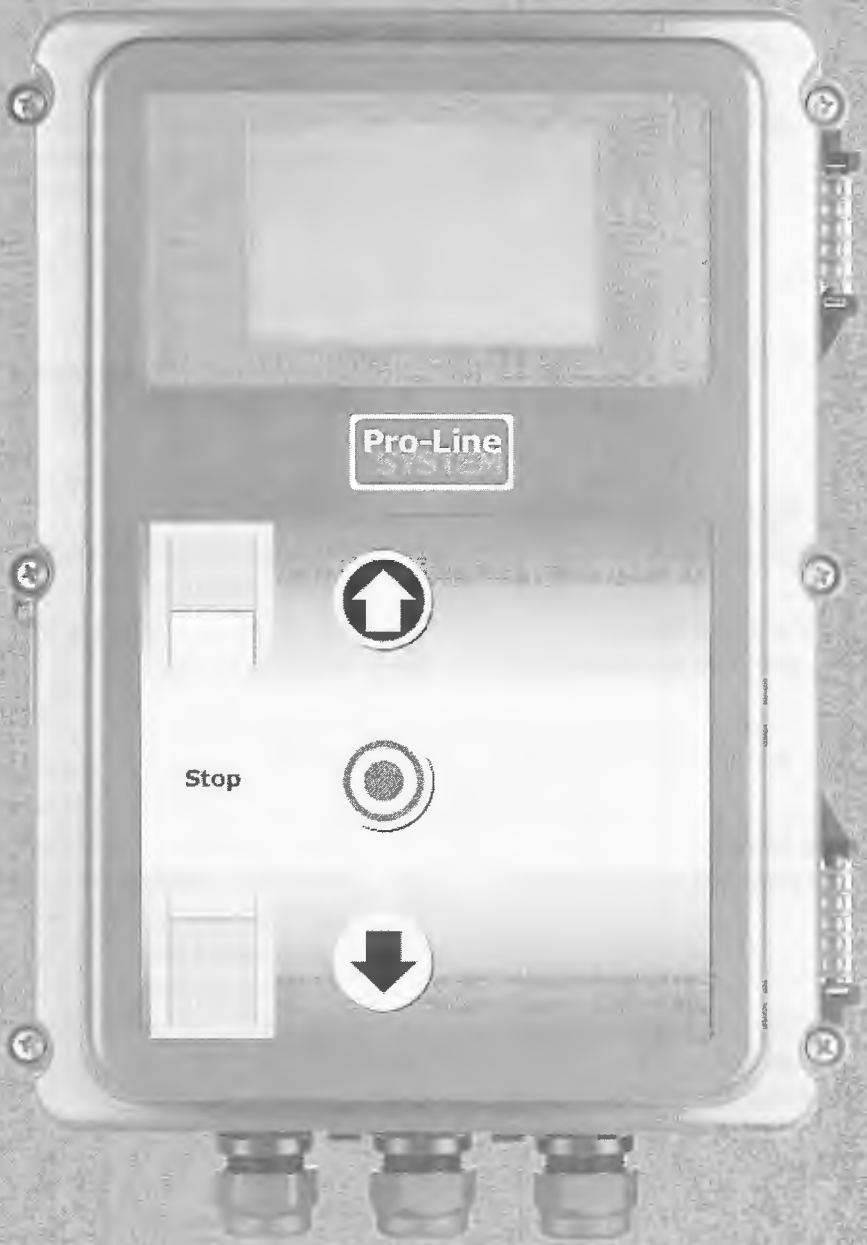
Operating Instruction CS300FU



Pro-Line SYSTEM

GB

Pro-Line SYSTEM

1. Contents

2. Key to symbols

Danger of personal injury!
The safety instructions must be observed!

Warning! Danger to property!
The safety instructions must be observed!

Information
Special information
OR
Reference to other sources of information

3. General safety instructions

Guarantee
The function and safety of the equipment is only guaranteed if the warning and safety instructions included in these operating instructions are adhered to.
The producer is not liable for any personal injury or damage to property that occurs as a result of the warning and safety instructions being disregarded.

Using the equipment for its intended purpose
The CS 300 FU controls are designed only for controlling gates and doors with digital end position systems and integrated frequency converters. It is only permitted to operate the equipment in dry rooms.

Target group
Only qualified and trained electricians may connect, programme and service the controls.
Qualified and trained electricians meet the following requirements:
- knowledge of the general and specific safety and accident prevention regulations,
- knowledge of the relevant electrical regulations,
- trained in the use and care of appropriate safety equipment,
- capable of recognising the dangers associated with electricity.

Instructions for installation and connection
- The controls must be disconnected from the electricity supply before carrying out electrical works. After the disconnection there will be a residual voltage. Therefore a safety period of 180 seconds must be adhered to. During the works the electricity supply must remain disconnected.
- Local protective regulations must be complied with.
- Mains cables and control cables must be laid separately.

Regulations and bases for testing
For connecting, programming and servicing, the following regulations must be observed (the list is not exhaustive).

Construction product standards
- EN 13241-1 (Products without fire resistance or smoke control characteristics)
- EN 12445 (Safety in use of power operated doors - Test methods)
- EN 12453 (Safety in use of power operated doors - Requirements)
- EN 12978 (Safety devices for power operated doors and gates - Requirements and test methods)

Electromagnetic compatibility
- EN 55014-1 (Radio disturbance, household appliances)
- EN 61000-3-2 (Disturbances in supply systems - harmonic currents)
- EN 61000-3-3 (Disturbances in supply systems - voltage fluctuations)
- EN 61000-6-2 (Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments)
- EN 61000-6-3 (Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments)

Machinery guidelines
- EN 60204-1 (Safety of machinery, electrical equipment of machines, part 1: general requirements)
- EN 12100-1 (Safety of machinery. Basic concepts, general principles for design. Basic terminology, methodology)

Low voltage
- EN 60335-1 (Household and similar electrical appliances - Safety)
- EN 60335-2-103 (Particular requirements for drives for gates, doors and windows)

Professional association (D)
- BGR 232 (Directive for Power-driven Windows, Doors and Gates)

4.1 Various options

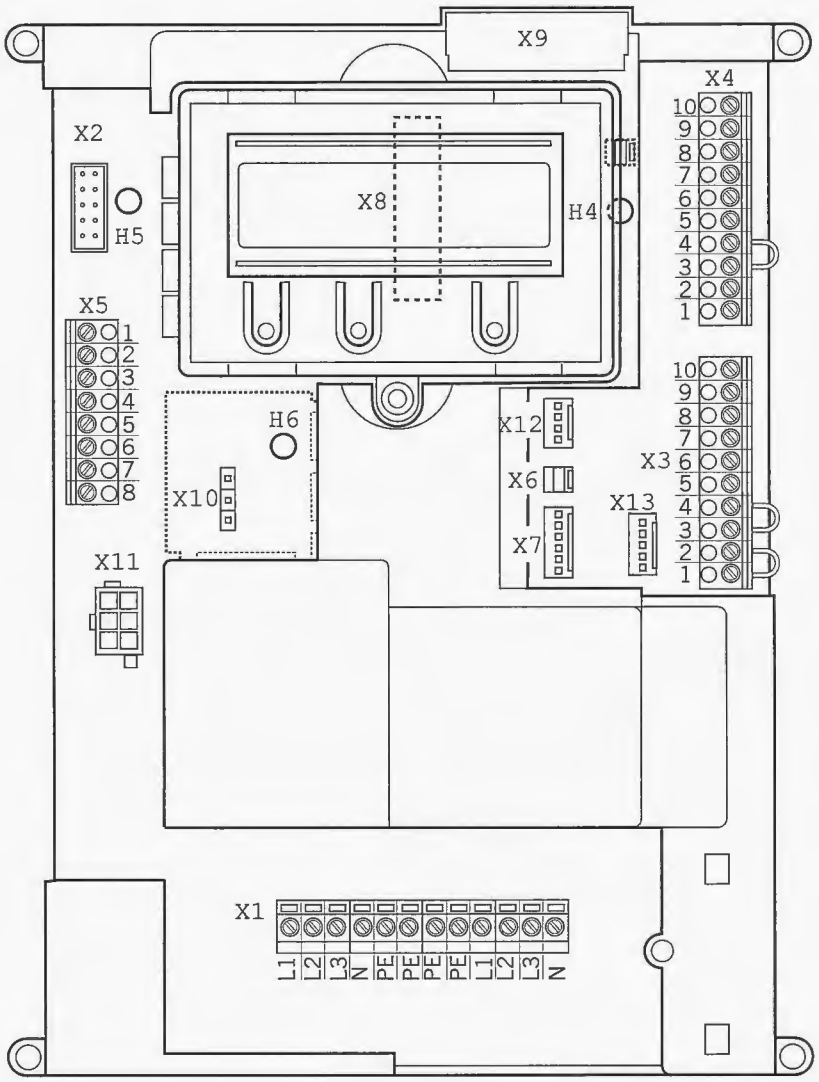
CS300 FU controls can be supplied with the option of a frequency converter module integrated in the control housing (model CS 300 FU-E) or a frequency converter integrated in the door or gate operator (model CS 300 FU-I).
The following package options are available for both versions of the CS 300 FU control:
- CS 300 FU control with LCD monitor
- CS 300 FU control with LCD monitor in housing
- CS 300 FU controls without LCD monitor (monitor is required for adjusting the settings)

All the above options can be fitted with a plug-in weekly timer and a plug-in radio receiver.

The following options are available for the housing.
- housing with CS 3-button input switch
- housing with OPEN-STOP-CLOSE -button input unit
- housing with key switch ON/OFF
- housing with main switch
- housing with emergency off switch

The operating instructions describe the connection possibilities and programming procedures for the different models:
- CS 300 FU-E control with attached LCD display board
- CS 300 FU-I control with attached LCD display board

4.3 CS 300 FU 0,75 basic board (with attached LCD display monitor)



Key:

X1: mains connection (mains) terminal block / power supply frequency converter (FC)

X2: terminal block for FC data cable

X3: terminal block command devices

X4: terminal block safety elements

X5: terminal block relay

X6: sockets for internal ON-OFF switch

X7: sockets for internal 3-button input unit

X8: socket for monitor (under monitor)

X9: sockets for radio receiver

X10: sockets for weekly timer

X11: sockets for digital limit switch system with safety circuit (STOP CIRCUIT)

X12: socket for external radio receiver

X13: terminal block for CS three-button input unit

H4: status display for safety edge protection (SEP) – illuminated when SEP is working

H5: status display frequency converter (FC) - lights up when the FC is ready

H6: Safety circuit status message - lights up when the safety circuit is closed

General

The frequency control system allows the door speed to be adjusted separately for the OPEN and CLOSE directions. The acceleration and retardation times (SPEED UP / SLOW DOWN) ensure a gentle start and stop at the end positions.
The frequency of the converter determines the operator speed.

Adjustable Values

The following values can be adjusted in the input menu.

SPEED UP
Acceleration time from minimum speed to maximum speed.

SLOW DOWN
Retardation time from maximum speed to minimum speed.

MIN SPEED OPEN
Minimum speed of the drive for the OPEN run (creep speed).

MAX SPEED OPEN
Maximum speed of the drive for the OPEN run.

MIN SPEED CLOSE
Minimum speed of the drive for the CLOSE run (creep speed).

MAX SPEED CLOSE
Maximum speed of the drive for the CLOSE run.

BRAKE POINT OPEN
The brake point for the OPEN run lies before the OPEN limit switch value. When the OPEN brake point is passed, the retardation time SLOW DOWN is triggered.

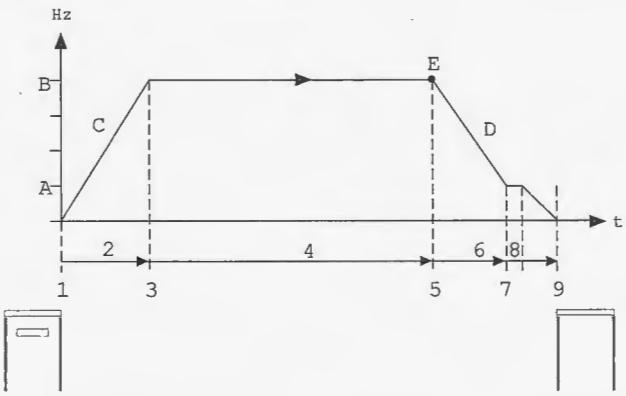
BRAKE POINT CLOSE
The brake point for the CLOSE run lies before the CLOSE limit switch value. When the CLOSE brake point is passed, the retardation time SLOW DOWN is triggered.

U START
The start-up voltage increases the performance of the door operators at low rotational speeds.
If the start-up voltage is set too high or too low, the door or gate may not run properly.
The start-up voltage can be set between 0V and 42V.
If the start-up voltage is too high, this will result in an over-current fault (FU2).
The start-up voltage must be reduced in this case.
If the start-up voltage is too low, then the motor will not have sufficient power to move the door.
The start-up voltage must be increased in this case.
Due to the variety of different types of doors and gates, the correct start-up voltage setting must be obtained through practical trials.

BRAKE RETARDATION
In the case of drives with a brake and low self-locking (high speed door drives), the brake release must be retarded when the door or gate starts moving to prevent the door from dropping.
This parameter can be ignored in the case of weight counter-balanced doors and gates.

RATED FREQUENCY
The frequency rating parameter must be set to the rated frequency of the motor. There are three modes available.

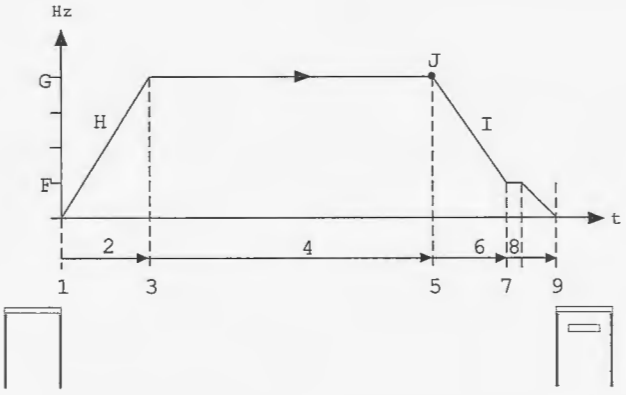
Opening Run of the Door/Gate



A	MIN SPEED OPEN
B	MAX SPEED OPEN
C	SPEED UP
D	SLOW DOWN
E	OPEN brake point

1. The door/gate moves in the OPEN direction.
2. The frequency converter accelerates over an acceleration period SPEED UP (C) to reach its maximum speed MAX SPEED OPEN (B).
3. The door/gate reaches its maximum speed MAX SPEED OPEN (B).
4. The door/gate travels at the maximum speed MAX SPEED OPEN (B).
5. The OPEN brake point (E) is triggered and activates the soft run in the OPEN direction.
6. The frequency converter reduces the speed over the retardation period SLOW DOWN (D) to reach the minimum speed MIN SPEED OPEN (A).
7. The door/gate reaches its minimum speed MIN SPEED OPEN (A) .
8. The door/gate travels at the minimum speed MIN SPEED OPEN (A).
9. The door/gate stops at the upper end position.

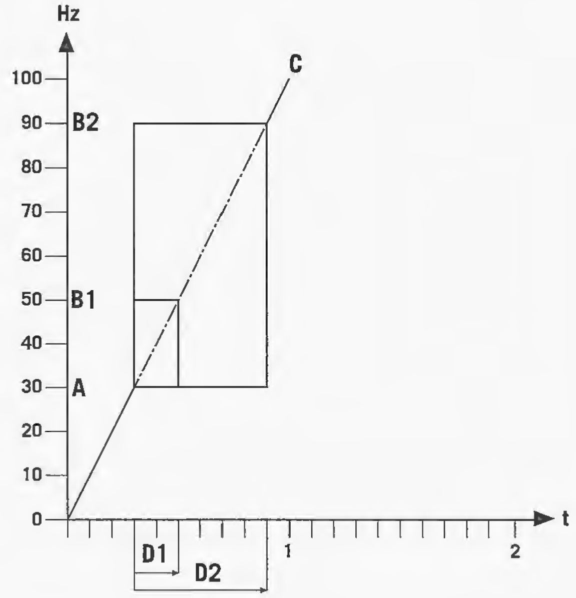
Closing run of the door/gate



F	MIN SPEED CLOSE
G	MAX SPEED CLOSE
H	SPEED UP
I	SLOW DOWN
J	CLOSE brake point

1. The door/gate starts to move in the CLOSE direction.
2. The frequency converter accelerates over an acceleration period SPEED UP (C) to reach its maximum speed MAX SPEED OPEN (B).
3. The door/gate reaches its maximum speed MAX SPEED CLOSE (B).
4. The door/gate travels at the maximum speed MAX SPEED CLOSE (B).
5. The CLOSE brake point (E) is triggered and activates the soft run in the CLOSE direction.
6. The frequency converter reduces the speed over the retardation period SLOW DOWN (D) to reach the minimum speed MIN SPEED CLOSE (A).
7. The door/gate reaches its minimum speed MIN SPEED CLOSE (A) .
8. The door/gate travels at the minimum speed MIN SPEED CLOSE (A).
9. The door/gate stops at the lower end position.

Effective OPEN DOOR acceleration time - Example showing change of frequency setting



t = seconds

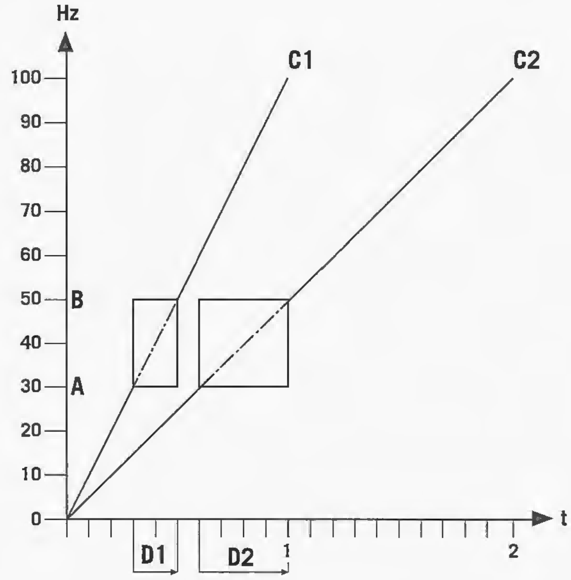
> *i*
> ***Information:***
> *The time values set for SPEED UP / SLOW DOWN always relate to the maximum values of 0 Hz to 100 Hz. The drive always starts with MIN SPEED OPEN.*

The values set:

A	MIN SPEED OPEN	30 Hz
B1	MAX SPEED OPEN	50 Hz
B2	MAX SPEED OPEN	90 Hz
C	SPEED UP	1 second
D1	Effective acceleration time 1	
D2	Effective acceleration time 2	

If the time for SPEED UP (C) is set to 1 second, the effective acceleration time (D1) from 30 Hz to 50 Hz is 0.2 seconds.
If the setting for MAX SPEED OPEN is increased to 90 Hz (B2), the resulting effective acceleration time (D2) is 0.6 seconds.

Effective OPEN DOOR acceleration time – Example showing change of time setting



t = seconds

> *i*
> ***Information:***
> *The values set for SPEED UP / SLOW DOWN always relate to the maximum values of 0 Hz to 100 Hz. The drive always starts with MIN SPEED OPEN.*

The values set:

A	MIN SPEED OPEN 30 Hz	
B	MAX SPEED OPEN	50 Hz
C1	SPEED UP	1 second
C2	SPEED UP	2 seconds
D1	Effective acceleration time 1	
D2	Effective acceleration time 2	

If the time for SPEED UP (C) is set to 1 second, the effective acceleration time (C1) from 30 Hz to 50 Hz is 0.2 seconds.
If the SPEED UP time is increased to 2 seconds (C2), the resulting effective acceleration time (D2) is 0.4 seconds.

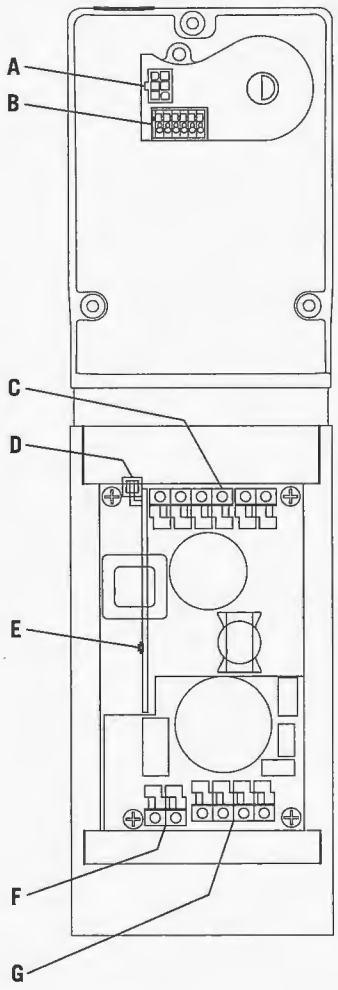
6.1 General

Warning!
To guarantee that the equipment functions properly, the following points must be ensured:
- *The gate or door is installed and operational.*
- *The command and safety devices are installed and ready for operation.*
- *The control housing with the CS 300 FU control is installed.*

Information:
For the installation of the gate/door, the MFZ drive motor and the command and safety devices, the relevant manufacturer's instructions are to be adhered to.

6.2 Connection of Drive - Controls

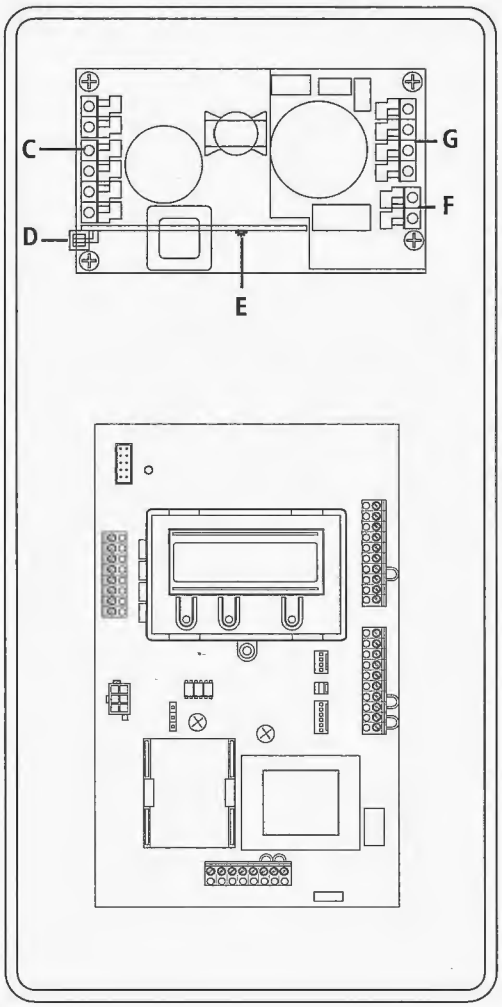
Model CS300 FU-I, frequency converter module integrated in drive



A	AVE plug
B	AVE plug terminal
C	Motor output FU (U2, V2, W2), Temperature sensor, optional
D	Plug connection for data cable FU
E	LED operation FU
F	Connection of brake resistance (R-, R+)
G	Power supply FU, 230V (U1, N, PE)

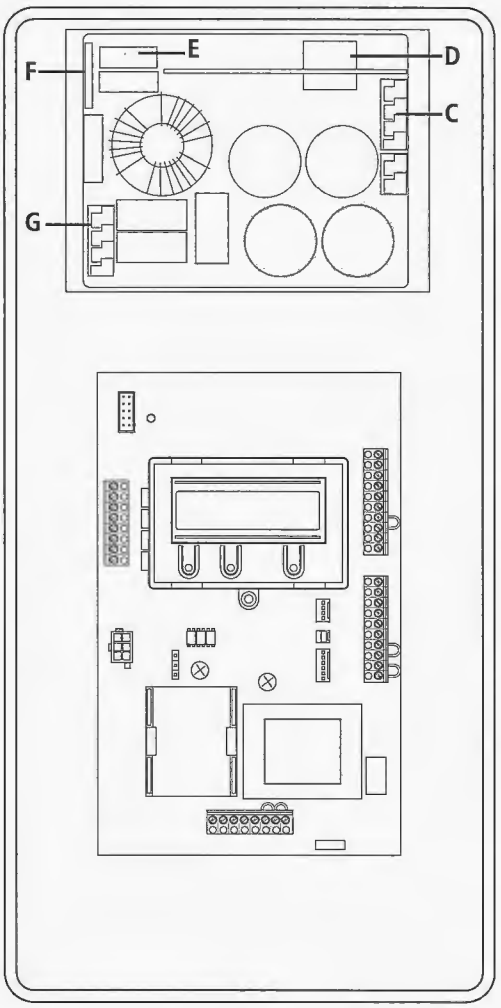
Connection to CS 300 FU Controls:
- ☐ Connect power supply FU (G) at terminal X1.
- ☐ Connect AVE plug (A) at terminal X11.
- ☐ Connect data cable FU (D) at terminal X2.

Model CS300 FU-E, external frequency converter module, 0.75 KW



- C Motor output FU (U2, V2, W2), Temperature sensor, optional
- D Plug connection for data cable FU
- E LED operation FU
- F Connection of brake resistance (R-, R+)
- G Power supply FU, 230V (U1, N, PE)

Model CS300 FU-E, external frequency converter module, 1.5 KW / 3 KW



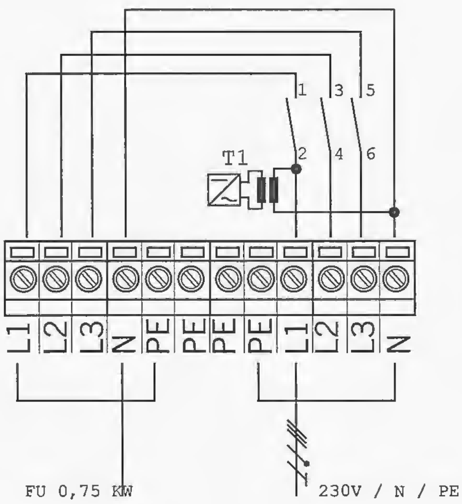
- C Motor output FU (U2, V2, W2), Temperature sensor, optional
- D Plug connection for data cable FU
- E LED operation FU
- F Connection of brake resistance (R-, R+)
- G Power supply FU, 400V AC

6.3 Mains connection

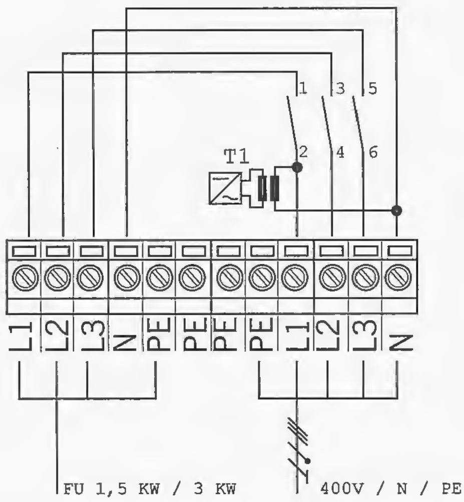
Danger!
To guarantee that the controls function properly, the following points must be ensured:
- *The mains voltage must correspond to the voltage stated on the type plate.*
- *For a permanent connection, an all-pole main switch must be used.*
- *The drive cover must be closed.*

Warning!
Before switching on the controls for the first time, a check must be carried out after completing the wiring to ensure that all the motor connections at the motor and at the controls are securely fixed. All control voltage inputs are galvanically isolated from the supply.
For all components to be connected to the controls, at least one additional isolation with a rated voltage of > 230 V is recommended.

Detailed circuit diagram for mains connection (230 V AC 1-phase / 0.75 KW)



Detailed circuit diagram for mains connection (400 V AC 3-phase / 1.5 KW or 3 KW)



Key:
X1: terminal block for mains connection

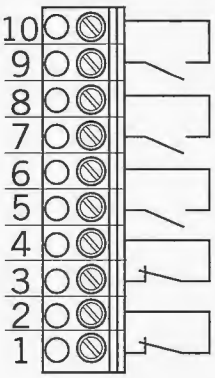
Connection:
- ☐ Connect the control to the mains.
- ☐ Short before the corresponding screw terminals, groups of cables should be make safe by means of straps.

Information:
Technical data see page 26.

6.4 Allocation of connections for command and safety devices

Command and safety devices can be connected to terminals X3, X4 and X5.

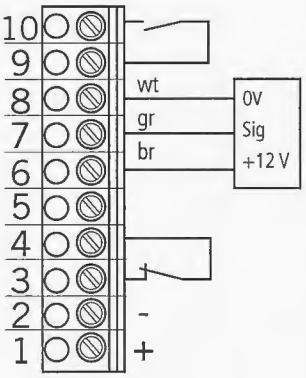
Terminal block X3



- CLOSE switch
- impulse switch[1]
- OPEN switch
- STOP switch, Wicket door switch, draw-in protection
- Emergency off, slack rope switch

Terminal block X4

(for optoelectronic safety edge protection)



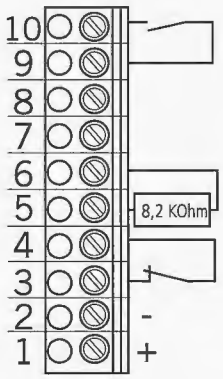
- PART – OPEN[2]
- safety edge protection OPTO
- photoelectric drive-through barrier[3]
- 24 V DC / 250 mA[4]

[1] sequence control
[2] button or selector switch
[3] effective in down direction
[4] for external switching devices (connection to terminals 1 and 2)

wt: white
gr: green
br: brown

Terminal block X4

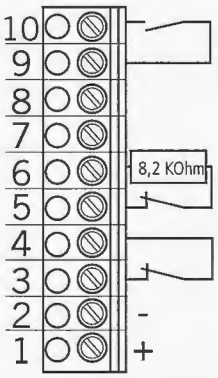
(for 8.2 kOhm safety edge protection)



- PART - OPEN[2]
- safety edge protection
- photoelectric drive-through barrier[3]
- 24 V DC / 250 mA[4]

Terminal block X4

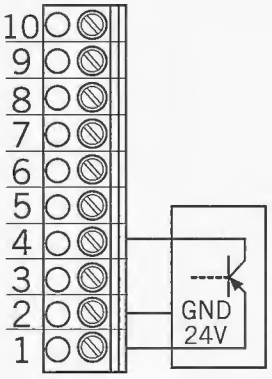
(for pneumatic safety edge protection – pressure sensor test:
- A 8.2 kOhm resistor must be connected in series
- The input parameter SEP TEST must be switched on)



- PART - OPEN[2]
- safety edge protection
- photoelectric drive-through barrier[3]
- 24 V DC / 250 mA[4]

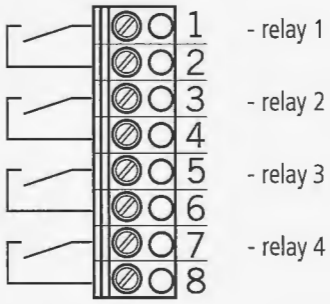
Terminal block X4

(for three-wire photoelectric barrier)

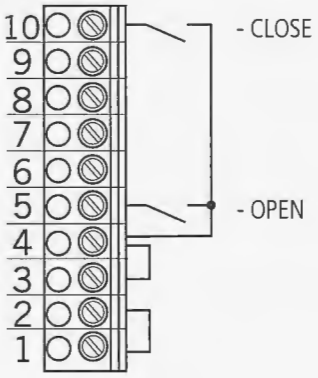


- Three-wire photoelectric barrier

Terminal block X5
(potential free switch contact)

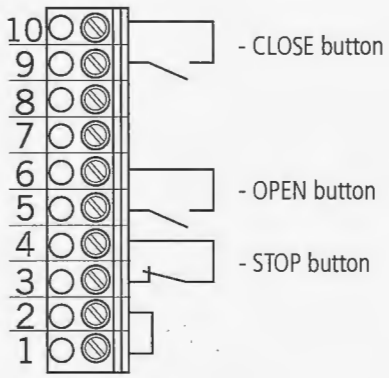


Key switch OPEN / CLOSE

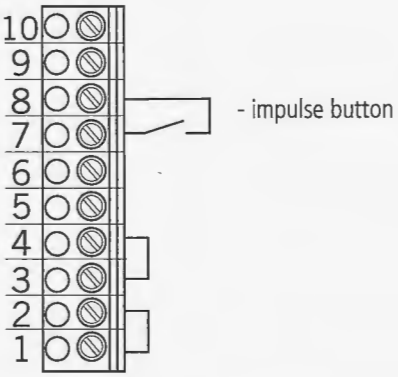


6.5 Connection examples for command and safety devices (terminal block X3)

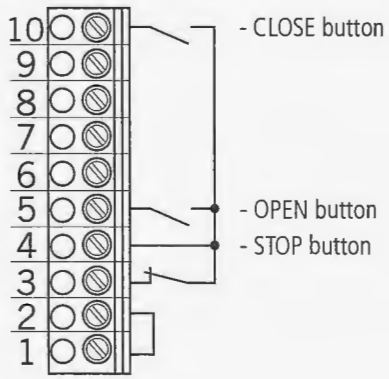
OPEN / STOP / CLOSE buttons
(6-lead solution)



Impulse button
(sequence control)



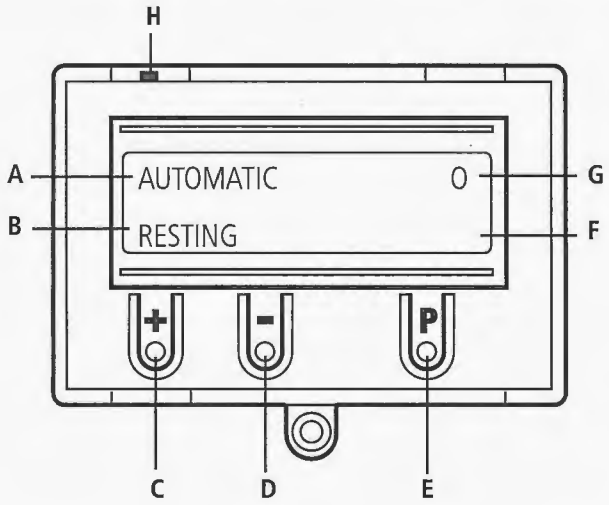
OPEN / STOP / CLOSE buttons
(4-lead solution)



Connection:

☐ Connect the command and safety devices to the control.

7.1 Overview of the LCD monitor



Key:

A: mode of operation / diagnostic info
B: parameter / diagnostic info
C: (+) button
D: (-) button
E: (P) button
F: value / status
G: value / status
H: jumper

7.2 LCD monitor, modes of operation

The control has four modes of operation with the LCD monitor:
1. AUTOMATIC
2. ADJUSTMENT
3. INPUT
4. DIAGNOSIS

When the jumper H is pulled, the + button, the - button and the P button have no function. The display still functions.

Operating mode 1: AUTOMATIC
In the AUTOMATIC operating mode the door system is operated.

Display:
- displays the function being carried out
- displays any error messages

If the „self locking" parameter is set to MOD2 or MOD3 in the input menu, the display changes from AUTOMATIC to MANUAL OPERATION.

Operating mode 2: ADJUSTMENT
In the ADJUSTMENT mode, the OPEN/CLOSED end position settings are adjusted.

Warning!
In the ADJUSTMENT mode of operation, the drive does not switch off when the end position is reached.
The drive moves at maximum speed.
The door can be damaged if driven beyond the end position.

Fine adjustments can be made in the INPUT operating mode.

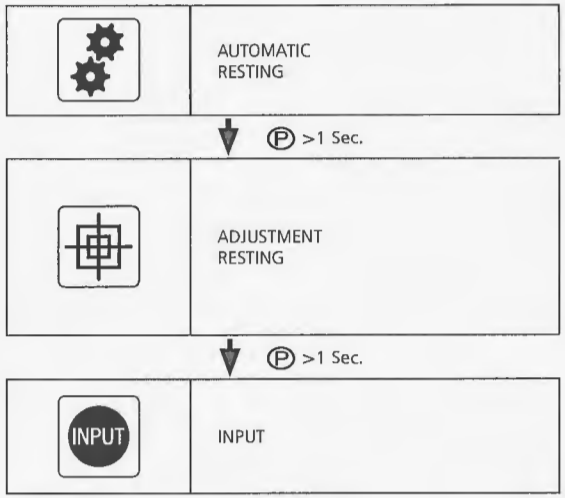
Display:
- displays the end position value

Operating mode 3: INPUT
In the INPUT operating mode, the values of various parameters can be altered.

Display:
- displays the selected parameter
- displays the programmed value /status

Operating mode 4: DIAGNOSIS
In the DIAGNOSIS operating mode, door-specific checks can be queried.

Display
- displays the check
- displays the checking status



⊕ -> Position DOOR OPEN

⊖ -> Position DOOR CLOSED

ADJUSTMENT MANUAL UP	Save door position: Ⓟ Hold P pressed and ⊕ > 1 Sec.
ADJUSTMENT MANUAL DOWN	Save door position: Ⓟ Hold P pressed and ⊖ > 1 Sec.

⊕ and ⊖ > 2 Sec. →

INPUT GERMAN	:		Scroll up through menu: ⊕ > 2 Sec. Scroll down through menu: ⊖ > 2 Sec. Select value: Ⓟ > 1 Sec. Increase value: ⊕ Decrease value: ⊖ Save value: Ⓟ Return to INPUT: ⊕ and ⊖ > 1 Sec.
INPUT RUNNING TIME	:	60	
INPUT TIME OPEN	:	0	
INPUT FOREWARNING	:	0	
INPUT TURN- TURNAROUND TIME	:	0,3	
INPUT M1-3 RESTING	:	Mod1	
INPUT QUICK CLOSE	:	OFF	
INPUT RELAY 1	:	Mod6	
INPUT RELAY 2	:	Mod7	
INPUT RELAY 3	:	Mod1	
INPUT RELAY 4	:	Mod14	
INPUT SEP TEST	:	OFF	
INPUT DELAY OPEN	:	OFF	
INPUT FINE OPEN	:	4050	
INPUT FINE CLOSE	:	3950	
INPUT BES OPEN	:	4000	
INPUT BES CLOSE	:	4000	
INPUT ROTATING FIELD	:	RE	
INPUT REVERSE OFF	:	50	
INPUT AUTO LEVEL	:	OFF	

Ⓟ >1 Sec.

INPUT SELF LOCK	:	MOD1
INPUT SU/WI	:	MOD5
INPUT P/E BARRIER OPEN	:	MOD2
INPUT P/E BARRIER CLOSED	:	MOD1
INPUT SEP LEADING	:	MOD1
INPUT MAX OPEN SPEED	:	50
INPUT MIN OPEN SPEED	:	20
INPUT MAX CLOSE SPEED	:	50
INPUT MIN CLOSE SPEED	:	20
INPUT SPEED UP	:	1.0
INPUT SLOW DOWN	:	150
INPUT BRAKE P OPEN	:	250
INPUT BRAKE P CLOSE	:	250
INPUT F START	:	3 Hz
INPUT U START	:	20V
INPUT BRAKE RETARDATION	:	50
INPUT RATED FREQUENCY	:	MOD1
INPUT P/E BARRIER	:	300

DIAGNOSIS

DIAGNOSIS 011	: :	R2.0 00703
DRAW-IN P OPEN DRAW-IN P CLOSE	: :	ON ON
OPEN BUTTON PART OPEN	: :	OFF OFF
CLOSE BUTTON SEP	: :	OFF ON
IMPULS TIMER	: :	OFF OFF
P/E BARRIER STOP CIRCUIT	: :	ON ON
CYCLE AVE	: :	4 2599

Scroll up through menu:
⊕ > 2 Sec.

Scroll down through menu:
⊖ > 2 Sec.

Return to AUTOMATIC operating mode:
Ⓟ

Only query is possible

9. Overview of functions

9.1 Automatic operating mode

Display		Description
AUTOMATIC OPENING		The door is driven to the OPEN* end position*
AUTOMATIC CLOSING		The door is driven to the CLOSED* end position
AUTOMATIC RESTING		The door stands between the end positions
AUTOMATIC RESTING	O	The door stands at the OPEN end position
AUTOMATIC RESTING	o	The door stands at the position PART OPEN („before-end position" up)
AUTOMATIC RESTING	U	The door stands at the CLOSED end position
AUTOMATIC RESTING	u	The door stands at the position PART CLOSE („before-end position" down)
AUTOMATIC RESTING	r	The door stands in the position where the reversing switches off

Information:
If the „self locking" parameter is set to MOD2 or MOD3 in the input menu, the display changes from AUTOMATIC to MANUAL OPERATION.

Display	Description
MANUAL MANUAL UP	The door is driven to the OPEN* end position*
MANUAL MANUAL DOWN	The door is driven to the CLOSED* end position
MANUAL RESTING	The door stands between the end positions

*When the gate is being driven OPEN, the power currently being used is displayed.

9.2 Input operating mode

Function	Description	Setting options	Factory setting
DEUTSCH	Select the menu language	DEUTSCH ENGLISH FRANCAIS ESPANOL NEDERLANDS POLSKI CESKY ITALIANO	DEUTSCH
RUNNING TIME	Monitoring the max. running time for an open and close movement. The running time must be set to be slightly greater than the effective running time of the door.	1 – 250 Seconds	60 Seconds
TIME OPEN	After the door has opened, it runs in the CLOSE direction again after the set time has elapsed. At a setting OPEN TIME > 0, the impulse function (X3 8/9) only generates commands in the OPEN direction.	0 – 600 Seconds	0 = Auto-close off
FOREWARN-ING	Before the door starts to move downwards, the traffic light flashes during the forewarning time if automatic closing is activated, or in the case of impulse operation.	0 - 120 Seconds	0 = Off
TURNA-ROUND TIME	Standing time at every change of direction	0,1 - 2,0 Seconds (in 1/10 Sec)	0,3 Seconds
M1-3 RESTING	MOD1: When resting relay OFF (door closed) MOD2: When resting relay ON (door closed)	MOD1 MOD2	MOD1
QUICK CLOSE	ON: The open time is cut short and the door closes immediately after the photoelectric barrier (X4 3/4) has been activated. This function is also active if the open time = 0. OFF: The open time continues as usual	ON OFF	OFF
RELAIS 1	All 4 relays can be allocated to a relais mode of 1-28. The parameter M1-3 TRAFFIC LIGHT REST affects the red traffic light (MOD 1-3).	MOD1 - MOD13 MOD17 - MOD28	MOD6
RELAIS 2	MOD1: (Red light 1) flashes during forewarning and is on when door is running	MOD1 - MOD13 MOD17 - MOD28	MOD7
RELAIS 3	MOD2: (Red light 2) flashes during forewarning and when door is running	MOD1 - MOD13 MOD17 - MOD28	MOD1
RELAIS 4	MOD3: (Red light 3) is on during forewarning and when door is running MOD4: Impulse signal at OPEN command MOD5: Error message (In the case of stop messages and error messages, please refer to section 10) MOD6: OPEN end position MOD7: CLOSE end position MOD8: Final position OPEN denied MOD9: Final position CLOSED denied MOD10: Before-end position OPEN	MOD1 - MOD28	MOD14

9. Overview of functions

Function	Description	Setting options	Factory setting
	MOD11: Before-end position CLOSE MOD12: From before CLOSE position to CLOSE position MOD13: Magnetic locking function MOD14: Brake MOD15: Brake negated MOD16: Brake MOD17: SEP activated MOD18: (Red light 4) flashes during forewarning and is off when door is running MOD19: From before-end position OPEN to OPEN end position MOD20: Activation of transmission system MOD21: Test mode before opening run MOD22: Test mode before closing run MOD23: (Green light) is on during OPEN end position and OFF during forewarning and OFF when door is running MOD24: Capacitor circuit for 230V single phase drives MOD25: Yard light function 2 minutes after OPEN command MOD26: FREE (continuously ON) MOD27: Impulse signal after attaining OPEN end position MOD28: Relay OFF		
SEP TEST	ON: PS testing is active OFF: PS testing is inactive The testing of the PS switch takes place in the CLOSE end position. To achieve this, the airswitch contact must be activated briefly when the door comes to rest on the ground.	ON OFF	OFF
DELAY OPEN	ON: Forewarning also before opening OFF: Immediate opening Only active when the parameter FOREWARNING TIME is > 0.	ON OFF	OFF
FINE OPEN	Fine adjustment of OPEN end position	0 – 8190 (is set to programmed value after adjustment)	4050
FINE CLOSE	Fine adjustment of CLOSE end position	0 – 8190	3950
BES OPEN	Setting of cut-out point before-end position OPEN / PART OPEN	0 – 8190	4050
BES CLOSE	Setting the before-end position switch point for the CLOSE direction	0 – 8190	4000
ROTATING FIELD	MOD1: Standard assembly (clockwise rotating field / increasing AVE values during opening run) MOD2: Special assembly (anticlockwise rotating field / increasing AVE values during opening run) This setting may only be altered in the case of a special customised drive installation!	MOD1 MOD2	C
REVERSE OFF	The point where the reversing switch is activated before the CLOSE end position is reached. After going beyond the cut-out point, the door is stopped if the switching strip or photoelectric barrier is activated, but it is not reversed. The value must not exceed a maximum of 5 cm above the lower end position.	10 – 250	50
AUTO LEVEL	ON: Align with ground, ON OFF: Align with ground, OFF	ON OFF	MOD1

Function	Description	Setting options	Factory setting
SELF LOCK	MOD1: Automatic operation MOD2: Manual operation for OPEN and CLOSE MOD3: Manual operation for CLOSE	MOD1 - MOD3	MOD1
SU/WI	Connection to terminal strip X4 (9 + 10) MOD1: (SU/WI button 1) When the button is pressed, the door opens as far as the intermediate position PART OPEN. There is no automatic closing of the door from the position PART OPEN. MOD2: (SU/WI selector switch 1) Closed: all OPEN commands lead to the position PART OPEN. Open: all OPEN commands lead to the position OPEN. The door closes automatically from both positions. MOD3: (SU/WI selector switch 2) Closed: all OPEN commands lead to the position PART OPEN. Open: all OPEN commands lead to the position OPEN. The door closes automatically only from the position PART OPEN. MOD4: (SU/WI selector switch 3) Closed: all OPEN commands lead to the position PART OPEN. Open: all OPEN commands lead to the position OPEN. The door closes automatically only from the position OPEN. MOD5: (SU/WI button 2) When the button is pressed, the door opens as far as the intermediate position PART OPEN. Automatic closing of the door also occurs from the position PART OPEN. MOD6: Activation of automatic closing Closed: no automatic closing of the door Open: automatic closing of the door is active MOD7: External input for clock The door opens once the contact closes and remains in the position OPEN until the contact opens. The door then closes automatically. This function can be aborted by pressing the CLOSE button. The door then closes.	MOD1 - MOD7	MOD5
P/E BARRIER CLOSED	MOD1: Stop when activated MOD2: Stop and reverse when activated	MOD 1 MOD 2	MOD 2
P/E BARRIER OPEN	MOD1: Photoelectric barrier not active MOD2: When the photoelectric barrier is activated between the CLOSED end position and the pre-limit switch CLOSE, the door stops. The red light is on. The pre-limit switch CLOSE goes automatically to CLOSED end position + 600.	MOD 1 MOD 2	MOD 1
SEP LEADING	MOD1: No function MOD2: Leading photoelectric barrier (MFZ)	MOD 1 MOD 2	MOD 1
MAX SPEED OPEN	Sets the frequency that regulates the speed for the OPEN door run. - Maximum speed of the drive for the OPEN door run	10 Hz – 100 Hz	50 Hz
MIN SPEED OPEN	Sets the frequency that regulates the speed for the OPEN door run. - Minimum speed of the drive for the OPEN door run (creep speed)	10 Hz – 50 Hz	25 Hz
MAX SPEED CLOSE	Sets the frequency that regulates the speed for the CLOSE door run. - Maximum speed of the drive for the CLOSE door run	10 Hz – 100 Hz	50 Hz
MIN SPEED CLOSE	Sets the frequency that regulates the speed for the CLOSE door run. - Minimum speed of the drive for the CLOSE door run (creep speed)	10 Hz – 50 Hz	25 Hz
SPEED UP	Acceleration time from minimum speed to maximum speed.	0,1 Sec. – 2 Sec.	1,0 Sec.

9. Overview of functions

Function	Description	Setting options	Factory setting
SLOW DOWN	Retardation time from maximum speed to minimum speed.	0,1 Sec. – 2 Sec.	1,0 Sec.
BRAKE P OPEN	The OPEN brake point lies before the OPEN limit switch value. When the OPEN brake point is passed, the retardation time SLOW DOWN is activated. The adjustable value is based on the distance from the OPEN limit switch.	0 – 999	250
BRAKE P CLOSE	The CLOSE brake point lies before the CLOSE limit switch value. When the CLOSE brake point is passed, the retardation time SLOW DOWN is activated. The adjustable value is based on the distance from the CLOSE limit switch.	0 – 999	250
U START	The start-up voltage increases the performance of the door operators at low rotational speeds.	0 – 42 V	20 V
F START	The start-up frequency increases the performance of the door operators at low rotational speeds.	0 – 10 Hz	3 Hz
BRAKE RETARDATION	The brake retardation delays the falling off of the brake when the door operator starts up.	0 – 500	50
RATED FREQUENCY	This is the frequency rating of the motor	MOD1= 50 HZ, MOD2=87 Hz, MOD3=100 Hz	Set to match the motor supplied
P/E BARRIER	The photoelectric barrier signal is not evaluated between the CLOSED end position and the photoelectric barrier. This function masks the photoelectric barrier signal at low rotational speeds to avoid interference resulting, for instance, from spiral cables.	0 ... 999	300

Explanation of the relay modes:

A. Traffic light functions

MOD	Description	CLOSED end position	OPEN end position	Forewarning	Door run
MOD 1	Red traffic light 1	ON / OFF *	OFF	Flashing	ON
MOD 2	Red traffic light 2	ON / OFF *	OFF	Flashing	Flashing
MOD 3	Red traffic light 3	ON / OFF *	OFF	ON	ON
MOD 18	Red traffic light 4	OFF	OFF	Flashing	OFF
MOD 23	Green traffic light	OFF	ON	OFF	OFF

* depending upon parameter MOD1-3 RESTING

B. Position messages

MOD	Description	Remarks
MOD 6	OPEN end position	The relay closes the contact when the door is in the OPEN end position.
MOD 7	CLOSED end position	The relay closes the contact when the door is in the CLOSED end position.
MOD 8	Not OPEN end position	The relay closes the contact when the door is not in the OPEN end position.
MOD 9	Not CLOSED end position	The relay closes the contact when the door is not in the CLOSED end position.
MOD 10	Before-end position OPEN / PART OPEN	The relay closes the contact when the door is in the before-end position OPEN / PART OPEN.
MOD 11	Before-end position CLOSED	The relay closes the contact when the door is in the before-end position CLOSED.
MOD 12	Before-end position CLOSED to CLOSED end position	The relay closes the contact when the door is in the area between the end position CLOSED and the before-end position CLOSED.
MOD 19	Before-end position OPEN to OPEN end position	The relay closes the contact when the door is in the area between the OPEN end position and the before-end position OPEN / PART OPEN.

C. Impulse signals

MOD	Description	Remarks
MOD 4	Impulse when there is an OPEN command	The relay closes the contact for 1 second when the door receives an OPEN command. This impulse can be used to control lights, for instance.
MOD 27	Impulse when OPEN end position is reached	The relay closes the contact for 2 seconds when the door reaches the OPEN end position. This impulse can be used, for instance, to open a following photoelectric barrier.

D. Brake functions

MOD	Description	Remarks
MOD 14	Brake	The switching contact of the brake rectifiers is activated via the relay to achieve a quicker brake function. The contact is closed, and the brake released as a result, as soon as the door moves (zero current brake).
MOD 15	Brake negated	The switching contact of the brake rectifiers is activated via the relay to achieve a quicker brake function. The contact is opened, and the brake released as a result, as soon as the door moves (operating current brake).

E. Error messages

MOD	Description	Remarks
MOD 5	Error message	The relay closes the contact when a stop command is given or an error occurs. All errors described in section 10 result in activation of the relay.
MOD 17	SEP activated	The relay opens the contact when the switching strip is activated. An error in the switching strip or an unsuccessful test is shown via MOD 5.

F. Functions for external accessories

MOD	Description	Remarks
MOD 13	Magnetic lock function	The relay is open in the CLOSED end position. If an OPEN command is received, the relay closes and remains closed until the CLOSED end position is reached again. If a time delay is required for opening the magnetic lock, this is realised through the parameter DELAY OPEN and forewarning.
MOD 20	Activation of optoelectronic transmission system	Before every CLOSE command, the optoelectronic transmission system is activated and remains active for the duration of the closing run. This activation results in a closing run delay of approx. 0.5 seconds.
MOD 21	Test of draw-in protection	The relay generates a test signal when the CLOSED end position is reached and expects, as a reaction to the test signal, that the safety circuit is activated.
MOD 22	Test of external safety devices	The relay generates a test signal when the OPEN end position is reached and expects, as a reaction to the test signal, that the switching strip input circuit is activated.
MOD 24	Capacitor	At every drive command the relay closes for approx. 1 second. With the aid of this relay, an additional starting capacitor that is required for AC applications is switched on in addition, to ensure safe starting of the motor.
MOD 25	Yard light function	At every OPEN command, the relay is closed for 2 minutes and can therefore be used to control a light.
MOD 26	Activation of radio transmission system	Before every CLOSE command the radio transmission system is activated by an impulse. The duration of the activation must be set in the transmission system. This activation results in a closing run delay of approx. 0.5 seconds.
MOD 28	Relay OFF	The relay is always open.

9.3 Diagnostic operating mode

Display	Meaning	Status
DIAGNOSE R2.0 011 007037	Software version	Displays the software versions of CS 300 (R2.0) and FU (011 007037)
ES-OPEN	OPEN end position	OFF: confirmed ON: not confirmed
ES-CLOSE	CLOSE end position	OFF: confirmed ON: not confirmed
OPEN BUTTON	OPEN button	ON: confirmed OFF: not confirmed
PART OPEN	PART OPEN button (X4 / 9 + 10)	ON: confirmed OFF: not confirmed
CLOSE BUTTON	CLOSE button	ON: confirmed OFF: not confirmed
SEP	Safety edge protection	ON: system circuit is closed OFF: system is interrupted (fault)
IMPULSE	Impulse button	ON: confirmed OFF: not confirmed
TIMER	Weekly timer	ON: confirmed OFF: not confirmed
P/E BARRIER	Photoelectric drive-through barrier	ON: circuit closed OFF: interrupted (fault)
STOP CIRCUIT	- Stop button of controls - Stop systems of drive	ON: circuit closed OFF: interrupted (fault)
CYCLE	Gate-cycle counter	Displays the gate cycles
AVE	Absolute value encoder	Shows the gate position value

10. Error messages and rectification

Fault / error message	Cause	Rectification
System does not respond	- No voltage supply	- Check the voltage supply of the drive and the controls
Door travels to the CLOSE end position when the OPEN button is pressed Door travels to the OPEN end position when the CLOSE button is pressed	- Rotational field at the motor is incorrect.	- Switch over the FU unit terminals U2 and V2
STOP	- The safety circuit is interrupted. X3 1,2: Emergency off, slack rope switch, wicket door contact, draw-in protection X6 1,2: Internal On-Off switch X11 4,8: Safety circuit for door operator X2 B1/B2: Bridge X3 3,4: External stop button X7 1,2: Internal stop button	- Check and then close the safety circuit
ERROR END POSITION	- The door has travelled beyond one of the end positions - The end positions have not been programmed yet	- Check the programming of the end positions and reset them if necessary
ERROR RUN TIME	- The programmed running time has been exceeded	- Check the path of the door - Re-programme the running time
ERROR SEP	- The safety edge protection is faulty	- Check the safety edge protection and the spiral cable
	- Safety edge protection was triggered	- Remove obstruction from path of door
ERROR PRESSURE SENSOR TESTING	- The PS switch is not activated at the CLOSE end position	- Check the PS switch, spiral cable and profile - Check the setting for the CLOSE end position
ERROR ROT. FIELD	- Only special assembly motors are operated with an anticlockwise rotating field.	- In the „rotating field" input menu, reprogram the rotating field parameter from R to L
ERROR RS 485 AWG	- Communications fault between the end position switch and the controls	- Check the cable and socket connections
ERROR RS 485 FU	- Communication fault between frequency converter and control	- Check the cable and socket connections
ERROR POWER	- The power monitoring has been triggered	- Check that the door can open easily and smoothly - Check AVE (absolute value encoder) plug

Fault / error message	Cause	Rectification
ERROR FU 1	- Undervoltage	- Check the voltage supply of the drive and the controls - Check that all connections are securely fixed
ERROR FU 2	- Overvoltage	- Check that the door can open smoothly and easily - For sectional doors, check the springs and reset - The preset connection period of the drive may not be exceeded
ERROR FU 4	- Frequency converter overheating	- Check that the door can open smoothly and easily - For sectional doors, check the springs and reset - The preset connection period of the drive may not be exceeded
ERROR FU 9	- Frequency converter overloaded (peak current)	- Check that the door can open easily and smoothly - For sectional doors, check the springs and reset
ERROR FU 10	- Frequency converter overloaded (intermediate circuit overloaded)	- Check that the door can open easily and smoothly - For sectional doors, check the springs and reset
ERROR FU 13	- Frequency converter overloaded (short-circuit)	- Check that the door can open easily and smoothly - Check the motor for short-circuits
ERROR FU 16	- No release from control	- Check safety circuit of the control - Check data cable to frequency converter

☐ If any other faults or error messages occur, please contact the customer service department.

After rectifying the cause of the fault, the controls must be disconnected briefly from the mains!
After a reaction time of 15 seconds, the frequency converter is ready again (H5).

11. Technical data

Dimensions of housing:	245 x 455 x 200
Assembling height:	vertically at the wall, min. at a height of 100 mm
Power supply via L, N:	230 V, 1 PH, 50 Hz
Protection:	10 A K-characteristic
Own consumption of control:	max. 250 mA
Control voltage:	24 V DC, max. 250 mA; protected by self-resetting safety for external sensors
Control inputs:	24V DC, all inputs are to be connected free of potential, min. signal time for incoming control command >100ms.
Control outputs:	24 V DC, max. 250 mA
Safety chain / Emergency shutdown:	all input connections must be potential-free; if the safety circuit is interrupted, no further electrically powered movement of the drive is possible, not even in deadman mode.
Input safety bar:	For electrical safety bars with 8,2 kΩ, moving loads and dynamic optic systems.
Relays output:	If inductive loads are switched to (e.g.: relays or breaks), so these must be equipped with corresponding interference measures (recovery diode, varistores, RC modules). Operating contact free of potential, min. 10 mA; max. 230 V AC / 4A *Contacts used once for power switch are not able to switch mini power anymore.*
Temperature range:	Operation: -10 °C ... +45 °C Storage: -25 °C ... +70 °C
Air humidity:	to 80% non condensing
Vibrations:	Assembling works with less vibration, e.g. at a masonned wall
Type of protection:	IP 65
Weight:	about 1,8 kg

12. EU Declaration of Conformity

Manufacturer:

We hereby declare that, by virtue of their conceptual development and design, as well as their manufacture as we have brought them onto the market, the products cited below:
CS300 FU Door Controls
conform to the relevant basic health and safety regulations of the following EU guidelines and standards:

EU Construction Products Directive 89/106/EU
DIN EN 13241-1
DIN EN 12453
DIN EN 12445
DIN EN 12978

EU Electromagnetic Compatibility Directive 2004/108/EG
EN 55014-1
EN 61000-3-2
EN 61000-3-3
EN 61000-6-2
EN 61000-6-3

EU Machinery Directive 2006/42/EG
EN 60204-1
EN ISO 12100-1

EU Low Voltage Directive 2006/95/EG
EN 60335-1
EN 60335-2-103

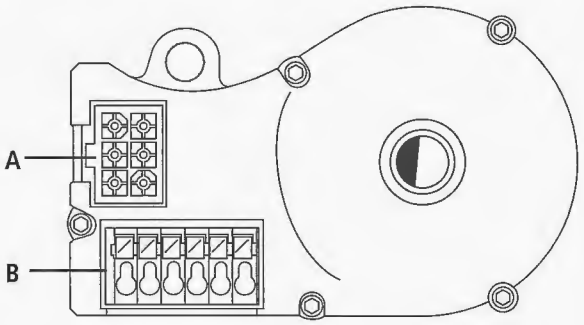
BGR 232 - Directive for Power-driven Windows, Doors and Gates

Place, Date.
Manufacturer's signature:

Position of signatory:
Manager

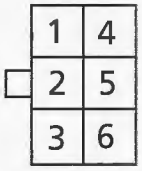
Limit switch and safety circuit for drive

Electronic interface



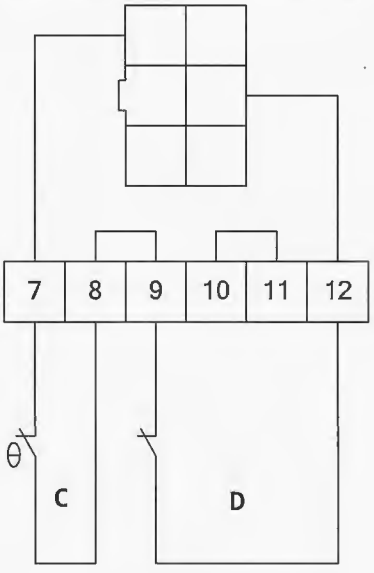
A: AVE plug (absolute value encoder plug)
B: AVE plug terminal (absolute value encoder plug terminal)

Wiring allocation, AVE (absolute value encoder) plug



1 - grey: Safety circuit input
2 - pink: RS 485 B
3 - white: GND
4 - yellow: RS485 A
5 - green: Safety circuit output
6 - brown: 7...18V $_{DC}$

AVE (absolute value encoder) plug terminal (7-12)



C: Thermal element in the drive
D: Manual emergency control (emergency crank or emergency chain)