

# User Manual

## Electromechanical Door Closer Brake HD-FlexBrake – Item No. 102500.1



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### User Manual Band Brake HD-FlexBrake

**Item No.:** 102500.1  
**Version:** 1.5  
**Date:** 14<sup>th</sup> April 2021  
**Document:** 102500Err\_ENG

## 1 General

HD-FlexBrake has been designed for super yachts to use with existing mechanical door closers, e.g. Dorma Door Closer System TS 93. With HD-FlexBrake electromechanical stopping of doors at user-defined door angle can be realised. Applications with high requirements in the maritime area can be covered with this product.

With the use of HD-FlexBrake, following can be achieved:

- Electromechanical braking (stopping) and position keeping of doors
- Feedback about door state „open“, „closed“
- High robustness
- Emergency release in case of a power failure (door is closed via the door closer system)

Through the use of robust materials and a high quality brushless motor, the door closer brake provides high reliability and a durability.

### 1.1 Characteristics of HD-FlexBrake

- Power Supply 24 V
- Standby current < 20 mA
- Feedback of holding torque, door closer angle (ModBus)
- Electrical control via static signals or serially via ModBus protocol
- Robust stainless steel V4A (316 L) housing
- In case of voltage breakdown, brake is released via integrated energy storage system
- Brake operates in closing direction – opening of door always possible
- High protection class (IP 65) and seawater resistant while mounted
- Short circuit proof outputs max. 120 mA (except ModBus)
- High holding torque of up to 60 Nm

## 2 Installation

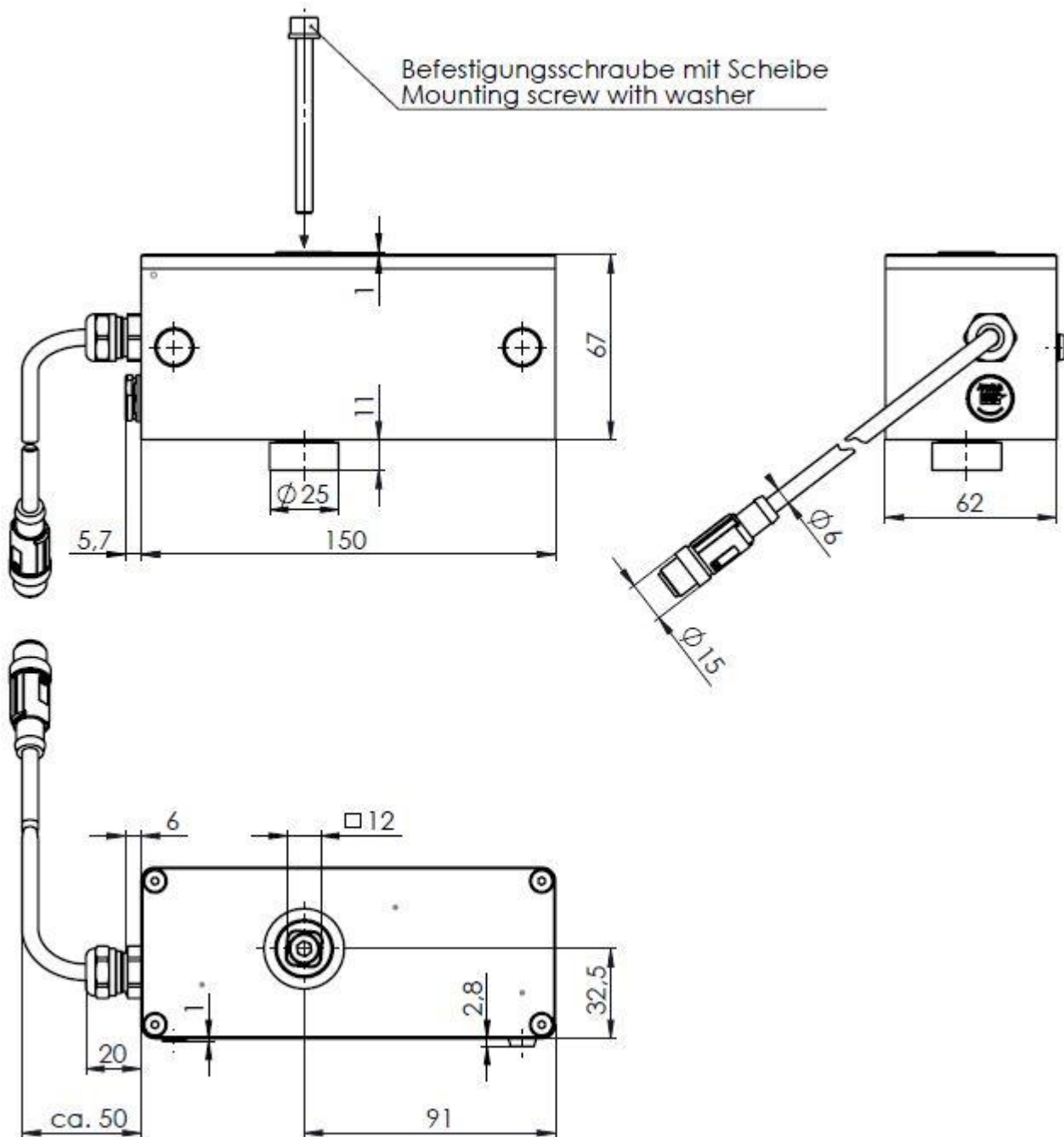
HD-FlexBrake is mounted above the existing mechanical door closer using a M6x70 DIN912 screw (refer to section 2.1). When mounting HD-FlexBrake the rotational direction between the brake and the mechanical door closer has to be considered.

When viewed from above (cover-side) the brake only operates if the axis turns counter-clockwise. Therefore, the brake has to be mounted in such a way as to the axis turns counter-clockwise when door closes. The labels on the cover and on the housing mark the closing direction of the door.

A tightening torque of 15 Nm needs to be applied to the supplied M6x65 screw.

The wiring is performed by using a M12 plug connection. It has to be considered that the bending radius must not fall below 30 mm. Measures to avoid galvanic corrosion have to be taken accordingly (recommendation: Tef-Gel).

## 2.1 Mechanical dimensions



Allgemeintoleranzen DIN ISO 2768-cK  
General tolerances DIN ISO 2768-cK

Figure 1

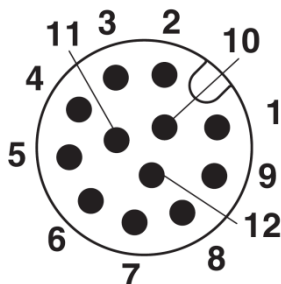
### Note:

It is crucial to adequately mount the door closer onto the mounting plate (door). Sufficient and adequate mounting is essential for proper operation of HD-FlexBrake. Also, sufficient and adequate mounting of HD-FlexBrake onto the door closer needs to be ensured.

### 3 Operation

#### 3.1 Electrical Interface

Electrical connection is performed by using a 12-pole M12 male connector.



Pole assignment M12 connector – male side view

Inputs and Outputs of HD-FlexBrake			
Pin	Signal	Wire color	Description
1	Teach	brown	Input signal for teaching the opening angle
2	GND	blue	GND
3	Locked-1	white	Floating output. Connects with Locked-2 if door is kept open. Disconnects, if door is not kept open. Signals the „Teach“ process.
4	Brake en/dis_	green	Input signal, which puts the brake into the active state. If voltage > 10 V the door is kept open at the taught opening angle. If voltage < 4 V, the brake remains inactive.
5	RXTX-N	pink	ModBus Signal B (RS485)
6	Locked-2	yellow	Floating output. Connects with Locked-1 if door is kept open. Disconnects, if door is not kept open. Signals the „Teach“ process.
7	RXTX-N-2	black	ModBus Signal B (RS485)
8	RXTX-P	grey	ModBus Signal A (RS485)
9	VCC	red	Positive power supply voltage area
10	RXTX-P-2	violet	ModBus Signal A (RS485)
11	Alarm-1	grey/pink	Floating output for alarm notifications. Disconnects from Alarm-2 in case of an alarm. For alarm notifications refer to 4.1.
12	Alarm-2	red/blue	Floating output for alarm notifications. Disconnects from Alarm-1 in case of an alarm. For alarm notifications refer to 4.1.

## 3.2 Factory setting and Start-up

The door needs to be in closed position when mounting HD-FlexBrake onto the door closer. In delivery state, the brake of HD-FlexBrake is released. After HD-FlexBrake is connected to power supply, the system starts to operate (e.g. energy storage system is charging, initialisation is carried out). As soon as this phase is completed, the "Alarm" output is conductive if there is no functional error. The braking angle is set at 90° at the factory. For exact operation it is recommended to open and release the door at a position > 10° of the teached braking angle.

**Attention: If the shaft of the HD-FlexBrake was twisted during installation, the factory setting is no longer valid. A functional test of the factory settings is therefore no longer possible. It is necessary to teach in a new braking angle.**

### Functional test of factory setting:

- Activate input signal „ Brake en/dis\_“ (> 10 V)
- Open door > 100°
- Release door and check following:
  - Braking and releasing time approx. 1 sec
  - Constant gear noise can be heard
  - HD-FlexBrake holds the door between 95° and 80°
  - Brake is released if door is pushed longer than 2 sec
- If functionality cannot be confirmed, electrical connectivity and mechanics have to be checked.

## 3.3 Teach-In of a new braking angle

After HD-FlexBrake is put into operation successfully, it is possible to teach-in a new braking angle. For that, please perform following:

- Close the door
- De-activate input signal „Brake en/dis\_“ (< 4 V)
- Activate input signal „Teach“ – output „Locked“ changes quickly now (high to low state). If this is not the case, the "Teach" input signal must be deactivated again and then activated.
- Open door up to the desired braking angle (min. > 5°) and then release the door – output „Locked“ changes slowly if a valid angle is available. If there is no change in the change interval, the entire process must be started from the beginning.
- De-activate input signal „Teach“
- Activate the input signal "Brake en / dis\_"
- A new braking angle is teached-in now

BSS recommends using the programming device (Art. No. 102900.3). With this, start-up, functional test and teach-in process can be carried. In addition, HD-FlexBrake can be connected to the ModBus via USB line and the parameters can be read out and changed.

### 3.4 Review of a newly teached braking angle

Please perform following steps to review a newly teached braking angle:

- Activate the input signal "Brake en / dis\_"
- Open door at a position > 10° of the teached braking angle
- Release door
- Review and verify if door is held at newly teached in braking angle

**Note:**

If the door cannot be opened > 10° of the teached-in braking angle because of mechanical boundaries, the door cannot be held open exactly at the teached-in braking angle. Due to the functional principle, it is not possible to brake (hold) a door directly at a wall.

### 3.5 Release of the brake

To release the brake, either the "Brake en / dis \_" signal can be deactivated or the held door can be pushed shut. When pushing, it is necessary to let a torque of > 60 Nm act on the HD-FlexBrake for 2 seconds. Both values (duration and torque) can be changed via ModBus.

### 3.6 Operating conditions

Start-up phase (approx. 40 seconds):

- Energy storage device empty (no supply voltage for more than 65 seconds)
- Energy storage system is charging initially with 98 mA for approx. 30 seconds
- Initialisation phase
- Brake is ready for operation  
("Alarm" output signal becomes conductive. If not, there is an error.)

Regular operation:

- Brake closes: Supply current 98mA for approx. 5 seconds
- Latency \*
- Brake releases: Supply current 98mA for approx. 5 seconds
- Latency \*

\* If latency is more than 20 seconds, closing and opening can be performed as often as needed.

Insufficient braking:

- The brake is applied but the holding torque is not sufficient to hold the door.
- As soon as the door has fallen to an angle of 15° below the braking angle, the brake is released.

Emergency opening (approx. 5 seconds):

- Power supply is disconnected > 2 seconds (< 16V is considered an interruption in the supply voltage).

## 4 Troubleshooting

### 4.1 Malfunctions

In case of malfunctions following points need to be checked:

- **Wiring:**  
Are all wires connected correctly?
- **Control signals:**  
Power supply in the nominal voltage range?  
Control signal correctly applied to HD-FlexBrake?
- **Installation:**  
Is HD-FlexBrake mounted in the correct way?  
Can the door be opened and closed normally or is higher force noticeable?
- **Operation:**  
Charging time of the energy storage in the range of 20-30 seconds?  
Is the braking angle set correctly?  
Is there an alarm message?  
Can you hear braking noise, but no braking noticeable?

### 4.2 Alarm notifications

Check if there is an alarm notification. Following reasons can lead to an alarm:

- Charging current too small / high
- Motor forward / backward
- Lever failure
- Magnet sensor field strength (door, case, lever)
- Magnet sensor I<sup>2</sup>C (door, case, lever)
- 
- Energy storage system charges too slow (e.g. not fully charged after 3 mins)  
=> **Reason: Malfunction of electronic**
- Energy storage system charges too fast (e.g. fully charged after 3 sec)  
=> **Reason: Malfunction of electronic**
- Gear motor not working  
=> **Reason: Motor blocked**
- Braking lever covered critical distance, however door still closes  
=> **Reason: Mechanical breakdown**
- Gear motor works, braking lever stays in position  
(e.g. motor increment = 500 & lever angle <10)  
=> **Reason: Mechanical breakdown**

Alarm notifications have to be fixed and reset for an error-free operation of HD-FlexBrake. Alarm notifications can be reset by performing a restart of HD-FlexBrake (power off/power on).



## 5 ModBus Protocol

<b>ModBus</b>	RTU
<b>Baud-Rate</b>	19200
<b>Parity</b>	Even
<b>Stop Bits</b>	1
<b>Byte Size</b>	8
<b>Slave ID default</b>	1

Detailed information about ModBus interface is available in a separate document. Please request this document if interested.

## 6 Technical Specifications

Certifications	CE; Conducted emissions accord. to DNV-GL: EMC A Housing interference radiation accord. to DNV-GL: EMC A
Power supply / Operation Voltage Range	24 V DC / (16...30 V DC)
Power consumption	min. 0.4 W / max. 2.6 W
Inrush current	max. 100mA @ 24V
Electrical fuse protection @ 24 V (tripping characteristic slow or inrush capacitance of >20,000 µF)	Each device must be fused with 0.5 A 3 A (<20 devices), 8 A (<50 devices), 16 A (<100 devices)
Standby current (input is not active)	< 20 mA @ 24V
Current supply required before Opening and after closing of the brake	max. 100mA @ 24V
Input current supply required to activate the input	0.2 mA
Minimum pulse length for the inputs	20 msec
Output-current	120 mA
Closing / opening time	< 3 sec
Holding torque	≤ 60Nm
Delay after voltage breakdown until emergency opening	1 sec
Operating temperature / Storage temperature range	5° C ... +60° C / -20° C ... +70°C
Protection Class	IP 65
Mechanical dimensions	Refer to Figure 1
Weight with connection cables	2.6 kg
Cable length	1.9 m
Material of housing	Stainless Steel 1.4404 (316 L)
Mechanical compatibility	Dorma Door Closer System TS 93 and design equal door closer systems