight, you must add the weight of the cabins and the landing door. According to EN81, all landing doors have closing weights or springs so that doors close automatically when there is no cabin door behind the landing door. These weights or springs reduce the maximum weight of the door panel.
As a rough estimate, a 1 kg closing weight corresponds to a door panel weight of approx 30 – 40 kg. The TSG 200 is sufficient for doors with a minimum passage of 900 mm (not glass doors but normal doors without an additional coating). The TSG 400 can be used for passages of approximately 5000 mm, provided the door panel weight does not exceed 350...400kg. For doors with a door panel weight of approximately 750 kg, we have a special solution.

4 Display

4.1 Display in normal mode

Display	Meaning
- -	Normal mode (Door is idle)
oF	Command OPEN
cL	Command CLOSE
Au	Door is open
Cu	Door is closed
bL	Door is blocked

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5 Assembly

5.1 Conditions for the installation

1. The door needs fixed mechanical end stops for open and close positions.
2. Fasten the brackets to the cabin door so that the door-width is constant on every floor.
3. If there is a shaft-door counter-weight it must not jump.
4. Cabin-doors and shaft-doors must run smooth.
5. No additional springs (tension springs or compression springs) should be used inside the door's travel. Any springs, which would be used in previous door drives, must be removed when the TSG is installed.

5.2 Installation

1. Fit Motor
2. Fit pulley
3. ***Please note:*** The alignment of motor pulley and divertor pulley is important, please make sure that the alignment is correct in line.
4. Tooth belt must be joined and placed on drive system.
5. ***Please note:*** The special toothed belt with the supplied clamp device must not run over the pulley. Use only the supplied tooth belt clamp to assure the correct function.
6. Tension the special toothed belt.
7. Fasten buffers to the combination angles if no rigid stoppers are available. The C-shaped molding is bolted on as a counterpart at a height which corresponds with the coupler.
8. Wire the TSG electronic PCB to the lift controller in accordance with any supplied diagrams
9. The pre-wired motor connections (X4) must not be changed! The motor rotation is determined when the manual “teach in” is carried out.

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6 Commissioning

6.1 Display while going in operation

Display	Meaning
cA	Check Open Position
c2	Check Close Position

1. A manual “teach in” has to be carried out. ***Please note:*** Please make sure that the door moves clearly, the first movement will be stored and should be exactly the same, as in normal operating mode. (the door must not be impeded by objects). Slide the door by hand to approximately the half-way point of its travel path in order to begin the calibration run from there.

2. There must be no close or open signals from the lift controller. The display must show „-- “ (If necessary, unplug plug X1 (inputs)).

3. Press and hold both buttons „+“ and „-" at the same time, until the TSG 400 is switched into “teach in” mode. This is indicated by display sign „cA “ „***check open***“. Move the door to the ***open position*** by pressing buttons „+“ or „-". Which one of the buttons needed to be pressed depends on the turning direction of the motor and will be found out by testing. If the doors close, simply release the button and press the other and the doors will open. Press the button during the whole “teach in“ until ***open position*** is shown, then release the button. Now the display shows „c2“ check “close position“ .

4. By means of the „+“ or „-" buttons drive the door to the ***close Position.*** This will be the opposite button to the one which drives the door open. When the ***close position*** is reached the display shows „oF“.

   Please note*!:* After “teach in” all parameters are set back to default values.

5. TSG is ready for operation.

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7 Manual Operation

By pressing the "***mode***" button you may switch over to manual operation. (Indication „P 1" resp. „- - -."). Manual mode is indicated by the dot.
In this mode you can close the door by pressing the "+" button and open the door by pressing "-" button.
Please note!: Movement of the door is not controlled (Speed, acceleration and deceleration) in manual mode. The setup parameters do not affect manual mode (similar to maintenance travel).

Please note!: After the above adjustment set door operator back to normal operation mode by pressing the "mode" button until the display shows „- - -".
In manual mode the door can only operate by using the appropriate buttons, the inputs from the lift controller are disabled.

8 Adjustment

8.1 Basic Adjustment

The TSG is factory pre-set and under normal conditions there will be no adjustments required.

8.2 Adjustment to site condition

By pressing the „Mode" button the unit is ready for adjustment.
Please note!: The inputs from the lift controller are disabled.
By pressing the „Mode" again you can select the different modes ranging. (P1...P7).
By pressing the button „+" or „-" you can alter the parameters to suit your application.
The parameter P1 is reserved for manual operation. This display switches over by pressing the „+" or „-" button (see below).

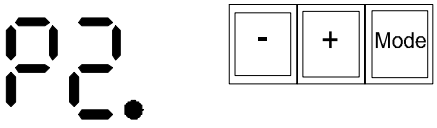

Abb. 8: view of display an button

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8.3 Parameters

Parameter		Default Value	Unit
P1	Manual operation by using " -, + "	.	- -
P2	OPENING Speed	50	[cm /sec]
P3	CLOSING Speed	30	[cm /sec]
P4	Creeping Speed	40	[mm/sec]
P5	Acceleration and Deceleration in Open Direction	5	
P6	Acceleration and Deceleration in Close Direction	5	
P7	Door Locking and Un-locking Distance	40	[mm]

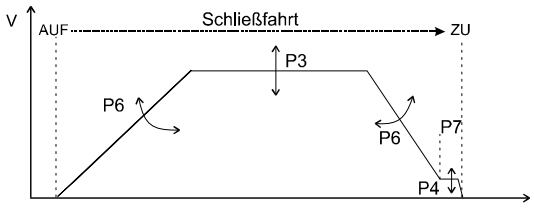

Abb. 9: Door Close Direction P3, P4, P6, P7

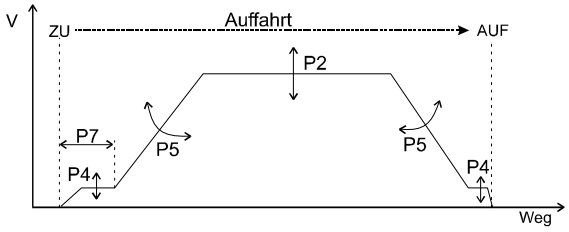

Abb. 10: Door Open Direction P2, P4, P5, P7

Please Note!: The smaller “P5 and “P6” are selected the higher the acceleration by starting and deceleration by stopping.

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8.4 Adjustment of door closing force limitation

By means of the potentiometer P1 the values for the maximum closing force are regulated. By turning the potentiometer P1 clock-wise the capacity of TSG will be increased.
Please note! According to ***EN 81*** the maximum static power while closing the door ***must not exceed 150 Newton*** (=15 kg mass of door weight). According to EN 81 the maximum kinetic energy of the door must ***not exceed 10 Joule*** . The kinetic energy is shown as follows:

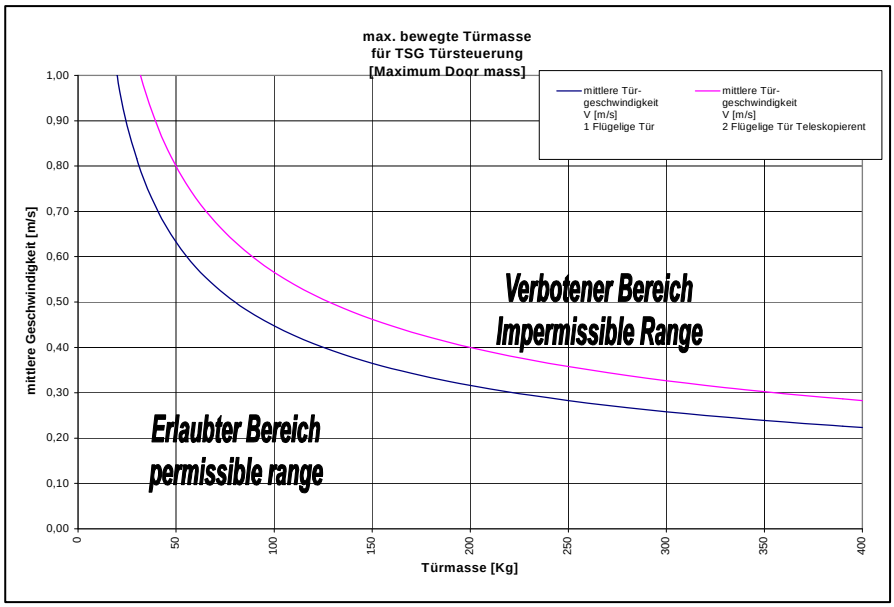

Abb. 11: kinetic energy

9 Mending of errors

9.1 Error

Display	Meaning	Check
E1	Door is blocked	Check Motor connection. Check Motor cable. Check door movement. Check earth of motor / encoder cable .
E2	Door is blocked with low speed.	Refer to E1.
E3	Error Door Locking Force detected	Check door mechanic limitation. (Is limitation fix). Check counter weight. (Is counter weight jumping?). TSG is out of order.
E4	Encoder Error	Check encoder cable. Check motor connections. Check counter weight. (Is counter weight jumping?).

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9.2 Questions and Answers

Doors automatically remain powered in fully open and fully closed position.

9.2.1 Closing force

The door closing force is set by the microprocessor and is monitored by the door closing force restrictor. The door closing force restrictor (blocked detection) can be adjusted using a potentiometer.

1.) Acceleration.
The door is open and starts the closing movement.
During the 1/3 of the closing distance, the door moves with maximum force. This is required so that there is sufficient force for acceleration. The monitoring of the door closing force (potentiometer) is inactive.
2.) Closing.
During the last 2/3 of the closing distance, the door's force can be adjusted on the circuit board by turning potentiometer P1 (turn clockwise → increase closing force or counter-clockwise → decrease closing force).
3.) Door is closed.
Once the door panel has just reached the 'Closed' position and is already stationary, the motor uses high power (and high force) and presses against the 'Door closed' stopper. There are two reasons why this occurs:
a.) If any dirt has accumulated inside the door track, this will push the dirt out
b.) It checks the function of the door closing force restrictor (potentiometer).
The force is reduced greatly immediately afterwards so that the motors does not overheat unnecessarily.

The following is important:

1.) There must a solid stopper in the 'Door open' and 'Door closed' positions.
2.) A new manual "teach in" has to be carried out after any modifications on the mechanical parts (e.g. tensioning of the toothed belt, readjustment of buffers). Please remember the parameters will need to be re-entered if they have been changed from the default.
3.) The door drive must receive a continuous 'Close Door' command when it travels through the lift shaft. The door is pressed against the Closed stopper as a result of this 'Close Door' command, so that it cannot "Vibrate open". While setting up the door, the Open command may remain pending so that the door is not pulled shut by the closing spring.
The electronics and the motor are designed for this type of continuous drive control.

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9.2.2 Automatic Reversing of the TSG

Reversing means that the door encounters an obstacle and automatically re-opens.

a) The function without additional wiring:
If the door encounters an obstacle, then the door stops upon reaching the door closing force set on the potentiometer, and switches the output relay “Blocked” (X2.31 - 2.32 and X2.31 - X2.34). Once the ‘Close door’ command at the input (X1.2) is re-activated, the door drive attempts to close the door once again after approximately 15 seconds.

b) The function with additional wiring, if automatic reversing is required:
Connect the +24VDC to the Common terminal on the potential-free relay output X2.7. Connect the output “Blocked” (X2.9) to the input “Open” (X1.1) (see Abb. 12: Circuit for automatic reversing in the event of blocking).
If the door is blocked now, then the Blocked output breaks contact and transmits the signal “Open door” to the input.

Caution: The door closing force restrictor is not active within the first third of the door closing process.

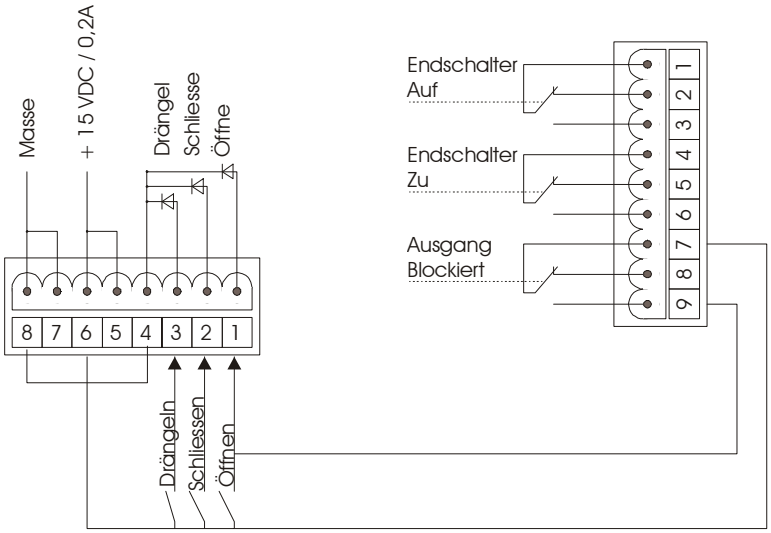

Abb. 12: Circuit for automatic reversing in the event of blocking

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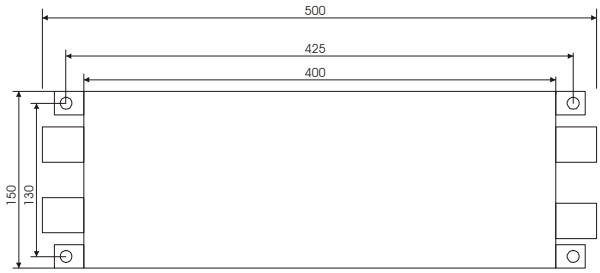
10 Scope of delivery for standard package TSG200/400

10.1 IP54 Cabinet



10.2 TSG motor

10.2.1 List of types

Artikel Nr	types of TSG motor
1.20.40000	Motor Large Left Version Gearbox 24V/4,6A/1:15
1.20.40001	Motor Large Right Version Gearbox 24V/4,6A/1:15
1.20.20000	Motor Small Left Version Gearbox 24V/2,8A/1:15
1.20.20001	Motor Small Right Version Gearbox 24V/2,8A/1:15

10.2.2 Motor

Motorlagen	Foto
TSG motor right	
TSG motor left	

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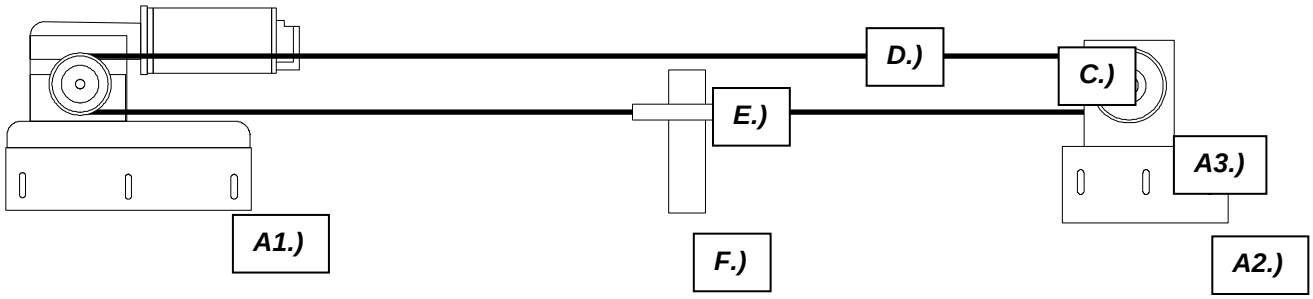
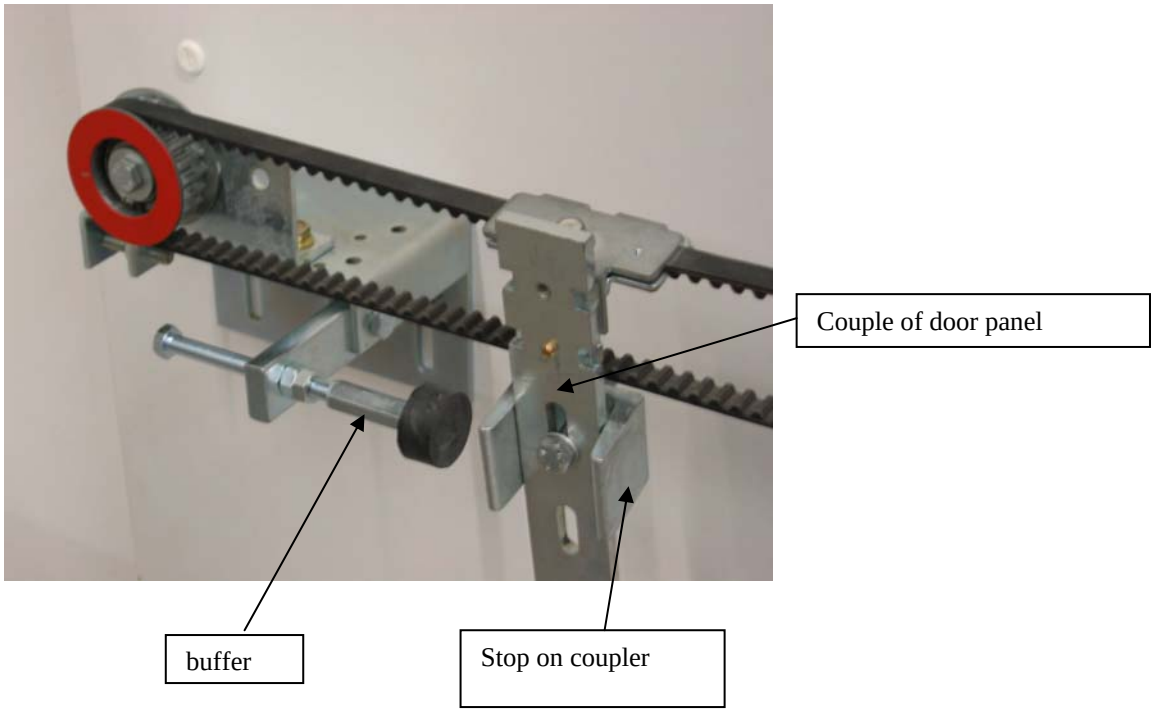
10.2.3 TSG Brackets

position	*Item No.*	quantity	TSG brackets of Conversion Package
A1.) A2.)	1.20.60030	2	Bracket
		2	Buffer
A3.)		1	Bag with tightener
C.)	1.20.60003	1	Divertor Pulley
D.)	1.20.60002	2,5 resp. 4,0	m belt
E.)	1.20.60005	1	Lock for belt
F.)	1.20.60004	1	Door Panel Coupler



10.2.4 Picture



11 Dimensions

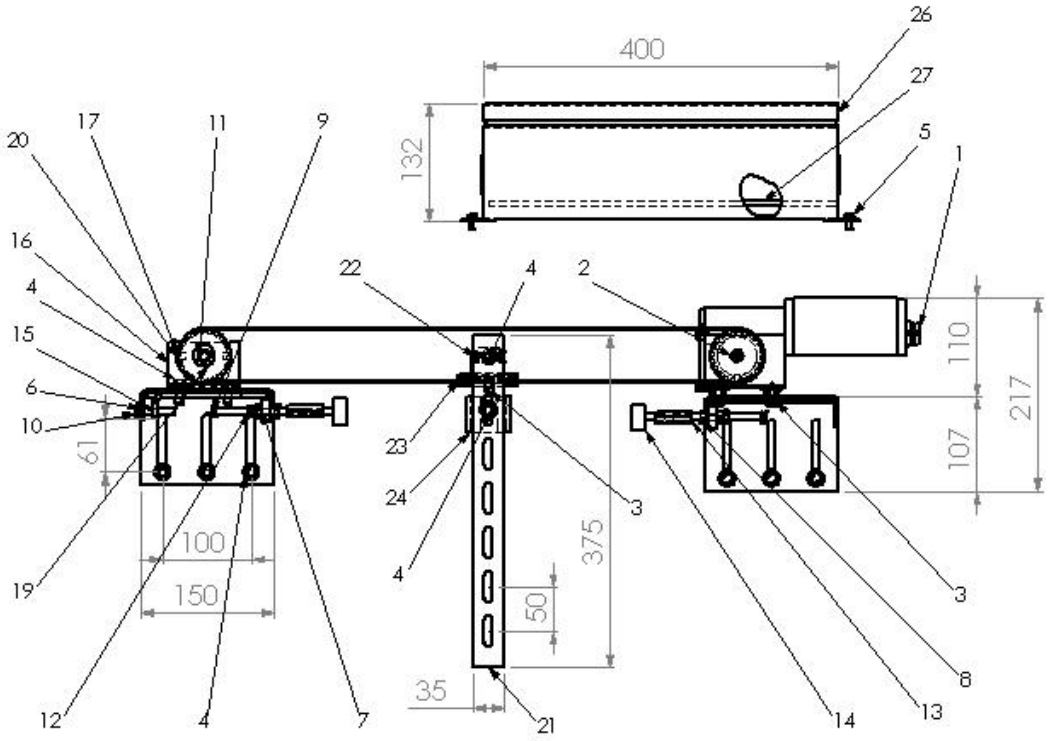


Abb. 13: Dimensions TSG (Front view)

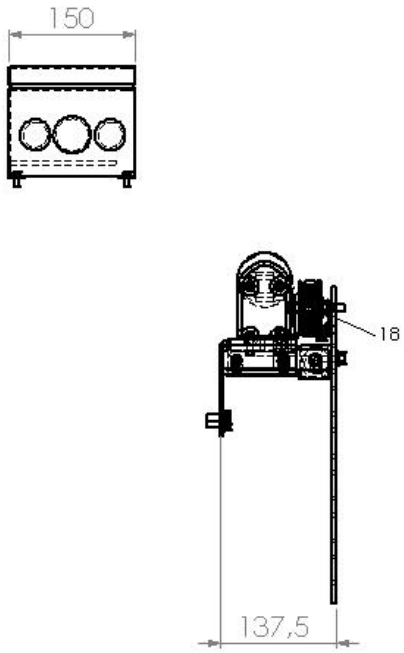


Abb. 14: Dimensions TSG (Side view)

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Parts list Abb. 13: Dimensions TSG (Front view)

1	motor
2	toothed wheel Da=56, z=22
3	screw M6 x 12 - DIN 6921
4	screw M8 x 20 - DIN 6921
5	screw M5 x 12 - DIN 6921
6	1.20.60040 bracket
7	bracket
8	screw M8 x 20 - DIN 933
9	screw M8 x 100 - DIN 933
10	screw M8 x 40 - DIN 933
11	screw M8 x 35 - DIN 933
12	nut Mu8 - DIN 934
13	nut Mu8 x 40
14	buffer
15	square
16	bracket
17	toothed wheel Da=55, z=22
18	spring B8 - DIN 127
19	washer 8,4 - DIN 9021
20	1.20.60002 TSG belt
21	1.20.60004 Door Panel Coupler
22	1.20.60005 Divertor Pulley part 1
23	1.20.60005 Divertor Pulley part 2
24	Stop on coupler
25	washer 8,4 - DIN 125
26	1.20.10022 TSG cabinet IP54
27	1.20.10005 TSG electronic

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12 Important Information

The output relays of the TSG must not be used as safety contacts in the safety circuit of the lift system.

In the case of a telescopic lift door, it should be noted that the door panel has a door interlock.
Extract from EN81-1:
Ch. 8.10 Lift-compartment sliding doors with several mechanically linked door panels
8.10.1 In the case of lift-compartment sliding doors with several directly mechanically interlinked door panels, it is permissible,

a) to attach the installation as per 8.9.2
   1. either only on one door panel (the fastest one in the case of telescopic doors)
   2. or on the door drive, as long as there is a form-fitting link between the drive element and the door panels,,

   and
b) in the event of locking only one door panel and in accordance with the conditions as per 11.2.1 c, if this one interlock prevents the opening of the other door panels due to their intermeshing with each other in the closed position.

When attaching and commissioning the TSG in/on a lift cabin, it must be ensured that the maximum permitted total weight of the lift cabin is not exceeded under maximum rated load.

In the event of an emergency stop or shut-down of the lift, it must be ensured that the TSG door-control unit does not cause any unintentional, dangerous or uncontrolled door movements.

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13 *Connectors*

X1 Inputs		8 pol. CombiCon
X1.1	Input Opening command	12-24V DC
X1.2	Input Closing command	12-24V DC
X1.3	Input Nudging command	12-24V DC
X1.4	Input common Earth	0 V
X1.5	Output Internal Power Supply 15 V DC Power Supply for Inputs	+ 15V DC / 0,2 A
X1.6	Output Internal Power Supply 15 V DC Power Supply for Inputs	+ 15V DC / 0,2 A
X1.7	Output Internal Power Supply Ground	0 V
X1.8	Output Internal Power Supply Ground	0 V

X2 Output			9 pol. CombiCon
X2.1	X2.11	Output Open Message for Lift Controller Common	
X2.2	X2.12	Output Open Message for Lift Controller Common (n.c.)	24 Volt DC / 4A - 230V AC / 1A
X2.3	X2.14	Output Open Message for Lift Controller Common (n.o.)	24 Volt DC / 4A - 230V AC / 1A
X2.4	X2.21	Output Close Message for Lift Controller Common	
X2.5	X2.22	Output Close Message for Lift Controller Common (n.c.)	24 Volt DC / 4A - 230V AC / 1A
X2.6	X2.24	Output Close Message for Lift Controller Common (n.o.)	24 Volt DC / 4A - 230V AC / 1A
X2.7	X2.31	Output Door is blocked Message for Lift Controller Common	
X2.8	X2.32	Output Door is blocked Message for Lift Controller Common (n.c.)	24 Volt DC / 4A - 230V AC / 1A
X2.9	X2.34	Output Door is blocked Message for Lift Controller Common (n.o.)	24 Volt DC / 4A - 230V AC / 1A

X3 Incremental encoder (Motor encoder)			Sub D
1	NC		
2	NC		
3	NC		
4	NC		
5	NC		(2 NC)
6	Inc. Minus	Yellow	1
7	Inc. Spur B	Green	5
8	Inc. Spur A	Brown	3
9	Inc. 5V DC	White	4

X4 Motor		2 pol. CombiCon
1	Motor +	Brown
2	Motor -	White
3	Motor Earth	Cabinet

Main Power		4 pol. CombiCon
X18	L	L 230V AC / 50 Hz
X19	N	N 230V AC / 50 Hz
X20	PE	PE
X21	PE	Cabinet PE

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14 Technical Data TSG200, TSG400, TSG750

Technical Data	
Max weight of panel TSG200	< 200 Kg
Max weight of panel TSG400	< 400 Kg
Max weight of panel TSG750	< 750 Kg
Speed range for Open speed	0,2 $^{m}/_{s}$ - max. 0,8 $^{m}/_{s}$ (TSG 750 max. 0,5 $^{m}/_{s}$)
Speed range for Close speed	0,2 $^{m}/_{s}$ - max. 0,6 $^{m}/_{s}$ (TSG 750 max. 0,5 $^{m}/_{s}$)
Speed range for Creeping Speed	0,02 $^{m}/_{s}$ - 0,08 $^{m}/_{s}$
Electronic Door Locking Force limitation	150 N
Range of door width	0,7 m - 5 m
Protection Class of Electronic / Motor	IP 54 / IP21
Power Supply	230 V AC 50 - 60 Hz
Power consumption	Ca. 250 Watt
Power fuse	2 Ampere
Storage Temperature	0 C° - 60 C°
Operating Temperature	10 C° - 40 C°
Dimension: Width* Height * Depth	470*340*180 (B*H*T) [mm]
Weight Electronic & Mechanic TSG200	Ca. 15,00 [Kg}
Weight Electronic & Mechanic TSG400	Ca. 16,00 [Kg}
Weight Electronic & Mechanic TSG750	Ca. 18,00 [Kg}

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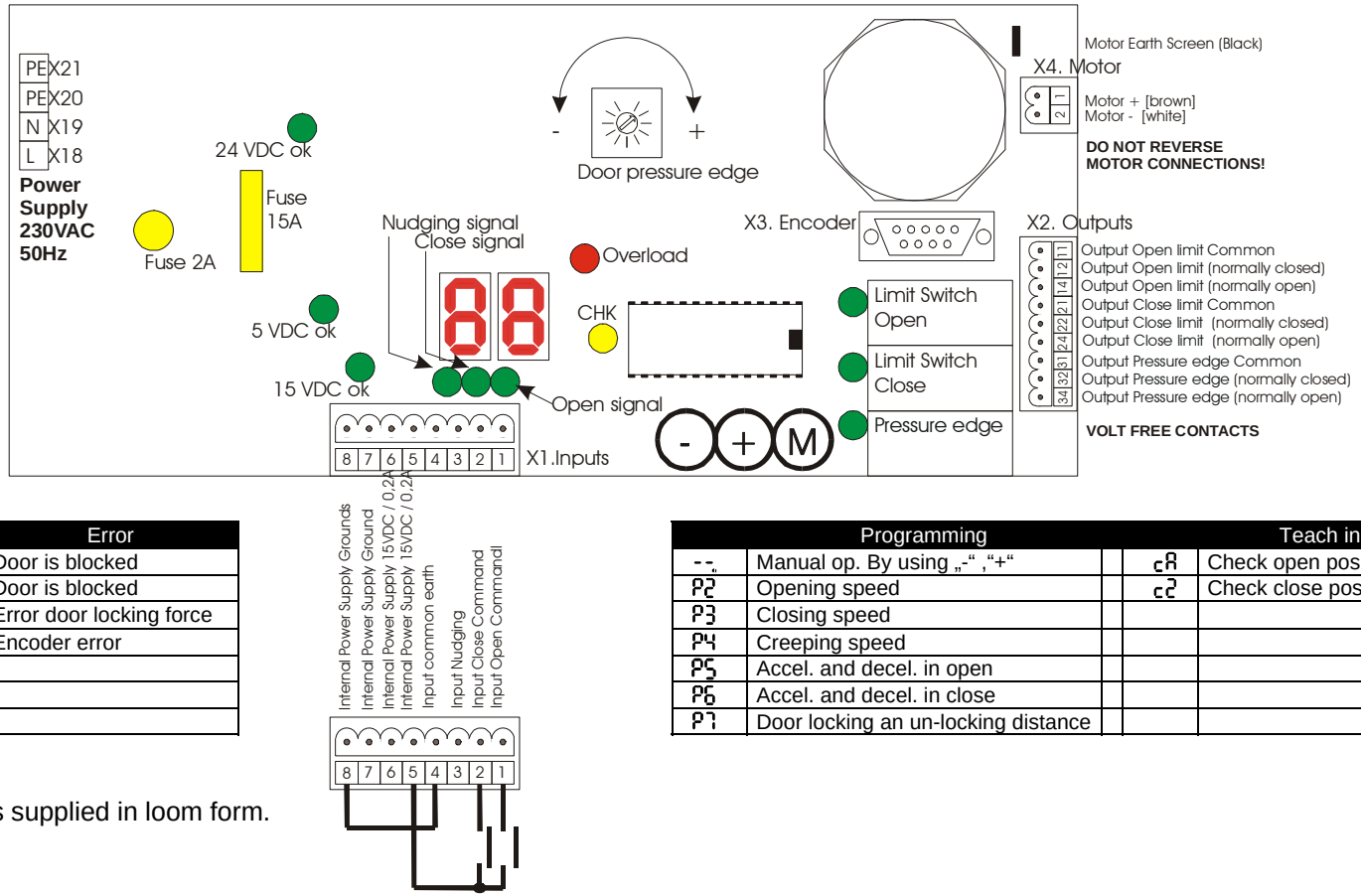
15 Device sketch



Normal mode	
--	No order
oF	Opening command
SL	Closing command
Au	Door open
Zu	Door is closed
bL	Door is blocked

Error	
E1	Door is blocked
E2	Door is blocked
E3	Error door locking force
E4	Encoder error

Programming			Teach in	
--	Manual op. By using „-“ ,“+“		cA	Check open position
P2	Opening speed		c2	Check close position
P3	Closing speed			
P4	Creeping speed			
P5	Accel. and decel. in open			
P6	Accel. and decel. in close			
P7	Door locking an un-locking distance			

Supply, motor and encoder wiring is supplied in loom form.