

# Functional Description Door Control ECS 2100 A60 & Cardeck + Variant "Alarm Contact"

+ Variant "Auto-Open"



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### **Door Control Interfaces**

### **Main Control Unit**

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The ECS 2100 Main Control Unit provides several status indication lights (LEDs), two push buttons and a row of connection terminals for various inputs and outputs. Note that the function of the status LEDs, inputs and outputs depends on the ECS 2100 board type and firmware.

### **Indication LEDs**

### **Red LED "Failure"**

The red LED "Failure" is permanently on in one or more of the following conditions:

- The ECS 2100 is manually switched off;
- There are no more safety strokes left during battery operation;
- More than one limit switch (open and closed) outputs an active signal;
- The motor driver signals an over-current or over-temperature error;
- The battery charger has detected faulty batteries;
- The ECS 2100 configuration is erroneous;
- The drive system stopped after the 250°C temperature fuse was blown (see Operation at Ambient Temperature >= 250°C).

If the red LED is off, the ECS 2100 is fully operational.

### Green LED "Run"

The green LED "Run" is permanently active if manually switched on. Note that the ECS 2100 may not be operational if the green LED is on together with the red LED.

### Yellow LED "Battery charger"

The yellow LED "Battery charger" is active during battery charging. While charging, it may regularly change to off for a few seconds to check the battery status. If the LED is permanently off, either the



batteries are fully charged, or the ECS 2100 currently operates on batteries (see Battery Operation), or there is a battery error.

### Yellow LED "Reference drive"

The yellow LED "Reference drive" is active to indicate the Reference Drive mode of operation. The LED is off in other modes.

### Yellow LED "Central open"

The yellow LED "Central open" indicates that the central open signal is present and the door is not locally released.

### Yellow LED "Close handle"

The yellow LED "Close handle" is on if the close handle is actuated.

### Yellow LED "Safety strip / Handle open"

The yellow LED" Safety strip / Handle open" is on if the door open handle or the safety strip is actuated.

### **Push Buttons**

### Button "Reset"

Use the button "Reset" to reset the ECS 2100. This may be necessary to clear any temporary error status, to cancel and restart a reference drive, or to recover from a drive system halt. Note that this reset does not clear the ECS 2100 configuration. If reset is pressed while the door is moving, it may be stopped very abruptly.

### Button "On / Off"

Use the button "On / Off" to switch the ECS 2100 on or off. Only switch on the ECS 2100 if it is safe to operate the door. Note that switching the unit off causes a moving door to stop, with the brake released.

If the ECS 2100 is switched off, pressing and holding the On / Off button for at least five seconds starts the system in Reference Drive mode.

### **USB Connection**

The USB connection can be used to connect the ECS 2100 to a Windows PC for maintenance. The Software Tool DoorControl should be used for configuration and firmware update.

### **Inputs and Outputs**

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Terminals	Name	Description
F1, F2		Two 1A fuses in the 230VAC circuits support safe operation of the ECS 2100.
1, 2, 3	L1, L2 (N), PE	230VAC supply for the ECS 2100.
DIP IN1, IN2		DIP switches to activate ("ON") pull-up resistors for inputs IN1 and IN2 if needed, e.g. for sensors with open-drain outputs.
4, 5, 6	IN1	+24VDC supply, +24VDC digital signal input (with optional pull-up)

### **Terminals**

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		and GND for input IN1. The signal level can be inverted by
		configuration.
7, 8, 9	IN2	+24VDC supply, +24VDC digital signal input (with optional pull-up)
		and GND for input IN2. The signal level can be inverted by
		configuration.
10, 11 –	IN3 – IN10	+24VDC digital signal input and GND for inputs IN3 to IN10 each. The
24, 25		signal levels can be inverted by configuration.
26, 27 -	OUT1 –	+24VDC relay switch terminals for digital outputs OUT1 to OUT4 each.
32, 33	OUT4	The signal levels can be inverted by configuration. The output current
		is limited to 140 mA at 23°C.
34, 35	BATT. +/-	Back-up battery connection terminals (34 = +24VDC, 35 = GND). The
		battery is used during 230V power failure, and charged under normal
		power supply condition.
36, 37, 38	COUNTER	Connection terminals for an encoder (A, B, Index) or Hall-effect
	A, B, IND. / C	sensor (A, B, C). For brush-type motors, an encoder can improve
		position detection and torque control. For brushless motors, Hall-
		effect sensors are required for motor commutation, and can also be
		used for position detection and torque control.
39, 40	+5V, GND	+5VDC supply for the encoder or Hall-effect sensor.
41, 42, 43,	MOTOR	Connection terminals for the motor phases. A brush-type motor is
44	РНС, РНВ,	connected on PHA and GND only. A brushless motor uses all three
	PHA, GND	phases PHA, PHB and PHC.
45, 46	AUX. +/-	Output for auxiliary +24VDC supply, can be used to power peripheral
		devices. Note that the maximum current supplied is limited. The
		source of the supply output is selectable by configuration. For
		hardware version 2.02, the output current is limited to 140 mA at
		23°C from both sources. For hardware version 2.03, it is limited to
		140mA at 23°C from internal power supply and 2.5 A at 23°C from
		24 V HP source.
		24 V HP source.

### IN1: "Limit Switch Closed"

The limit switch "Closed" indicates that the door is in closed position. A closing door stops when this position is reached. The closed position is the reference for all timed and position-controlled actions of the ECS 2100. During reference drive, the closed position is the first to reach. Above 70°C, the limit switch is disabled and the door uses a current limit monitor to stop the door.

### IN2: "Limit Switch Open"

The limit switch "Open" indicates that the door is fully opened. An opening door stops when this position is reached. During reference drive, the open position is determined after the closed position, and the total travel distance is known. Above 70°C, the limit switch is disabled and the door uses a current limit monitor to stop the door.

### IN3, IN4: "Temperature Fuses"

The ECS 2100 operates normally as long as both temperature fuses are intact. If any of the temperature fuses blows, a safety operating mode is entered, see Operation at Ambient Temperature  $\geq$  70°C. An open door is closed, and all non-fire rated equipment and cables are discarded. The door can still be moved, but above 250°C, the system is switched off when the door is closed.

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### IN5: "Door Open Handle / Safety Strip"

Using the handle / safety strip, the door is opened. The handle / safety strip must be actuated until the door has moved past the hook, otherwise it is closed again. According to operation mode, it then either stops and is held open, or it closes again after a set time. A closing door can always be stopped and opened by actuating the handle / safety strip. The door opens for a set time and closes again.

### IN6: "Door Close Handle"

A closing door can always be stopped and closed by actuating the door close handle to prevent injury.

### IN7: "Push button open"

If the door is closed or closing and the temperature fuses are intact, the door can be opened by actuating the push button. According to operation mode, the door either stops and is held open, or it closes again after a set time.

Cardeck: The open push button is deactivated if the sea mode is active.

### IN8: "Local Release Switch", IN9: "2nd Local Release Switch" / "2nd Safety Strip"

If the local release switches are locked and the central open signal is present, the door is held fully open, until either local release switch is unlocked or central open is deactivated. IN9 can also be configured to function as a safety strip to open a closing door, see IN5 and Second safety strip.

### IN10: "Central Open"

If the local release switches are locked and the central open signal is present, the door is held fully open, until either local release switch is unlocked or central open is deactivated.

### OUT1: "Brake"

In general, the motor brake is always active if the door is not moving. If either of the temperature fuses is blown, or if the ECS 2100 is manually switched off, the brake is deactivated. If the door is stopped during battery operation mode, the brake assumes the quiescent current state, which can either be active or inactive, depending on the type of brake used.

### OUT2: "Release Magnet"

If the door is closed in normal operation, it is fixed mechanically using a hook latch. Upon opening, the door shortly pushes against the frame and the hook latch release magnet is actuated shortly, releasing the hook latch and allowing the door to open. By activating the setting Release magnet only if closed, the release magnet is actuated only if the door opens when closed, as opposed to any time the door opens.

### OUT3: "Horn / Lamp"

If the door is held open and either the central open signal goes inactive or a local release switch is unlocked, the horn / lamp signal indicates that the door is about to close, according to Solas [Ch II-2 Rg9 4.1.1.4.2]. After the pre-alarm time is elapsed, the door closes. The horn / lamp is deactivated when the door is closed.

During reference drive, if the door is moving, the horn / lamp signal is active.



### OUT4: "Indication Door Closed" / "Alarm Contact"

The door closed signal indicates that the door is closed. For firmware variant "Alarm Contact", this output signals a drive system error or 230V power supply failure.

### **Cardeck Extension**





The Cardeck extension provides additional inputs and outputs. Note that the address selector and code switch are predefined and should not be changed.

### **Indication LEDs**

### Red LED "Failure"

The red LED is active if there is no communication between the extension and the main unit, usually during configuration, firmware update or reset.

### Green LED "Run"

The green LED is active if communication between extension and main unit is established.



### Yellow LED "Sea mode"

The yellow LED indicates the status of the sea mode input signal.

### Yellow LED "Key switch"

The yellow LED indicates the status of the key switch input signal.

### Yellow LED "Open button cardeck"

The yellow LED indicates the status of the open button cardeck input signal.

### **Push Button**

### Button "Reset"

Use the push button "Reset" to reset the extension and allow the connection to be re-established.

### **Inputs and Outputs**

### **Terminals**

Terminals	Name	Description
1, 2	OUT1	+24VDC relay switch terminals for digital output OUT1. The signal levels can be inverted by configuration.
3, 4 - 15, 16	IN1 – IN7	+24VDC digital signal input and GND for inputs IN1 to IN7 each. The signal levels can be inverted by configuration.

### OUT1: "Bolting magnet"

The bolting magnet mechanically locks the door if it is closed, the sea mode signal is active and the temperature fuses are intact.

### IN1: "Sea mode"

If the sea mode signal is present, the door closes automatically, the open handle is deactivated, and the door is locked in closed position by a bolting magnet, see Cardeck: Sea Mode.

### IN2: "Key switch"

The key switch signal opens the door even if the sea mode is active.

### IN3: "Open button cardeck"

The open button cardeck signal opens the door even if the sea mode is active.

### IN4: "Lock from outside (full)"

If this signal is present, the door closes automatically, the open handle and all push buttons are deactivated, and the door is locked in closed position by a bolting magnet.

### *IN5: "Lock from outside (escape)"*

If this signal is present, the door closes automatically, the open handle is deactivated, and the door is locked in closed position by a bolting magnet.

### IN6: "Local hold open"

If this signal is present and the door is not locked or in sea mode, the door is held open. Clear this signal to close the door immediately.



### **Modes of Operation**

### **Preconditions**

- All electrical components must be connected according to the schematics;
- The ECS 2100 firmware and board type are programmed and matching;
- Supply voltage is present.
- Push the button "On / Off" on the main control unit. Alternatively, if ECS 2100 is connected to a PC, you can use the software tool DoorControl to switch on the system.

### **Normal Operation**

If the central open signal is not active or the local release switches are unlocked, the door is normally closed. By pressing the open push button or actuating the door handle, the brake is released and the door pushes against the frame. The hook latch release magnet releases the mechanical lock and the door drives open. At local release distance, the door is stopped, the brake is activated and the system waits for the configured re-closing time. The door closes until reaching the close limit switch, where it automatically locks again. If enabled, the door pushes against the frame for some time before stopping and locking, see Close back-pressure.

### **Local Release**

If central open is active and the local release switches are locked, the door is held open after opening. By pressing the open push button or actuating the door handle, the brake is released and the door pushes against the frame. For firmware variant "Auto-Open", the door opens automatically. The hook latch release magnet releases the mechanical lock and the door drives open. At the open limit switch, the door is stopped and the brake is activated. If a local release switch is unlocked, the horn / lamp indicates that the pre-alarm time has started. When the pre-alarm time has elapsed, the brake is released and the door is closed.

### Cardeck: Sea Mode

If the sea mode is activated, central open and local release are overridden and the door is closed. Once closed, a bolting magnet locks the door. It can only be opened by a key switch and a push button on the cardeck.

### **Operation at Ambient Temperature >= 70°C**

At ambient temperature >= 70°C, possibly the start of a fire, a temperature fuse is blown, and some control elements like the push button, local release switches and limit switches are put out of action. Thus the ECS 2100 cannot be blocked by short-circuits caused by melting wires or control elements. The door automatically closes if open. It can only be controlled by door handles open / close and safety strip. These elements are fit for higher temperatures. Since the limit switches are inoperative, the motor current is monitored to detect driving against mechanical boundaries.

### **Operation at Ambient Temperature >= 250°C**

At ambient temperature >= 250°, possibly a fire, a temperature fuse is blown and all of the control elements are disabled. The door automatically closes if open, then the ECS 2100 is deactivated. The door can now only be moved manually.

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### **Battery Operation**

If main supply voltage fails, the back-up batteries take over the supply. If the door is open, it automatically closes after the configured black-out time. A configurable safety stroke is decremented every time the door reaches the close limit switch. SOLAS [Ch II-2 Rg9 4.1.1.4.8] requires 10 opening / closing cycles. If the safety strokes are depleted, the brake is released and the ECS 2100 is deactivated. The door can now only be moved manually.

### **Battery Charging**

The battery is charged using an UC2906 Lead-Acid Battery Charger form Texas Instruments. By reducing the output current of the charger when the battery voltage is below a 22V threshold, the charging system is protected against:

- High current charging of a battery chain with a shorted cell that could result in excessive outgassing from the remaining cells in the chain;
- Sourcing charge into a battery that has been connected with polarity reversed;
- Excessive power dissipation in the charger's pass element.

If the battery voltage is below 22V, the UC2906's driver is disabled and the trickle bias output is activated. A resistor connected to the battery from this output is used to set a trickle current (I=20mA) for the battery to help the charger distinguish between severely discharged cells and damaged or improperly connected cells.

The battery charger is always active if the system voltage is above 18V. Charging is carried out in cycles of 3,5s battery measurement and 120s charging.

### **Reference Drive**

In order to teach the ECS 2100 the positions of the limit switches to allow the system to determine the travel length of the door, a reference drive must be performed. Necessary preconditions are as follows:

- All configuration settings with regards to motor, drive and timing have been adequately set using the Software Tool DoorControl;
- The reference drive mode is selected in the tool, either by setting the "Reset positions" checkbox, or by selecting the menu item "Enable Reference Drive";
- The ECS 2100 is switched off, or maybe on and off again to release the brake.

Push the door away from any limit switch towards the centre position and switch on the ECS 2100. The Yellow LED "Reference drive" should be active now.

The acoustic signal is activated and the door should now close, i.e. drive towards the close limit switch. If it opens instead, switch off the ECS 2100, change motor polarity either at the connection terminals or using the software tool (see Inverted driving direction), then switch the system back on to repeat the reference drive.

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### **Extended Reference Drive**

If Position detection by calculated velocity is used, normal reference drive is preceded by voltage and current calibration, which has a few prerequisites:

- "Motor velocity (open / close)" should be set to a high value for better accuracy,
- "Opening time after safety strip" should be set such that the door drives at that speed for at least three seconds, not including acceleration/deceleration time.

Once the door has reached the close limit switch, it is stopped. Press the door handle or open push button to open the door. The door should open at high speed for at least three seconds, then slow down until it reaches the full open end switch. The door stops, the brake is activated, and the motor drives against the brake to measure the current at  $1/8^{th}$  nominal voltage for three seconds. Afterwards, the door closes at high speed for at least three seconds, then slows down until it reaches the close end switch, completing the calibration.

Once the door has reached the close limit switch, it is stopped, as well as the acoustic signal. Press the door handle or open push button to open the door. The acoustic signal is activated and the door opens until the open limit switch is reached. Once it stops there, the reference drive is completed, the ECS 2100 enters normal operation mode and the door closes again.

### **Safety Functions**

The ECS 2100 has a few safety monitoring functions built in. If the motor runs for at least 120 seconds continuously in any direction without stopping, it is stopped. Also, if an encoder or Hall-effect sensors are used, and the motor runs, but the sensors do not detect a change of position for at least five seconds, the motor is stopped. Opening the door requires actuating the door handle or open push button to cancel the safety stop. If a safety stop condition occurs for at least three times without the ECS 2100 being reset, the system is switched off and a drive system error is issued. The door should be checked by service staff. See also Operate door even under fault conditions.

### **Software Tool DoorControl**

### **Installing DoorControl**

DoorControl is installed by double-clicking on the installation file, e.g. "Testfirmware 99.exe". You will be prompted to select a destination folder:

Self extracting ZIP file	X
Unpack all files to:	
C:\Users\apmarine\Desktop\DoorControl	
Confirm overwrites	
OK Cancel	



Inside that folder, double-clicking on doorcontrol.exe starts the tool. Note that for communication with an ECS 2100 via USB cable, a USB driver may have to be installed separately, which has to be performed once per Windows PC the tool is to be run on.

### **Using DoorControl**



### Menu "File"

The "File" menu is used to save and load ECS 2100 settings to resp. from a file. The menu items are only accessible in Settings View.

### **Open (Ctrl + 0)**

Use "Open" to load ECS 2100 settings previously saved to a file. Note that saved settings can only be loaded if the Board Type matches.

### Save (Ctrl + S)

Use "Save" to store ECS 2100 settings in a file on local disk. All settings of the currently connected ECS 2100 can be saved to file for later use.

### Save As (Ctrl + Shift + S)

Use "Save As" to store ECS 2100 settings in a file with a different file name.

### *Quit (Ctrl + Q)*

Click on "Quit" to close the software tool. Note that closing the tool does not change any operational mode on the connected ECS 2100. Unsaved settings changes will be lost.



### Menu "Device"

The "Device" menu switches between the different views, i.e. settings and firmware, and provides direct access to ECS 2100 functions.

### Stop (ESC)

Use "Stop" to switch off the connected ECS 2100. This is identical to pressing the On / Off button of the Main Control Unit if it is switched on, otherwise it has no effect. Note that the motor is stopped and the brake is released when switched off.

### Reset (F10)

Use "Reset" to reset the connected ECS 2100. This is identical to pressing the Reset button of the Main Control Unit. After reset, the ECS 2100 is stopped and switched off, as if just powered up. Possible warnings or errors are cleared.

### Start (F4)

Use "Start" to switch on the connected ECS 2100. This is identical to pressing the On / Off button of the Main Control Unit if it is switched off, otherwise it has no effect. Note that the door must be in a safe state before switching on the ECS 2100, as it may start to move immediately.

### **Enable Reference Drive**

Choose "Enable Reference Drive" to start the Reference Drive mode.

### Change Settings (F5)

Use "Change Settings" to view or change the connected ECS 2100's configuration in Settings View.

### Firmware (F8)

Use "Firmware" to view or update the connected ECS 2100's firmware in Firmware View.

### Calibrate Drive System

"Calibrate Drive System" is used to calibrate internal sensor values during manufacturing or for maintenance.

### Service Interval

Choose "Service Interval" to view the total operating hours of the connected ECS 2100 as well as the time left until maintenance service is due. Using password [PWD1], the service interval can be reset to the value configured in Motor Settings.

### Menu "Help"

The "Help" menu provides general information about DoorControl.

### About (F1)

Click on "About" to view information about the software tool.

### **Status View**

The Status View contains several indicators that reflect the status of control elements and the system as a whole. Indicators are roughly grouped. The drive system status is located to the left, the motor status is in the centre, and the door status elements are aligned around the centre. Indicators are all



named and contain a small picture for ease of spotting. They can take on different colours reflecting the current state as follows:

- Blank for idle or inactive state;
- Green for operational or active state;
- Flashing yellow for a warning or an ongoing action or motion;
- Flashing red for an error or disabled state.

Motor and drive system status each have an attached text box providing more detailed status information.

The status indicators in the red box in the image are only visible if the currently connected board type is A60 Cardeck, see below.



### **Drive System Status**

### Indicator "70°C"

The indicator "70°C" flashes red if the 70°C temperature fuse is blown, and is blank otherwise.

### Indicator "250°C"

The indicator "250°C" flashes red if the 250°C temperature fuse is blown, and is blank otherwise.



### Indicator "Horn / Lamp"

The indicator "Horn / Lamp" flashes red if the acoustic signal that the door is about to move is active, and is blank otherwise.

### Indicator "230V HP"

The indicator "230V HP" is green if main power supply for the 24V high power adapter is available, and flashes red if not, possibly because of a blown fuse.

### Indicator "230V"

The indicator "230V" is green if main power supply is available, and flashes red in case of power failure, in which case the system runs on back-up battery supply.

### Indicator "24V HP"

The indicator "24V HP" is green if the 24V high power adapter is active, also displaying the measured voltage. It is blank if the adapter is inactive.

### Indicator "Battery / Drive System"

The indicator "Battery / Drive System" has multiple states:

- Green if the system is active and operational, and the battery is okay and fully charged;
- Flashing yellow if the system is active and operational, and the battery is currently being charged;
- Flashing red if the system is either inactive, inoperative due to a drive system error, or there is a battery error.

The text box can contain one or more of the following status texts:

- OK: the system is operational;
- manually switched off: the system is waiting to be switched on;
- reference drive: Reference Drive mode is active;
- sensor / switch error: open and close limit switch both signal active;
- motor error: a motor error can be seen in the respective status text box;
- battery error: the battery has an error and possibly needs to be replaced;
- configuration error: the ECS 2100 configuration should be checked using the tool;
- safety stroke zero: the number of safety strokes during battery operation is depleted;
- fire emergency halt: the 250°C fuse is blown, the door is closed and the system is halted;
- service needed: the periodic service is due.

### **Motor Status**

### Indicator "Brake"

The indicator "Brake" is green if the brake is active, and is blank otherwise.

### Indicator "Motor"

The indicator "Motor" has multiple states:

• Green if the motor is active and currently stopped;

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- Flashing yellow if the motor is running, i.e. the door opens or closes;
- Flashing red if the motor is either inactive or there is a motor error.

The caption below the indicator shows more detailed motor status information:

- enabled / disabled: indicates whether the motor driver is active or not;
- opening / closing: indicates the direction in which the motor is currently driving;
- reached: the motor is either stopped or has ramped to the desired speed;
- current / velocity: the motor has reached the configured current or voltage threshold;
- WARNING / ERROR: there is a temporary or permanent error that needs attention.

In case of warning or error, the text box below can contain one or more of the following status texts:

- Overcurrent on phase(s) ...: the motor stopped due to overcurrent protection, showing the specific motor phase or phases affected;
- Overtemperature warning / shutdown: the motor driver warned about or shut down because of overtemperature;
- Undervoltage PVdd / GVdd: the motor driver detected an undervoltage condition and shut down;
- Overvoltage GVdd: the motor driver warned about overvoltage;
- Drive controller fault / communication error: the motor driver is unable to drive the motor and shut down;
- Safety stop:

the motor was running for at least 120 seconds continuously and stopped for safety reasons, it may be required to push the door handle or push button to continue;

 Stalled motor position: the motor was running, but no change in position was detected for at least five seconds, either the door is blocked or there is an encoder / Hall-effect sensor fault.

### **Door Status**

### Indicator "Central Open"

The indicator "Central Open" is green if the central open signal is present, and is blank otherwise.

### Indicator "Local Release"

The indicator "Local Release" is green if the local release switches are locked, and is blank if they are unlocked.

### Indicator "Lock Full"

The indicator "Lock Full" is green if the Lock from Outside (full) signal is active, and is blank otherwise.

### Indicator "Lock Escape"

The indicator "Lock Escape" is green if the Lock from Outside (escape) signal is active, and is blank otherwise.



### Indicator "Open"

The indicator "Open" is green if the open limit switch is active, flashes red if both the open and close limit switches are active, and is blank otherwise.

### **Indicators** "Closed"

The left indicator "Closed" is green if the close limit switch is active, flashes red if both the open and close limit switches are active, and is blank otherwise. The right indicator "Closed" shows the state of the door closed output signal, which is also in effect if the door is closed at high ambient temperature. For firmware variant "Alarm Contact", instead of the right indicator "Closed" there is an indicator "Alarm Contact" that flashes red if there is a drive system error or 230V power supply failure.

### Indicator "Magnet"

The indicator "Magnet" is green if the hook latch release magnet is active, and is blank otherwise.

### Indicator "Strip / Handle"

The indicator "Strip / Handle" is green if the safety strip or open handle are actuated, and is blank otherwise.

### Indicator "L. Hold Open"

The indicator "L. Hold Open" is green if the local hold open signal is active, and is blank otherwise.

### Indicator "Close Handle"

The indicator "Close Handle" is green if the close handle is actuated, and is blank otherwise.

### Indicator "Push Button"

The indicator "Push Button" is green if the open push button is actuated, and is blank otherwise.

### **Door Status Cardeck**

### Indicator "Close Lock"

The indicator "Close Lock" is green if the sea mode signal is present, and is blank otherwise.

### Indicator "Bolt. Magnet"

The indicator "Bolt. Magnet" is green if the bolting magnet for locking the door in sea mode is active, and is blank otherwise.

### Indicator "Key Switch"

The indicator "Key Switch" is green if the key switch is actuated, and is blank otherwise.

### Indicator "PB Cardeck"

The indicator "PB Cardeck" is green if the push button on the cardeck is actuated, and is blank otherwise.

### **Settings View**

In Settings View, several ECS 2100 parameters can be configured. Some of the parameters require password authorization. Click on "More options" to enter a password.

Use the "File" menu to save and load configuration files.

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Click on "Done" when finished. A dialog box will appear, requesting confirmation if changes shall be written back to the ECS 2100. DoorControl will afterwards return to Status View.

### **Drive Settings**

DoorControl   OM Lütker Elektrotechnik		- 🗆 X
DoorControl   OM Lütker Elektrotechnik <u>File Device Help</u> Motor settings Drive settings Timing settings Motor acceleration 5 Motor brake 5 Motor current limit (opening) [A] 0 Motor velocity (open) [rpm] 2 Slow drive velocity (open) [rpm] 11 Slow-down distance (opening) [%] 2 End switch "closed"inverted End switch "closed"inverted	Reset positions  Current limited velocity  Current limited velocity  Current limit develocity  Current limit (closing) [A]  Curent limit (closing) [A]  Current limit (closing) [A]  Current	- C X
70°C fuse       inverted         300°C fuse       inverted         Door handle / safety strip       inverted         Door handle "close"       inverted         Push button "open"       inverted         Local release 1       inverted         Local release 2       inverted         Key switch staircase       inverted         Fush button cardeck       inverted	Hom / lampinverted Door closedinverted Bolting magnetinverted Lock from outside (full)inverted Lock from outside (escape)inverted Local hold openinverted Release magnet only if closed Second safety strip Always enable bolting magnet Brake is off at power-up	
More options Door Control	Done 260 Cardeck 5/N: 12345678	Version: 3.05

# Prevention Full-open distance Full-open distance slow-drive distance Braceleration Brake Brake

### **Reset positions**

If "Reset positions" is checked, the ECS 2100 enters Reference Drive mode after configuration.

### **Motor acceleration**

Change "Motor acceleration" in the range from 1 to 50. 1 corresponds to fast acceleration, 50 corresponds to slow acceleration.

### **Motor deceleration**

Change "Motor deceleration" in the range from 1 to 50. 1 corresponds to fast deceleration, 50 corresponds to slow deceleration.

### Motor brake

Change "Motor brake" speed in the range from 1 to 50. 1 corresponds to fast brake, 50 corresponds to slow brake.

### *Motor velocity (open / close)*

Choose a "Motor velocity" independently for opening and for closing the door. Any value between 1 rpm and the nominal motor velocity can be selected.

### Slow drive velocity

Choose a "Slow drive velocity" if slow door movement towards the end switches or the door frame is desired.

### Local release distance

Set the "Local release distance" as a percentage of the total travel length of the door, applicable if Local Release is activated. SOLAS [Ch II-2 Rg9 4.1.1.4.11] specifies a re-opening distance of 0.7 to 1m.

time



Example: For 2m door travel length, 1m re-opening distance corresponds to 50% "Local release distance" value.

### Slow-down distance (opening / closing)

Set the "Slow-down distance" as a percentage of the total travel length of the door, independently for opening and for closing the door. Towards the end switches resp. local release distance, the door slows down to slow drive velocity and drives the slow-down distance at that speed. Example: For 2m door travel length, 0.5m of slow travel corresponds to 25% "Slow-down distance" value.

### **Drive Settings, Extended**

The extended drive settings (red boxes in the image) are only visible if password [PWD1] is entered.

### Motor current limit (opening / closing)

Set the current limit in Ampère that is used for velocity limiting (if enabled) and for stopping the door at high temperature, when the current limit is used instead of limit switches.

### **Current limited velocity**

Check the "current limited velocity" checkbox to throttle the driving velocity when the current limit is reached.

### Input / Output inversion

Click on any of the digital input and output inverter checkboxes to invert the logic level used to detect the respective signal.

### Release magnet only if closed

If checked, the release magnet is engaged only if the door is opened when closed, as opposed to whenever the door is opened.

### Second safety strip

If checked, the input terminal for the second local release functions as a second safety strip, see IN8: "Local Release Switch", IN9: "2<sup>nd</sup> Local Release Switch" / "2<sup>nd</sup> Safety Strip".

### Always enable bolting magnet

If checked, the bolting magnet is engaged whenever the door is closed, independent of sea mode or locks.

### Brake is off at power-up

If checked, the brake is released after a reset or power-up of the ECS 2100.

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### **Timing Settings**

OporControl   OM Lütker Elektrotechnik			-	×
File       Device       Help         Motor settings       Drive settings       Timing settings         Pre-alarm time [s]       Opening time after safety strip [s]         Re-closing time [s]       Re-closing time [s]         Close then open (to release hook) [s]       Blackout time [min]         Safety stroke       Close back-pressure [s]         Bolting magnet - brake delay [s]       Bolting magnet - brake delay [s]	2 3 2 4 0.5 4 2 4 0 4 0 4 0 4 0 4 7 0 4 7 0 4 7 0 4 7 7 7 7 7 7 7 7 7 7 7 7 7			
More options	60 Cardeck	Done	Version: 3.05	

Timing settings are only accessible if password [PWD1] is entered.

### Pre-alarm time

Set the time in seconds to wait before the door closes after local release is unlocked. During this time, the horn / lamp is already active, indicating that the door is about to close.

### Opening time after safety strip

Set the amount of time in seconds a closing door can be opened again using the safety strip.

### *Re-closing time*

Set the time in seconds to wait before the door closes after it was opened to local release distance.

### Close then open (to release hook)

Set the time in seconds to let the door push against the frame so that the hook latch is released.

### **Blackout time**

Set the time in minutes to wait after main power loss until an open door is closed in battery operation mode.



### Safety stroke

Set the number of door actions (open / close) allowed for safe battery operation in case of main power failure.

### Close back-pressure

Set the time in seconds to let the door push against the frame when closing. Set to zero to disable this function.

### Bolting magnet – brake delay

Set the time in seconds to allow the bolting magnet to be engaged or released before the brake when closing resp. opening.

### **Motor Settings**

DoorControl   OM Lütker Elektrotechnik <u>F</u> ile <u>D</u> evice <u>H</u> elp			-	×
Motor settings Drive settings Timing settings Board type Motor type	<ul> <li>A60 Cardeck</li> <li>Brush type motor</li> <li>Inverted driving direction</li> <li>Position detection by Hall</li> <li>Position detection by Encoder</li> <li>Use Encoder / Hall sense</li> </ul>	Brushless motor effect sensor coder culated velocity or for motor feedback		
Encoder / Hall sensor resolution Nominal motor velocity [rpm 24V HP on-time [s Battery low error voltage [V Motor voltage limit [V Service interva PI controller coefficient K PI controller coefficient K Overcurrent protection limit	n 12 • • • • • • • • • • • • • • • • • •	/ HP fault conditions Done		
Door Control	A60 Cardeck	S/N: 12345678	Version: 3.05	្ន

Motor settings are only accessible if password [PWD2] is entered.

### Board type

"Board type" shows the type of the currently connected ECS 2100, i.e. A60 or A60 Cardeck. It can only be changed by updating the firmware of the device, see Firmware View.



### Motor type

ECS 2100 can operate using brush-type or brushless motors, selectable by "Motor type". Note that brushless motor operation requires Hall-effect sensors. Brush-type motor operation quality may be improved by employing quadrature encoders.

### Inverted driving direction

Check the box "Inverted driving direction" to change the rotational direction of the motor, in case the door drives in the opposite direction if commanded to open.

### Position detection by Hall-effect sensor

If a motor equipped with Hall-effect sensors is connected to the ECS 2100, the sensors can be used for travel position homing, which is less precise without sensor input.

### **Position detection by Encoder**

If a motor equipped with quadrature encoder is connected to the ECS 2100, the sensor can be used for travel position homing, which is less precise without sensor input.

### Position detection by calculated velocity

For brushed motors, the velocity can be calculated using voltage and current measurements, and this calculated velocity can be used for travel position homing, as an alternative to using an encoder. An extended reference drive is needed for calibration of velocity calculation, see Reference Drive.

### Use Encoder / Hall sensor for motor feedback

If an encoder or Hall-effect sensor is attached, or if calculated velocity is used for position detection, it can be used to control torque and maintain steady speed control.

### Encoder / Hall sensor resolution

The resolution of the encoder or Hall-effect sensor can be taken from the respective data sheet of the manufacturer and must be entered here precisely for correct operation.

### Nominal motor velocity

The nominal motor velocity can be taken from the data sheet of the motor manufacturer and must be entered here precisely for correct operation.

### 24V HP on-time

Enter the amount of time the external 24V power adapter shall stay activated after the door has come to a halt. Enter 0 to keep the power adapter activated permanently.

### **Battery low error voltage**

If the battery voltage falls below the value selected here, a Drive System Error status is produced. This is a measure for safe operation.

### Motor voltage limit

A Motor Voltage Limit warning is produced if while driving, the voltage limit is exceeded.

### Service interval

Choose a service interval, which when reached produces a Service Interval Reached status. This status can be reset by the maintenance technician, restarting the service interval.



### PI controller coefficient Kp

The Kp coefficient determines the proportional gain of the speed controller, which is active if a sensor is used for motor feedback. Note that changing this value may produce unexpected or unwanted drive behaviour.

### PI controller coefficient Ki

The Ki coefficient determines the integral gain of the speed controller, which is active if a sensor is used for motor feedback. Note that changing this value may produce unexpected or unwanted drive behaviour.

### Auxiliary voltage from 24V HP

If checked, the Auxiliary Voltage output is routed from the external rather than the internal 24V power adapter of the ECS 2100.

### **Operate door even under fault conditions**

If checked, the ECS 2100 is not switched off due to its Safety Functions, and can thus still be operated. Note that there is a potential risk of hardware damage when overriding safety functions! A red warning will appear in the settings view.

### **Overcurrent protection limit**

Normally, the overcurrent protection limit is set to 50 A. The value can be changed to 56 A or 63 A here. Note that there is a potential risk of hardware damage when applying higher current limits! A red warning will appear in the settings view.

### **Firmware View**

Password [PWD1] is required to enter Firmware View.

The connected devices list shows the currently connected ECS 2100 units, along with board type (A60, A60 Cardeck, etc.), serial number and firmware version. Pick a device from the list to interact with it.

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	ar Elektrotachnik				
	er Elektrotechnik	-			
Select connected device:		<b>D</b>	0.1	_	
Device Device		Board type	Serial number	Firmware	
Door Control		A60 Cardeck	12340678	3.03	
Select board type:	A60 Cardeck	-			
Board serial number:	12345678				
<b>F</b> 11 - 1					
Firmware update version:	doorcontrol_3.03.twp		Up	date firmware	
Reading USB controller se	ttings: ok. no changes necessary				
Resetting to boot mode (#	2/2): ok, checking boot ID: ok, 64K	(flash			
Downloading firmware: ok,	verifying: SUCCESS	ng binary. ok			
Reading configuration: ok, SUCCESS	checking serial number: done.				
More options				Done	
t connected					 
c connecteu					

### **Update Firmware**

To update a device's firmware, pick the device from the list of connected devices, choose a board type and click on "Update Firmware". Note that the serial number can only be programmed if it is empty. Click on "Done" when finished. DoorControl will return to Status View.

### **More Options**

Accessing "More Options" requires password [PWD2].

More options	×
Read System Log	
Erase Configuration (EEPROM)	
Update Drive Firmware	
Check USB Settings	
Cancel	



### **Read System Log**

Use "Read System Log" to view the system log of the connected ECS 2100 and save it to a log file for support.

### **Erase Configuration (EEPROM)**

Choose "Erase Configuration" to clear all settings, logs and reference data. Settings and reference drive must be carried out again completely.

### **Update Drive Firmware**

Choose "Update Drive Firmware" to update the motor driver's firmware in the Main Control Unit. Note that for a complete update of the main control unit, the drive firmware must be updated first, the main firmware must be updated separately afterwards. After updating the drive firmware, a full configuration set-up must be performed.

### Check USB Settings

Choose "Check USB Settings" if the USB controller is visible in the connected devices list, but is not responding.