Functional description

for door control unit TVE-1

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Functional description	Approved	44100003-EN				
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1 Documents change history

Edition	Date	Created / Modified	Approved	Description
-	2024-04-03	T. Nouri	R. Kleinpaß	First Edition
A	2024-04-10	T. Nouri	R. Kleinpaß	Description of the motor connection added

2 Confidentiality and copyrights

3 General information

Power supply	U_{AC} = 230V ±10% (50-60Hz)
Dimension	270 mm x 106 mm x 45 mm
Weight	0,7 kg
Protection class	IP 20
Onboard protection	8 A
Relay outputs	U_{DC} = 24 V; I_{DC} = 3 A
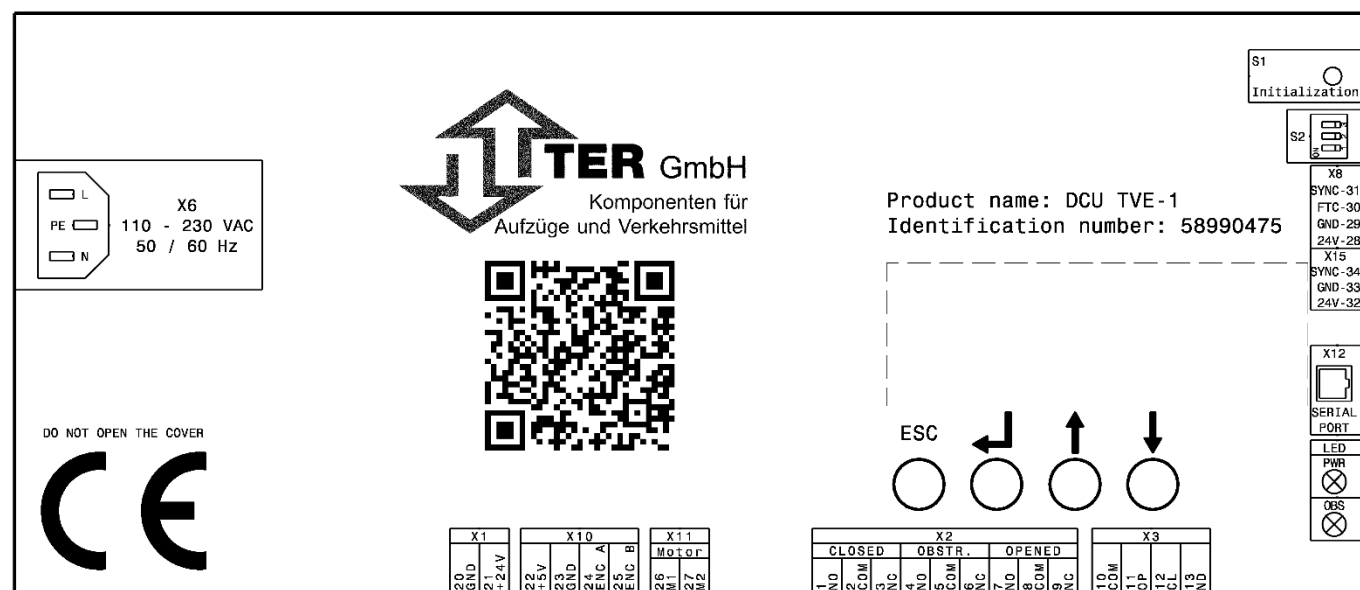
X1	Auxiliary power supply (24 Vdc Batteries)
X2	Relay output signals NO/NC **[OPENED]** Opening limit switch **[CLOSED]** Closure limit switch **[OBSTR.]** Obstacle (Safety edge)
X3	Inputs (dry contacts or external voltage) **[OPEN]** Door opening command **[CLOSE]** Door closure command **[NUDGE]** Forced closure
X6	Main power supply 230V (50/60 Hz)
X8	receiver Light Curtain (RX)
X10	Encoder motor (4 poles)
X11	Motor phases (2 poles)
X12	External programming keypad DISP801
X15	transmitter light curtain (TX)
SW1	Button **[LEARNING/TEST]:** • Learning (Hold down for 3 seconds) • Open/Close (Quick pressure)
SW2	Dipswitch: NOT USED
Led PWR	Normal functioning → green Alarm → Blinking Red
Led OBS	Obstacle (Safety edge) → Yellow

4   Initialization

1) Turn off the board by disconnecting the power cable.

2) Connect the motor to **X10** and **X11** connectors.
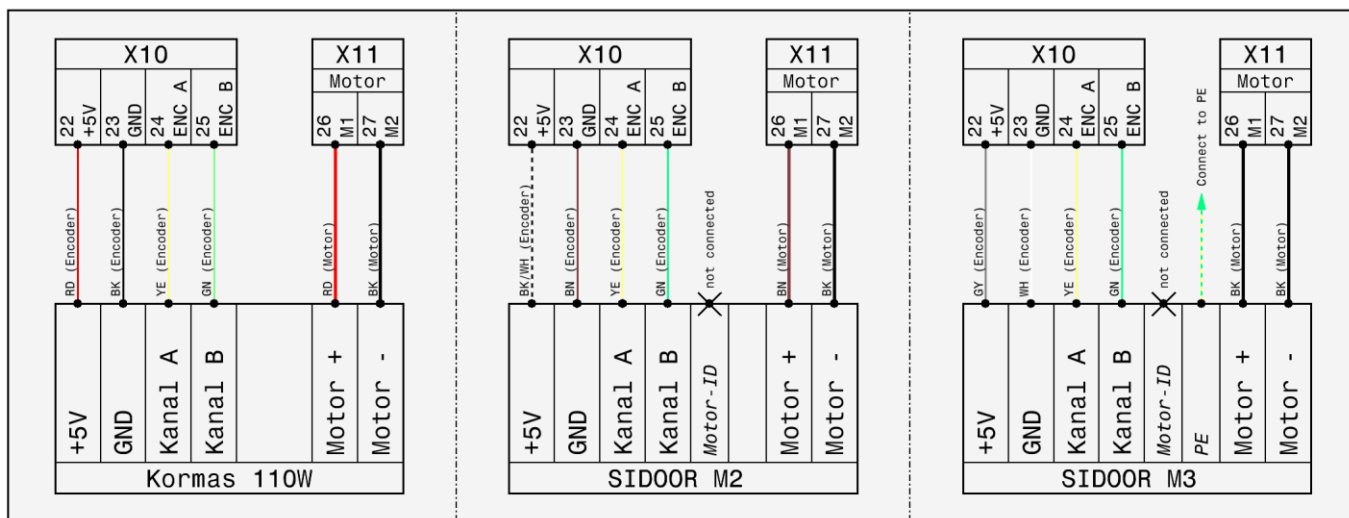
3) Connect the power cable to the **X6** connector.
   a) When switched on, the operator board waits for commands.
   b) Until the board completes an opening and a closing, the door moves at constant slow initial speed.
   c) After synchronization, if the board has completed the learning, the door starts to move with the ramps.

4) To perform the learning of the door stroke, position the door a few cm from the closing stop and hold the [LERNING/TEST] button positioned on the side of the board for at least 3 seconds.
   a) the Drive will slowly move in one direction, for 10 cm, in search of the end stop. If within 10 cm the door has not detected the limit switch, the door moves in the opposite direction.
   b) Once the door has closed, it moves towards opening at a slow constant initial opening speed.
   c) Once the door has opened, it moves towards closing at a slow constant initial closing speed.
   d) Once the door has closed, the board checks that the closing and opening stroke are similar. If not, a learning error is signaled, otherwise learning is complete and the ramps are enabled.
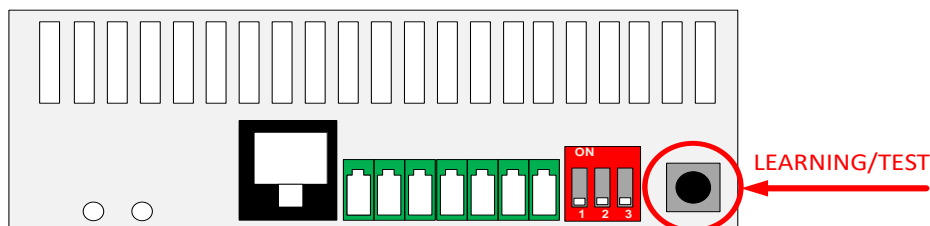
5 Connections

5.1 OPR521 - Controller
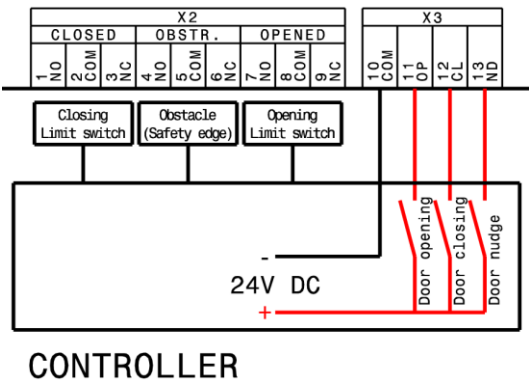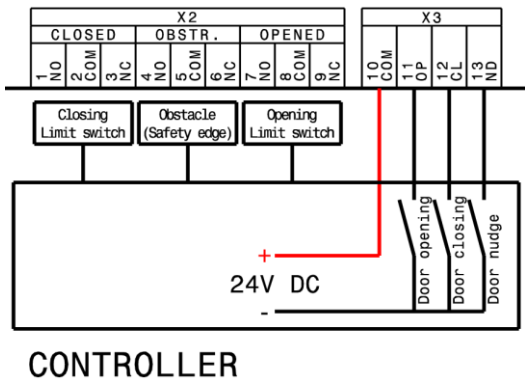
⚠️ NOTE: The connections between pins 10 and 11, 12, 13 must be an external voltage 12/24 V DC!

6 User interface

6.1 Integrated keypad and DISP801

The Drive can be programmed using the integrated keypad or the DISP801 external keypad.

INTEGRATED KEYPAD   **DISP801**

6.2 Programming Menu

ENT to enter the main menu and the sub-menus, and to confirm the settings.
ESC to exit the menus.
UP ↑/ DW ↓ to move between menus and to slide values.
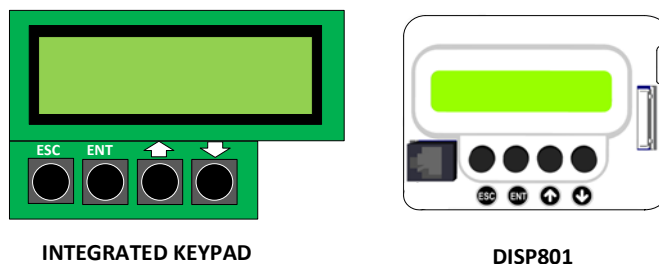
6.2.1 OPENING PROFILE

User interface	Description	Unit
[Start dist. open]	Start distance at constant start speed in opening	[mm]
[End dist. open]	End distance at constant end speed in opening	[mm]
[Start Speed open]	Initial speed in opening	[mm/s]
[Max Speed open]	Max speed in opening	[mm/s]
[End Speed open]	End speed in closing	[mm/s]
[Slw Ini Spd open]	Slow initial speed in opening. Used for opening speed during learning procedure	[mm/s]
[Acc. ramp open]	Acceleration ramp open	[mm/s^2]
[Dec. ramp open]	Deceleration ramp close	[mm/s^2]
[Rev. ramp Op/Cl]	Reversal ramp open/close. Ramp acceleration reversing motion from opening to closing	[mm/s^2]

6.2.2 CLOSING PROFILE

User interface	Description	Unit
[Start dist. close]	Start distance at constant start speed in closing	[mm]
[End dist. close]	End distance at constant end speed in closing	[mm]
[Start Spd close]	Initial speed in closing	[mm/s]
[Max Speed close]	Max speed in closing	[mm/s]
[End Speed close]	End speed in closing	[mm/s]
[Slw Ini Spd close]	Slow initial speed in closing. Used for closing speed during learning procedure and as speed of approach and post an obstacle	[mm/s]
[Nudge Speed]	Nudging speed during closing when nudge command is active	[mm/s^2]
[Acc. ramp close]	Acceleration ramp close	[mm/s^2]
[Dec. ramp close]	Deceleration ramp close	[mm/s^2]
[Rev. ramp Cl/Op]	Reversal ramp close/open. Ramp acceleration reversing motion from closing to opening	[mm/s^2]

6.2.3 TORQUES

User interface	Description	Unit
[Max Torque]	Represents the max torque that the drive can supply according to the requested speed profile.	[A]
[Idle Trq Open]	Represents the current to keep the door fully open.	[A]
[Idle Trq Close]	Represents the current to keep the door fully close.	[A]
[Force end Close]	Current threshold that must be exceeded to acquire the fully closed/opened door status	[A]
[Sec. Force Close]	SAFETY TORQUE IN CLOSING: current threshold that must be exceeded to activate the safety edge during the closure.	[N]
[Sec. Force Open]	SAFETY TORQUE IN OPENING: current threshold that must be exceeded to activate the safety edge during the opening.	[N]
[Sec. Force Nudge]	SAFETY TORQUE IN NUDGING: current threshold that must be exceeded to activate the safety edge during the nudging command.	[N]

6.2.4 COMMANDS

User interface	Description
[OPEN]	Opening command, with priority over the control board commands
[CLOSE]	Closing command, with priority over the control board commands
[DEFAULT]	Restores the factory settings
[LEARNING]	Self-learning start
[RESET]	Board reset [NOT IMPLEMENTED ON DISP801]

6.2.5 OPTIONS

User interface	Value	Description
[COMMANDS MODE]	[Slave]	Commands opening or closing for the time the input is active. When the command drops, the operation is interrupted
	[Master]	Once the closing or opening command is accepted, the board completes the operation even if the input is no longer active
[AUTO RUNNING]	[Disabled]	Automatic runs disabled
	[Enabled]	Automatic runs enabled
[PHOTO MODE]	[Slave]	In case of obstruction of the light curtains, the Drive signals the obstacle by the "CM" relay
	[Master]	In case of obstruction of the light curtains, the Drive signals the obstacle by the "CM" relay and reopens the doors if [COMMANDS MODE] = Master.
[NOF CL. RIF-ENC]	Number of closures after which the encoder synchronizes 0: Encoder synchronizing function disabled	

6.2.6 SELECT LANGUAGE

User interface	Description
[ENGLISH]	English language selected
[GERMAN]	German language selected
[ITALIAN]	Italian language selected

6.2.7 MECHANICAL PARAM

User interface	Description
[Type Motor]	Motor type: SIEMENS M2 SIEMENS M3 KORMAS 110W
[Resolution]	First row: Encoder resolution expressed in pulses/cm Second row: Corresponding Pulley diameter in cm

6.2.8 LIGHT CURTAIN

User interface	Value	Description
[Enabled L.C.]	[NO]	Light curtain check disabled
	[YES]	Light curtain check enabled
[Anti-V(sec)]	Vandal-proof function activation time expressed in seconds <10: Vandal-proof function disabled	
[Sec. Check]	[NO]	Light curtain safety check disabled
	[YES]	Light curtain safety check enabled
[Timeout(ms)]	Timeout for the light curtain safety check function, in milliseconds	
[Buzzer Nudge]	[NO]	Disabled acoustic signal during nudge and vandal-proof
	[YES]	Acoustic signal during nudge and vandal-proof
[Buzzer Obstr]	[NO]	Disabled acoustic signal when the light curtain detects the obstacle
	[YES]	Acoustic signal when the light curtain detects the obstacle

6.2.9 DIAGNOSTIC DOOR

User interface	Description	
[Alarm List]	[OVER-CURR]	Current overload
	[ENC-KO]	Motor/Encoder fault
	[ENC-INC]	Inconsistent Encoder
	[IxT-PROT]	IxT Protection
	[OVER-TEMP]	Overheating
	[NVM-ERR]	External EEprom error
	[UND-VOLT]	Power supply undervoltage error
	[BARR-KO]	Light curtain fault
	[ALIM-EMG]	Emergency power supply
	[LEARNING-KO]	Learning procedure error
[Learning]	View the length of the stroke in encoder pulses	
[Open counter]	View the number of openings	
[Close counter]	View the number of closures	
[Obstr. counter]	View the number of mechanical obstacles detections	

6.2.10 DIAGNOSTIC PAR

User interface	Description
[Vmot]	Shows the voltage in Volt provided to the motor.
[Imot]	Shows the current in Ampere provided to the motor.
[Vsupply]	Shows the voltage in volt available to the motor.
[Enc]	Show the encoder value in encoder pulses.

6.2.11 PAR.EN81-20/50:

User interface	Description
[Enable REOPENING]	[NO] = Reopening coupling disabled [YES] = Reopening coupling enabled
[Cm REOPENING]	Reopening space in centimeters
[WaitTime REOPE.]	Reopening waiting time in seconds
[Cm FCP ON]	Final space in which the limit switch is active during the closure, expressed in centimeters

7   Functions

7.1   IxT Protection

The function is always active and protects the motor from overloads due to mechanical hardening or obstacles that prevent normal door travel. If the current absorbed by the motor exceeds a certain threshold (about 5 A) for more than 7 seconds, the board is disabled and remains in IxT alarm.
After a pause of about 15 seconds, the Drive closes the door at reduced speed: Nudge Speed.

7.2   Vandal-proof Function

This function can only be activated if the light curtains are enabled by parameter [Enabled L.C.]. If the light curtains connected to the Drive detect a persistent obstacle for a time longer than that set in the parameter [LIGHT CURTAIN] → [Anti-V(sec)] the Drive commands a slow closure: Nudge Speed.
The closure is also signaled by an acoustic signal if [Buzzer Nudge] = [YES].
By setting parameter [Anti-V(sec)]<10, the function is disabled.

7.3   Safety Test for Light Curtains

The function can only be activated if the light curtains are enabled by the [Enabled L.C.]. The function can be enabled by parameter [LIGHT CURTAIN] → [Sec. Check].
If the safety test is enabled, when the door is fully closed the Drive performs a test on the light curtain to verify if it is functioning correctly. If the test fails, the doors will close at low speed and the closure will be signaled by an acoustic signal.

7.4   Coupling Reopening on the floor – EN81-20/50

The function can be enabled by [PAR. EN81-20/50] → [Enable REOPENING] = [YES]
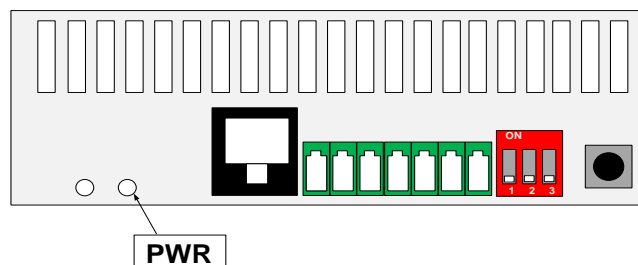If the reopening is enabled, when the door is closed and the [CLOSE] command is no longer active, after a few seconds (programmable) the board reopens the door a few centimeters (programmable).
This small reopening is used to unlock the landing door so that you can reopen the door when from inside the car when you are on the floor.

8 Diagnostic

8.1 LED

8.1.1 LED PWR

PWR

| LED Color	LED Status	Number of flashes	Drive Status
Green	Steady	-	Normal functioning
Green	Flashing	-	Synchronization
Red	Flashing	1	Alarm: Current overload
Red	Flashing	2	Alarm: Motor or Encoder fault
Red	Flashing	3	Alarm: Inconsistent Encoder
Red	Flashing	4	Alarm: IxT Protection
Red	Flashing	5	Alarm: Overheating
Red	Flashing	6	Alarm: EEprom error
Red	Flashing	7	Alarm: Undervoltage
Red	Flashing	8	Alarm: Light curtain fault
Red	Flashing	9	Alarm: Error Learning procedure

8.1.2 LED CM

CM
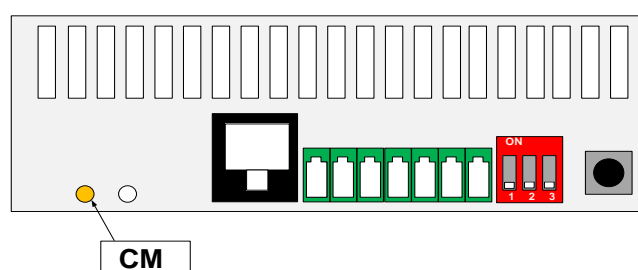
The LED OBS switches on to signal the activation of the [OBSTR] output because of mechanical detection in closing or because of an obstruction of the light curtain (when the light curtain is directly connected to the OPR521).

8.2   Terminal

When you are not in the programming menu, on the home screen of the keypad you can check the status of the door, the current error, and the active inputs:
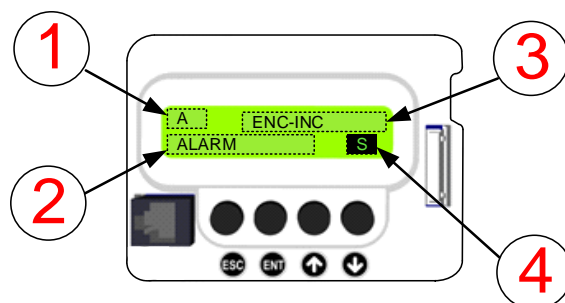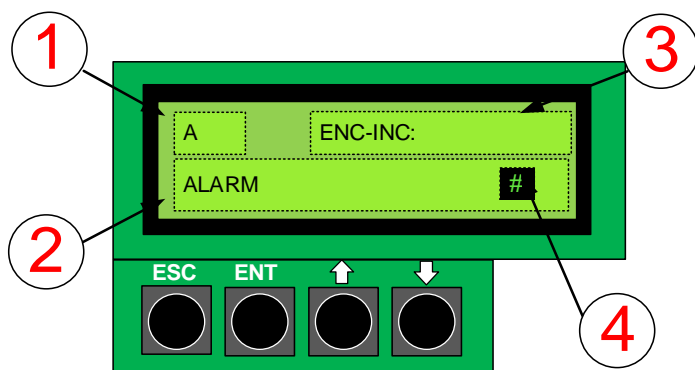
POSITION ON THE KEYPAD	MESSAGE DISPLAYED	DESCRIPTION
1 (INPUTS)	A	[OPEN] input active
	C	[CLOSE] input active
	N	[NUDGE] input active
	P	[FTC] input active
2 (STATUS)	ALARM	Error in progress
	REPHASING	Synchronization in closure at power-on
	LEARNING	Learning stroke in opening
	WAITING	Door halted, waiting for a command
	RUNNING	Moving door
	DOOR CLOSED	Door fully closed. [CLOSED] relay active
	DOOR OPEN	Door fully open. [OPENED] relay active
	OBSTRUCTION	Mechanical obstacle. [OBSTR.] relay active
3 (ALARMS/ENCODER)	Enc: xxxxx	Encoder position in impulses
	IxT-PROT	High current for 7 seconds
	ENC-KO	Encoder error
	OVERTEMP	Motor thermal protection
	OVER-CURR	Overcurrent
	BARR-KO	Light curtains error
	UND-VOLT	Power supply voltage is too low
	ENC-INC	Incoherent Encoder. Repeat the learning procedure.
	NVM-ERR	External EEPROM error
	LRN-KO	Learning procedure Error
4 (SD-CARD / AUTORUNNING)	S	SD card detected
	Ǝ	SD card reading error
	#	Automatic run's function enabled

9 Default

User Interface	Default	Einheit
OPENING PROFILE		
Start dist. open	30	[mm]
End dist. open	30	[mm]
Start Speed open	60	[mm/s]
Max Speed open	500	[mm/s]
End Speed open	40	[mm/s]
Slw Ini Spd open	90	[mm/s]
Acc. ramp open	850	[mm/s^2]
Dec. ramp open	500	[mm/s^2]
Rev. ramp Op/Cl	500	[mm/s^2]
CLOSING PROFILE		
Start dist. close	20	[mm]
End dist. close	40	[mm]
Start Spd close	40	[mm/s]
Max Speed close	319	[mm/s]
End Speed close	60	[mm/s]
Slw Ini Spd close	90	[mm/s]
Nudge Speed	150	[mm/s]
Acc. ramp close	500	[mm/s^2]
Dec. ramp close	500	[mm/s^2]
Rev. ramp Cl/Op	850	[mm/s^2]
TORQUES		
Max Torque	7	[A]
Idle Trq Open	1	[A]
Idle Trq Close	1	[A]
Force end Close	5	[A]
Sec. Force Close	120	[N]
Sec. Force Open	120	[N]
Sec. Force Nudge	120	[N]
OPTIONS		
COMMANDS MODE	[Master]	
AUTO RUNNING	[Disabled]	
PHOTO MODE	[Master]	
NOF CL. RIF-ENC	0	
MECHANICAL PAR		
Motor Type	KORMAS 110W	
Resolution	96	[Imp/cm]
LIGHT CURTAIN PAR		
Enable Light Curt.	[NO]	
Anti-V	90	s
Sec. Check	[NO]	
Timeout(ms)	800	ms
Nudge Buzzer	[EIN]	
Obst.Buzzer	[NO]	
PAR.EN81-20/50		
Enable Reopen	[NO]	
Cm Reopen	04	cm
Reop. Wait. time	08	s
Cm FCP ON	02	cm

10 TROUBLESHOOTIING

Problem	Resolution
The doors do not move, or move jerkily: [PWR] LED, 3 red flashes [ENC-KO] on the display	Check the wiring between board, motor and encoder
The doors are moving slowly	After switching on, the doors move at a slow and constant speed until a complete opening and closing is completed. If after a complete opening and closing the problem remain, perform a learning procedure
The doors do not open	Check if the doors open by pressing for 1 second the button on the side
	Check if during the opening command is displayed "A" on the top right
The doors do not close	Check if the doors open by pressing for 1 second the button side
	Check if during the opening command is displayed "C" on the top right
The doors move in the opposite direction.	Repeat the learning procedure
The doors slowdown with a delay and slam in opening	Repeat the learning procedure
	Increase the parameters: [OPENING PROFILE] → [Dec. ramp open] end [Dec. ramp open]
	Check that the belt is not to loosen
The doors slowdown with a delay and slam in closing	Repeat the learning procedure
	Increase the parameters: [CLOSING PROFILE] → [Dec. ramp close] end [Dec. ramp close]
	Check that the belt is not to loosen
The doors always detect an obstacle during the closure	Make sure that the doors do not have a mechanical obstruction during the closure, by moving the doors by hand with the board turned off
	Increase parameter: [TORQUES] → [Sec. Cl. Tor.]
The doors always detect an obstacle during the opening	Make sure that the doors do not have a mechanical obstruction during the opening, by moving the doors by hand with the board turned off
	Increase the parameter: [TORQUES] → [Sec. Op. Tor.]
The doors do not remain fully open because of the reclosing spring	Check if the spring is correct for the weight of the doors
	Increase the parameter: [TORQUES] → [Idle Trq Open]
The coupling does not remain fully closed	Check the parameter: [PAR. 81-20/50] → [Enable REOPENING]
	Increase the parameter: [TORQUES] → [Idle Trq Close]