

# **Flexible feed device**

## **Flipband 200 / Flipband 300**



**Operating and assembly manual**

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## This operating manual is valid for:

Type		Order number
Flip conveyor 200	with black conveyor belt	50436249
	with white conveyor belt	50436250
Flip conveyor 300	with black conveyor belt	50436251
	with white conveyor belt	50436252

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## History

version	changes
R03.0	Documentation of Flipband 200 and Flipband 300
R03.1	Changes of technical data regarding the maximal clockwise belt rotation length
R03.2	<ul style="list-style-type: none"><li>- Circuit diagram: flip speed &amp; flip duration swapped</li><li>- Belt direction: Open connection → left direction is active</li><li>- Description of error output and error acknowledge improved</li></ul>
R03.3	<ul style="list-style-type: none"><li>- Removed green conveyor belt</li></ul>
R03.4	<ul style="list-style-type: none"><li>- removed translation mistake</li><li>- recommended backup fuse updated</li></ul>
R04.0	New mounting parts, new mounting pattern

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# 1 Safety instructions



## 1.1 Explanation of symbols and notices


**Symbols:** Installation and commissioning must be carried exclusively by qualified personal according to the operating manual.

Please observe the following explanation of symbols and notices. They are classified according to danger levels and in according to ISO 3864-2.

 <b>DANGER</b>	
	<p>Identifies an imminently threatening danger.</p> <p>If the information is not followed, death or severe injuries (invalidity) can occur.</p>

 <b>WARNING</b>	
	<p>Identifies a potentially dangerous situation.</p> <p>If the information is not followed, death or severe injuries (invalidity) can occur.</p>

 <b>CAUTION</b>	
	<p>Identifies a potentially dangerous situation.</p> <p>If the information is not followed, property damage and minor or moderate bodily injury can occur.</p>

<b>NOTICE</b>	
	<p>Identified general information, useful user tips and work recommendations that have an influence on the safety and health of the personnel.</p>

## Principle safety information


This operating manual serves as a basis for safe use and operation of the flexible Flipband feed device. This operating manual, particularly the safety information, must be observed by all persons working on or with the Flipband. In addition, the rules and regulations for accident prevention for the respective place of use must be observed. The operating manual must always be available in the place of use of the Flipband.

Operation of the device must be carried out exclusively by technically qualified personnel. Qualified personnel are persons who, on the basis of their training, experience and instruction, as well as their knowledge of applicable standards, provisions, accident prevention regulations and operating conditions, have been authorized by the person responsible for the system of the equipment to carry out the respective necessary tasks, and are capable of recognizing and avoiding the potential dangers in the process (definition for specialized personnel according to IEC 364).


Faults that can impair the safety of persons, the Flipband or other property must be corrected immediately.

The following information is provided for personal safety of the operating personnel, safety of the described products and the connected equipment:

### 1.1.1 Electrical connection

NOTICE	
	<ul style="list-style-type: none"> <li>▪ <b>Disconnect the supply voltage before assembly or disassembly work, as well as structural modifications.</b></li> <li>▪ <b>Observe the accident prevention and safety regulations applicable in the specific usage case.</b></li> <li>▪ <b>Prior to commissioning, it must be checked whether the rated voltage of the device matches the local mains supply.</b></li> <li>▪ <b>EMERGENCY STOP devices must remain valid in all operating modes. Unlocking the EMERGENCY STOP devices must not enable uncontrolled restarting.</b></li> <li>▪ <b>The electrical connections must be exposed!</b></li> <li>▪ <b>Protective conductor connections must be tested for fault-free function after assembly!</b></li> </ul>



### 1.1.2 Danger areas

NOTICE	
	<p>The flexible supply devices from Afag are designed in accordance with the EC Machinery Directive, according to the state-of-the-art and generally recognized good engineering practices. Nevertheless, the use can result in hazards to life and limb of the user or others and can cause damage to the Flipband or other property.</p>

## 1.2 Proper use

The Flipband is designed for the animation of transported goods, particularly bulk material, by means of pulses transferred from flip shafts to the belt. The information in chapter 2.3 (**Table 1: Technical Data**) regarding the maximum permissible dimensions and weights of conveyor belts must be observed.

The intended use also entails observance of all instructions from the operating manual, as well as the observance of all safety instructions.

 <b>WARNING</b>	
	<p><b>The Flipband must <u>not</u> be used:</b></p> <ul style="list-style-type: none"> <li>a) in damp and wet areas.</li> <li>b) at temperatures below 10°C or above 50°C</li> <li>c) in areas with highly combustible media</li> <li>d) in areas with explosive media</li> <li>e) in highly aggressive or dust-laden environments</li> <li>f) in aggressive environments (e.g. atmospheres containing salt)</li> </ul>

### 1.3 Obligations of the owner

The Flipband must be in a safe condition and used safely to ensure the safe operation. Consequently, the operating company is obligated to ensure that the following instructions are complied with:

Ensure that the Flipband is operated exclusively by authorized personnel.

Forbid unsafe and/or dangerous work procedures. Ensure the appropriate conduct and actions of personnel.

The personnel must have understood the operating instructions. Have this confirmed by signature.

Please ensure that a copy of the complete operating instructions is always ready to hand at the Flipband.

Check the operating manual regularly for completeness and legibility.

For activities with increased risk of injury, stipulate that appropriate personal safety gear (safety gloves, safety goggles) is worn.

Precisely specify the responsibilities appropriate for the various task areas, such as installation, commissioning and operation.

Obligate personnel to immediately report recognizable safety deficiencies that occur to their supervisor.

#### NOTICE



**All persons who work on the Flipband, as well as persons who are active in accordance with the law on temporary employment bear a participatory obligation for Occupational Health & Safety. They must be instructed concerning the use of the Flipband.**



## NOTICE



Reasonably foreseeable misuse, which could pose a danger to the user, third parties or the Flipband, includes:

- a) The feed of components that deviates from the size and geometry that deviates specified for the Flipband.
- b) Operating the Flipband beyond the physical operating limits as described in the Chapter "Commissioning/Operation"
- c) Improper installation, commissioning and operation of the Flipband.
- d) Modifying the controller software without prior consultation with the manufacturer
- e) Operation of the Flipband with apparent malfunctions and / or defects.
- f) Cleaning tasks carried out without observing the local safety precautions for work on the Flipband.
- g) Improper installation, commissioning and operation of the Flipband.

## NOTICE



**Not modifications or changes to the Flipband are permitted without approval of the manufacturer.**

## NOTICE



**Any further use or structural modification applies as improper and renders the warranty claim void.**

## 2 Description of the device

### 2.1 General information

The Flipband consists of a conveyor belt and the integrated flip unit, with a control unit integrated in the flip unit. The control unit is designed for configuration of the possible operating modes.

The advantages of the Flipband system are:

- Configuration of an individual system, adapted to the respective application
- Fully-integrated embedded system
- Quick and easy parameterization of the modules with controls
- Simple assembly and commissioning

The various types of flexible feed devices differ in size and application spectrum (see **Table 1: Technical Data**)

### 2.2 Functional description

The components are transported on the Flipband and separated by means of pulsing. The loading of components onto the Flipband normally takes place with an electro-magnetically controlled bunker.

With the movement of the belt, the bulk material is transported to the flip area for pulsing. The flip intensity must be adjusted depending on the component size, weight, characteristics and shape of the bulk material. The valid gripping coordinates are determined by a camera system in order to feed the separated components to the other stations with the handling system.

With optimal implementation of the Flipband, the belt transports the accumulated bulk material to the limit stop (hopper wall) and then to the center position, between the two flip shafts in order to separate it there. The camera results are used to determine whether a part can be grabbed, must be flipped again or more parts must be supplied. In an ideal case, it should be possible to pick up at least one component after each pulse.

The Flipband can be activated with digital inputs only, as well as analogue and digital inputs. Depending on the configuration, various parameters can be influenced via the inputs (see 4 Adjustment modes)

## 2.3 Technical Data

Figure 1: Flip belt dimension sheet

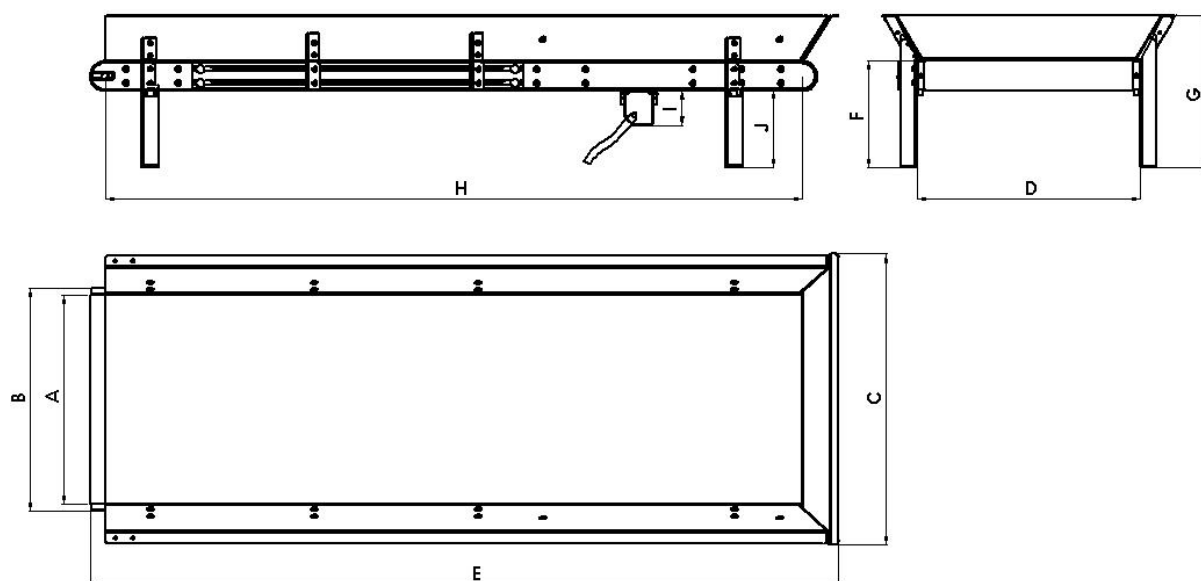


Table 1: Technical Data

Description		Unit	Flipband 200	Flipband 300
Dimensions	A	[mm]	200	300
	B	[mm]	220	320
	C	[mm]	318	418
	D	[mm]	220	320
	E	[mm]	~1073	~1073
	F	[mm]	154	154
	G	[mm]	218	218
	H	[mm]	1000	1000
	I	[mm]	51	51
	J	[mm]	110	110
Max. part size		[mm x mm]	□ 40x40	□ 40x40
Max. part weight		[g]	50	50
Control voltage		[V]	20 – 30	20 – 30
Load voltage		[V]	9 – 30	20 – 30
Total current [max]		[A]	7	7
Recommended backup fuse			C6A	C6A
Relative activation duration of actuators		[%]	< 15%	< 15%
Environmental & / storage temperature		[°C]	10° – 50° / 0° – 80°	10° – 50° / 0° – 80°
Weight		[kg]	23	25
Standard interface			Multi I/O	Multi I/O
Protection rating			IP50	IP50
Maximal clockwise belt rotation length			One full belt rotation	One full belt rotation

## 2.4 Transport

### **WARNING**



Incorrect use of transport equipment (industrial trucks, hall crane, aids, slings, etc.) can result in crushing and other injuries. Required conduct:

- Observe and adhere to the transport and assembly instructions
- Use transport equipment appropriately

### **CAUTION**



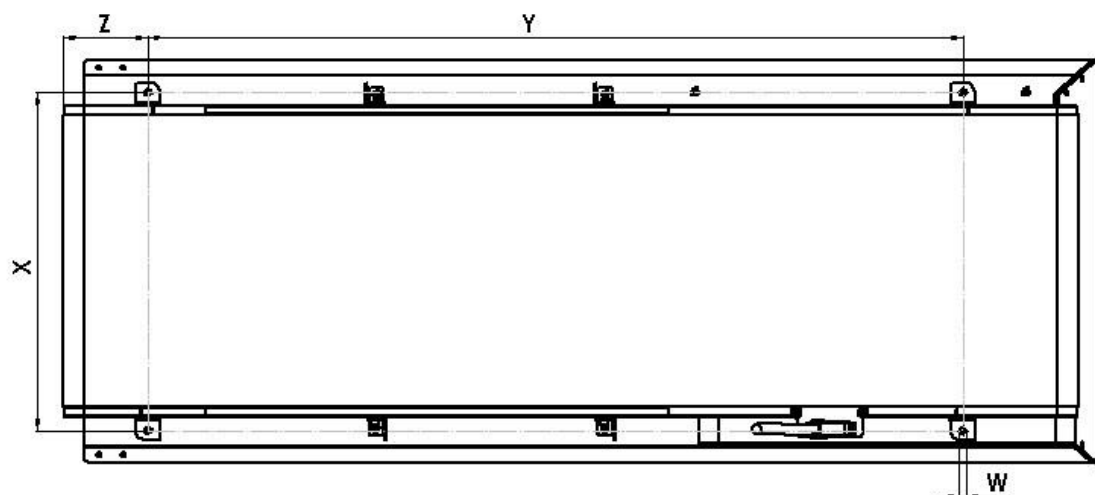
The Flipband must only be lifted by the base body for transport. The hopper is not a lifting point.

## 2.5 Assembly of the Unit

In order to enable reliable function of the Flipband, the steps below must be followed. Fault-free operation cannot be guaranteed if it this is disregarded.

### 2.5.1 Hole pattern for assembly

**Figure 2:** *Hole pattern on assembly level*

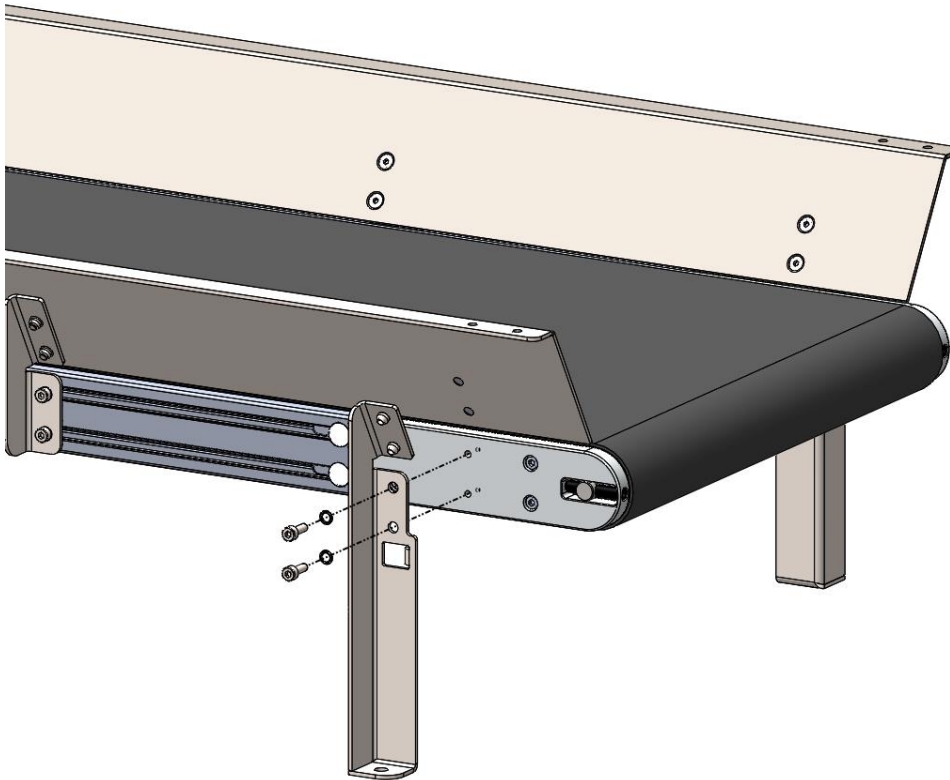


Description		unit	Flipband 200	Flipband 300
Dimension	W	[mm]	Ø 6,6	Ø 6,6
	X	[mm]	247	347
	Y	[mm]	837,5	837,5
	Z	[mm]	87	87

## 2.5.2 Assembly of the 4 holders on the Flipband

### 2.5.2.1 Assembly of the two front holders and accros from red cover

**Figure 3:** Mounting single holder



Mount the single holders with the supplied M4x12 cylinder head screws and the corresponding spring washers

This is also repeated on the other side of the Flipband and accros the red cover.

### NOTICE

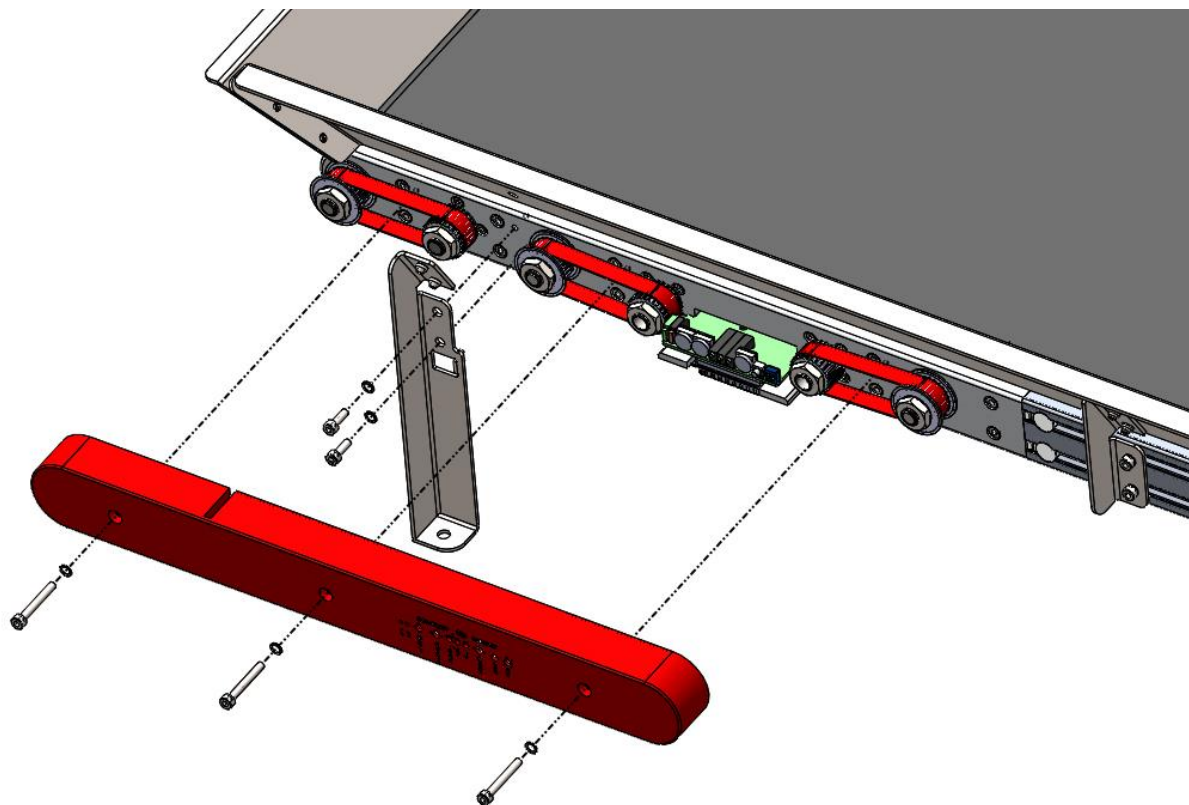


**Observe the following:**

- **Maximum torque: 3.5Nm**

### 2.5.2.2 Assembly of the holder for the gear cover

**Figure 4:** Assembly of the holder for the gear cover



Dismount the three cylinder head screws (M4x30) with corresponding spring washers of the red cover and remove the gear cover carefully.

Mount the single holder with the supplied M4x12 cylinder head screws and the corresponding spring washers

Mount the red gear cover with the original cylinder head screws (M4x30) and the corresponding spring washers

## NOTICE

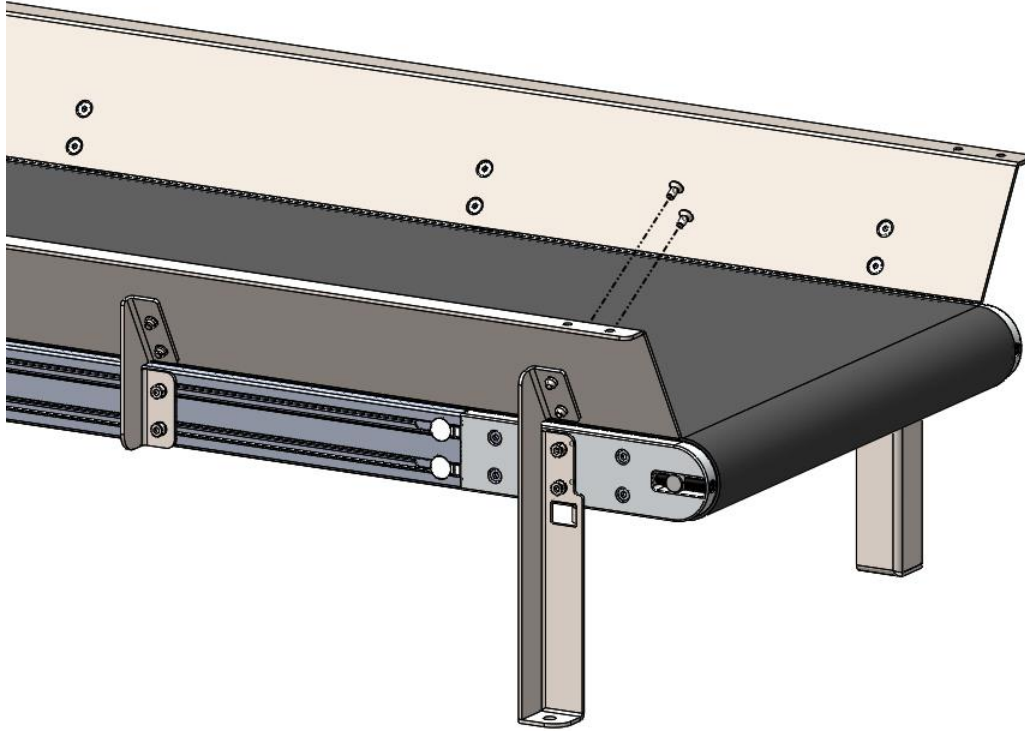


**Observe the following:**

- **Maximum torque: 3,5Nm**

### 2.5.2.3 Assembly of the holder on funnel sheet

**Figure 5:** Assembly of the holders on funnel sheet



The funnel sheet is fastened with two flat-head Allen screws M4x8 on the holders.  
Repeat this process on all holders.

#### NOTICE



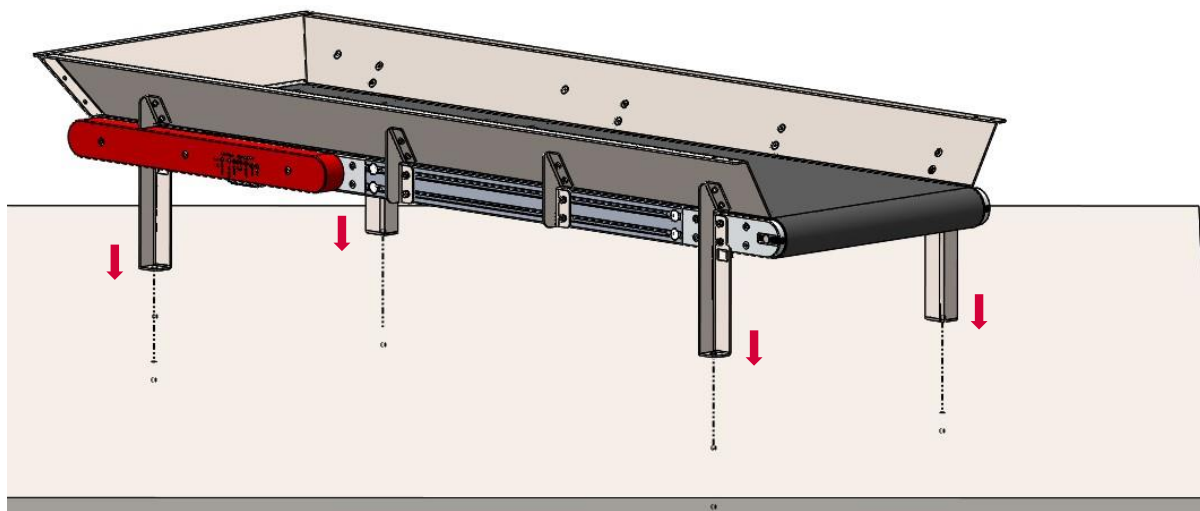
**Observe the following:**

- **Maximum torque: 2.5Nm**



### 2.5.3 Assembly of the Flipband on the base plate

**Figure 6:** Assembly of the Flipband on the base plate



The belt is then mounted with 4 M6 cylinder head screws on the base plate. (These screws are not included in the scope of supply)

#### NOTICE



**Observe the following:**

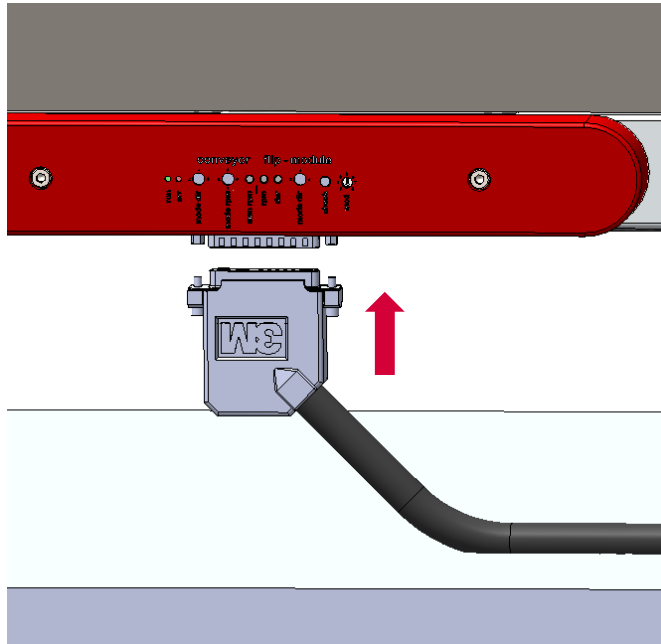
- Base plate executed as steel plate  $\geq 15\text{mm}$
- Base plate executed as steel plate  $\geq 20\text{mm}$

## 2.6 Connection of the unit



The actuators of the Flipband are connected by means of the 16-pin socket on the underside.

Use the supplied connection cable with corresponding plug connector for this purpose.

**Figure 7:** Connection of the unit



## 2.7 Power supply

 <b>WARNING</b>	
	<ul style="list-style-type: none"> <li>▪ <b>Work on the electrical supply must only be carried out by trained, approved qualified personnel!</b></li> <li>▪ <b>The mains supply must be provided by the customer via a ground fault circuit breaker!</b></li> <li>▪ <b>The Flipband must only be operated with the mains supply specified on the type plate!</b></li> </ul>

The power supply to the Flipband takes place with 24V DC low voltage. The power supply must be provided by the owner. The manufacturer recommends a 10A slow-burn melt fuse or a C6A automatic circuit breaker.

Please refer to 2.3 *Technical Data* for exact specifications.

Assembly must only be performed by a qualified expert.

## 2.8 Signal designation

The Sub-D interface of the Flipband has three analogue inputs, four digital inputs and three digital outputs. The supply voltage is fed via the same supply line. The supply to the control unit via the control voltage is separate from the supply of the motors via the load voltage. In the process, the load voltage can be interrupted in case of an emergency stop without making re-referencing necessary.

All signals are listed with the appropriate abbreviations in the following table. These abbreviations are used in the following text.

**Table 2: Signal abbreviation**

Abbreviation	Designation	Description
<b>U<sub>Load</sub></b>	Load voltage	Supply of the motors
<b>U<sub>Logic</sub></b>	Control voltage	Supply of the control unit
<b>GND</b>	Ground	
<b>U<sub>A_Csp</sub></b>	Belt speed	Belt speed analogue input
<b>U<sub>D_Cdir</sub></b>	Belt direction	Belt direction digital input
<b>U<sub>D_Con</sub></b>	Belt start	Belt start digital input
<b>U<sub>A_Fdur</sub></b>	Flip duration	Flip duration analogue input
<b>U<sub>A_Fsp</sub></b>	Flip speed	Flip speed analogue input
<b>U<sub>D_Fon</sub></b>	Start flipping	Start flipping digital input
<b>U<sub>D_AckErr</sub></b>	Acknowledge error	Acknowledge error digital input
<b>U<sub>DO_rdy</sub></b>	Stop flipper	Stop flip motors digital output
<b>U<sub>DO_err</sub></b>	Error/initialization	Error/initialization active digital output
<b>U<sub>DO_run</sub></b>	Ready for operation (run)	Ready for operation digital output (LED run)

2.9 Cable signal assignment

Figure 8: Circuit diagram

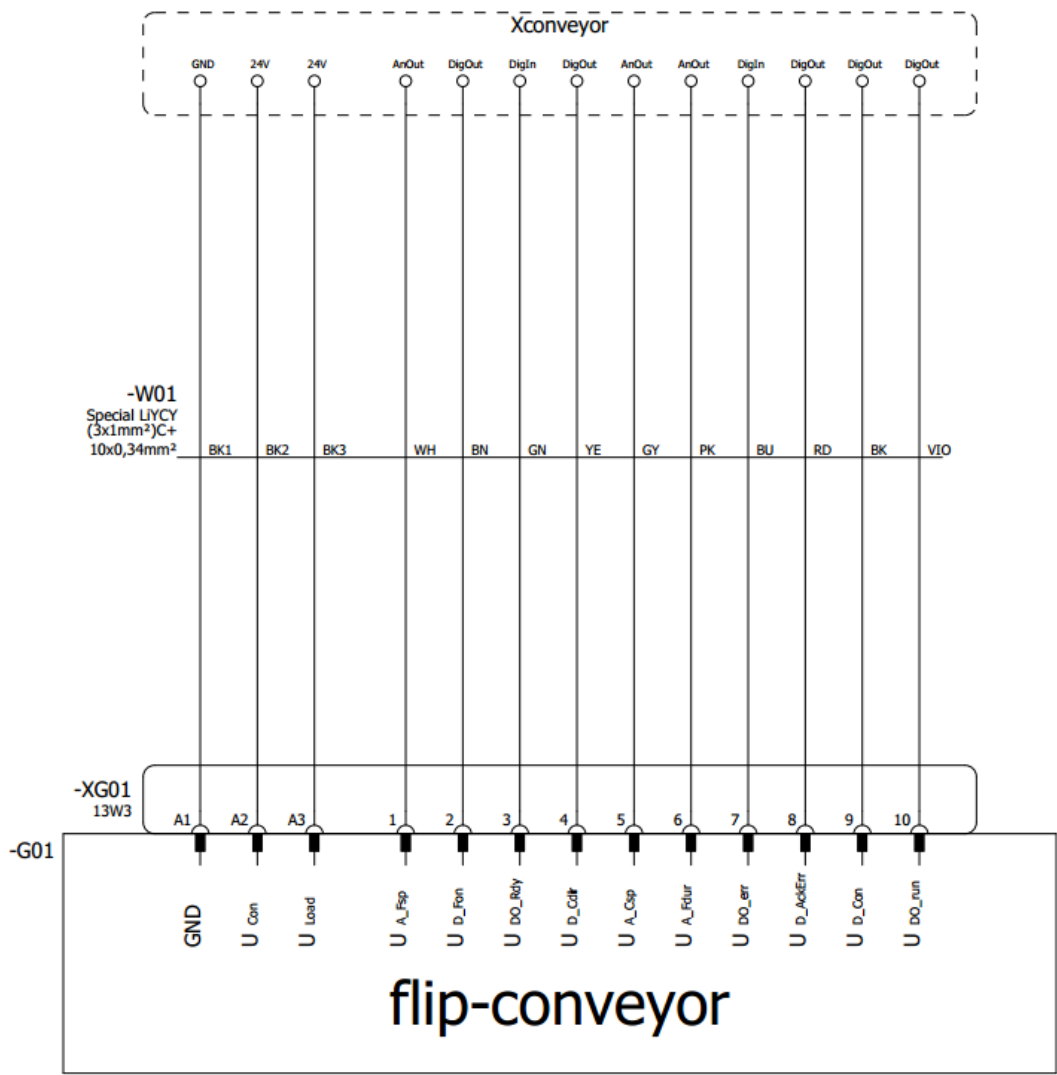


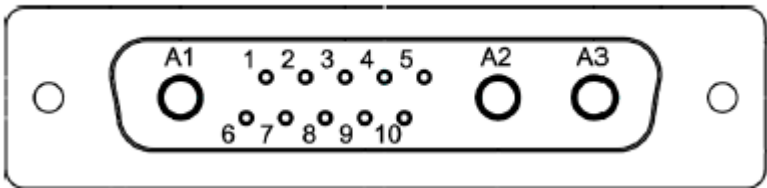
Figure 10: Conductor cross-section

Picture: W01



Figure 9: Plug pin assignment

Picture: XG01



### 3 Referencing

Once the supply voltage is connected to the logic and load feed, the belt begins to reference. This means that it starts the search process for the center position of the flip shafts. This process is mandatory in order to perform end positioning of the shafts after each flip process.

During referencing the outputs and LED are switched as follows:

- LED error & output  $U_{DO\_err}$  : switched on
- LED run & output  $U_{DO\_run}$  : switched off
- Output  $U_{DO\_rdy}$  : switched off

If an error occurs during referencing, the referencing is canceled. Then the control voltage  $U_{Logic}$  must be interrupted and re-activated in order to start a new referencing.

In the case of an error the outputs and LED remain as explained above.

After successfully referencing the outputs and LED are switched as follows:

- LED error & output  $U_{DO\_err}$  : switched off
- LED run & output  $U_{DO\_run}$  : switched on
- Output  $U_{DO\_rdy}$  : switched on

#### Possible causes of error:

- No load voltage
- Overcurrent on belt motor

#### NOTICE



**If an error occurs during referencing, the referencing is canceled. Then the control voltage  $U_{Logic}$  must be interrupted and re-activated in order to start a new referencing.**

## 4 Adjustment modes

The Flipband supports different control profiles. The profile is selected via rotary switch on the Flipband. The adjustment options of individual rotary switches are listed below.

### 4.1 Belt direction, "mode dir" rotary switch


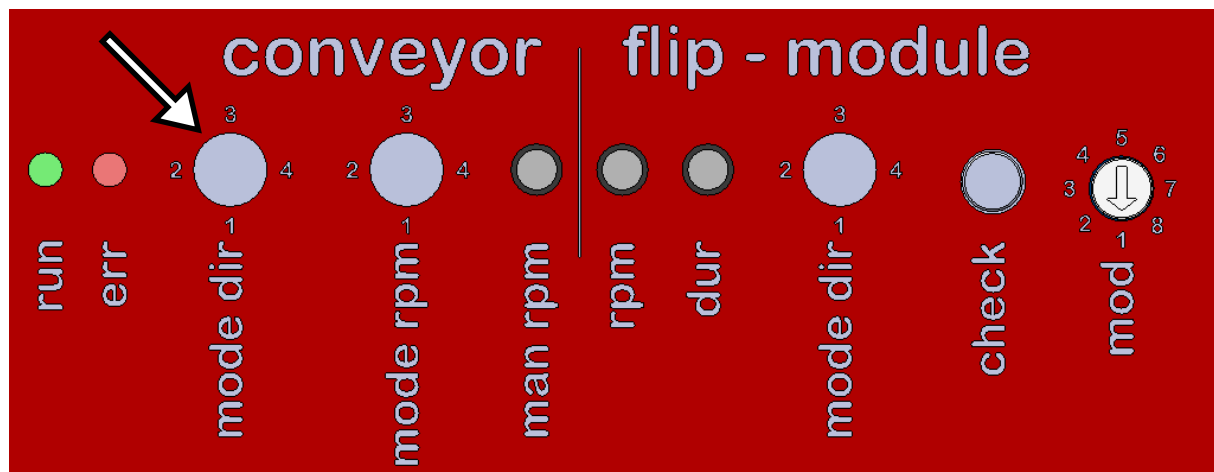
NOTICE	
	<b>Observe adjustment constellations!</b>
	<b><u>Only</u> turn the switch to Setting 4 in mode dir if Setting 4 is also selected for mode rpm.</b>
	<b>Examples for control, see 5.1 Profiles for belt control</b>

Figure 11: Belt direction mode





HINWEIS	
	<b>The maximal allowed Belt clockwise rotation length is secificated to one full belt rotation.</b>
	<b>In case of several full belt clockwise rotations the parallel belt position is not guaranteed.</b>

Table 3: Belt direction mode selection options

Actuation	Switch position	Description
Belt clockwise	<b>1</b>	Belt direction is permanently defined and cannot be changed by the superordinate control unit.
Digital input U <sub>D_Cdir</sub>	<b>2</b>	Digital control of the belt direction. "0"-Low = counterclockwise (open end or level<0.5V) "1"-Hi = clockwise (level > 3V)
Belt counterclockwise	<b>3</b>	Belt direction is permanently defined and cannot be changed by the superordinate control unit.
Analogue input	<b>4</b>	<u>Combination with "mode rpm" Mode 4.</u>

U <sub>A_Csp</sub>		Travel direction is controlled via analogue input U <sub>A_Csp</sub> < clockwise   > 5V counterclockwise
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## 4.2 Belt operating mode, rotary switch "mode rpm"

NOTICE	
	Observe adjustment constellations!
	<b>Only</b> turn the switch to Setting 4 in mode rpm if Setting 4 is also selected for mode dir.
	Examples for control, see 5.1 Profiles for belt control

The different speed operating modes of the conveyor belt are listed below.

Figure 42: Belt speed mode

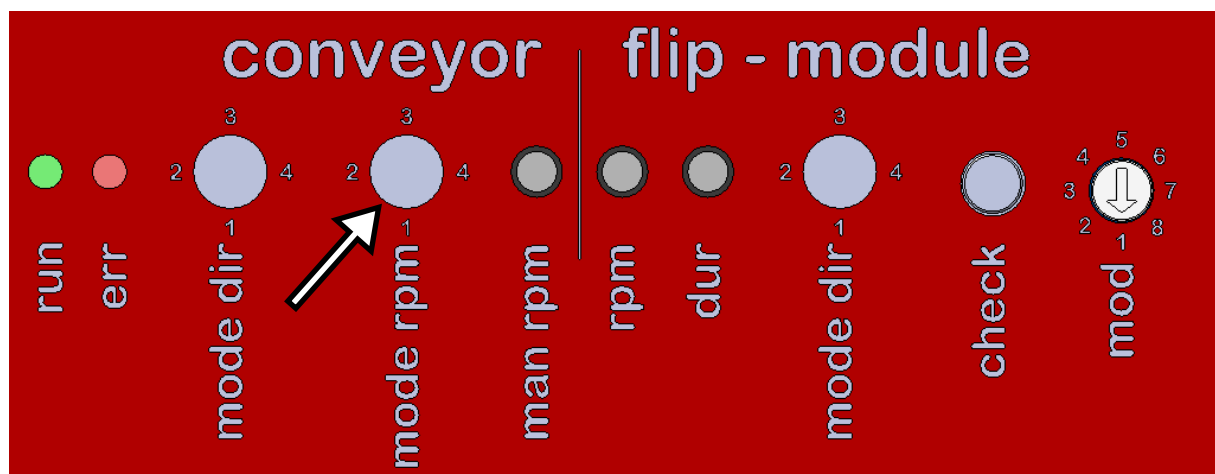



Table 4: Speed mode selection options

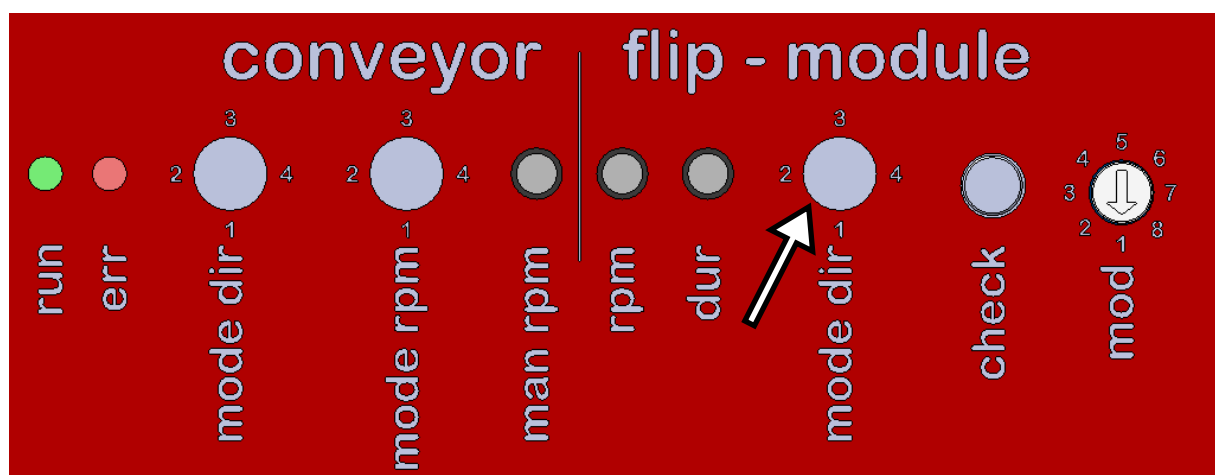
Actuation	Switch position	Description
Speed manual (Potentiometer)	1	The belt speed is permanently adjusted via the "man rpm" potentiometer. The digital input U <sub>D_con</sub> is used to switch on the belt. 0V = OFF 24V = ON
Analogue input U <sub>A_Csp</sub>	2	Belt speed is controlled via the 10V analog input. 0V = OFF 10V = Max
Belt motor off	3	Belt motor is deactivated.
Analogue input Analog belt speed U <sub>A_Csp</sub>	4	<u>Combination with "mode dir" Mode 4.</u> An analog input is used for speed and direction. Belt speed is controlled via analogue input U <sub>A_Csp</sub> . The belt is switched off at 5V. U <sub>A_Csp</sub> < 5V clockwise, U <sub>A_Csp</sub> > 5V counterclockwise. 5V = belt off (stop range 4.6V-5.4V)

	0V / 10V = maximum belt speed.
<b>⚠ CAUTION</b>	
	If Mode 4 is selected with "man rpm", a 5V level must be connected to $U_{A\_Csp}$ before the supply voltage $U_{Logic}$ is switched on. Otherwise, the belt starts up.

### 4.3 Flip direction, "mode dir" rotary switch





The different rotating directions of the flip shafts are listed below.

Figure 53: Flip direction mode



The rotating direction of the flip shafts is permanently adjusted via the rotary switch. Switching of the superordinate control unit is not possible.

Table 5: Flip direction selection options

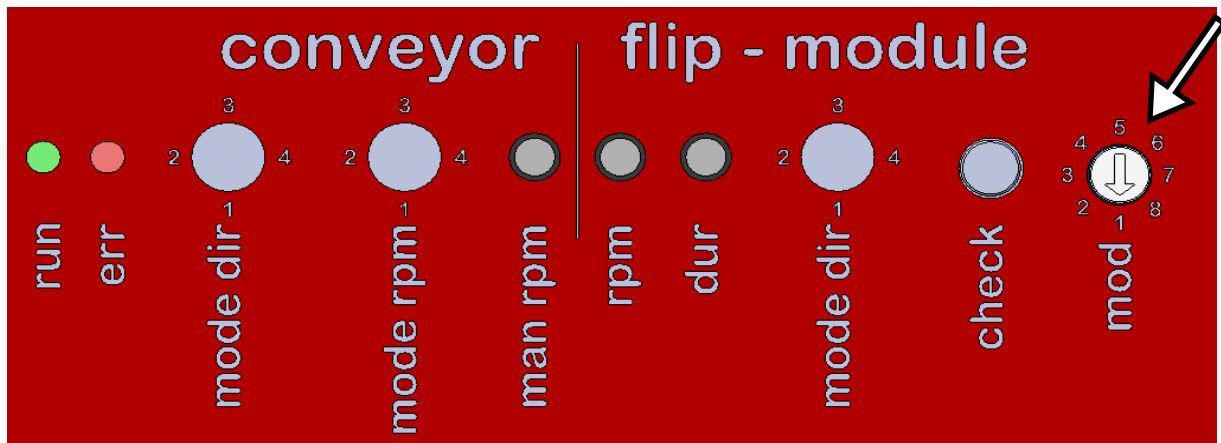
Switch position	Layout	Function
1		Opposite activation with inward rotating direction
2		Synchronous counterclockwise operation of the flip shafts
3		Opposite activation with outward rotating direction
4		Synchronous clockwise operation of the flip shafts



## 4.4 Flipping operating mode, "mod" rotary switch

The supported flip modes that are adjusted with the "mod" rotary switch are listed below.

Figure 64: Flip configuration mode



### Activated flipping:

The flipping is activated by a rising flank on the digital input UD\_Fon. Depending on the flip mode, the flip motors remain switched on for a specific duration (Mode 2,4-6) or as long as there is a high level at the digital input (Mode 3 and 7). Otherwise, the modes are 1 and 8. In these modes, the digital input UD\_Fon is ignored.

Table 6: Flip configuration selection options

Flip mode	Switch position	Description
<b>Off</b> (Afac test mode)	1	Test program for diagnosis See 4.4.1 Afag test mode.
<b>Flip duration</b> Analog U <sub>A_Fdur</sub> <b>Flip speed</b> Analog U <sub>A_Fsp</sub>	2	Rising flank at U <sub>D_Fon</sub> starts the flipping process. If an additional rising flank is recognized, the flip duration starts from beginning.
<b>Flip duration</b> not active <b>Flip speed</b> Analog U <sub>A_Fsp</sub>	3	U <sub>D_Fon</sub> directly controls the flipping process High level: Flipping active Low level: Flipping switched off
<b>Flip duration</b> Analog U <sub>A_Fdur</sub> <b>Flipping speed</b> Manual (PT1)	4	Rising flank at U <sub>D_Fon</sub> starts the flipping process. If an additional rising flank is recognized, the flip duration starts from beginning.
<b>Flip duration</b> Manual (PT1) <b>Flip speed</b> Analog U <sub>A_Fsp</sub>	5	Rising flank at U <sub>D_Fon</sub> starts the flipping process. The flipping process is ended automatically after the flip duration expires. If an additional rising flank is recognized, the flip duration starts from beginning. There is no reaction to the "check" button.

<b>Flip duration</b> Manual (PT1) <b>Flipping speed</b> Manual (PT1)	6	Rising flank at $U_{D\_Fon}$ or the "check" button starts the flipping process. The flipping process is ended automatically after the flip duration expires. If an additional rising flank is recognized, the flip duration starts from beginning.
<b>Flip duration</b> not active <b>Flipping speed</b> Manual (PT1)	7	$U_{D\_Fon}$ or the "check" button directly control the flipping process <b>High level:</b> Flipping active <b>Low level:</b> Flipping switched off
<b>Permanent flipping operation</b> ( <b>Flipping speed</b> Manual (PT1))	8	Permanent flipping operation with the speed adjustment via the flipping speed potentiometer


#### 4.4.1 Afag test mode

The Afag test mode is intended for checking the toothed belt tension of the flipper shafts. This check must only be started with the belt disassembled, because the flipper must move freely during the check. The minimum current required to move the respective flipper is evaluated. If one of the two flipper motors requires too much current, or the current deviates too much from the motor current of the second motor, it is displayed as an error.

##### Sequence of test mode

1. Select Mode 1
2. Press the "check" button 6x
3. LEDs blink
4. Start counterclockwise test
5. LEDs blink
6. Start clockwise test
7. End test
8. Green LED blinks

The red LED blinks in case of an error  
In order to end the mode, press the button 6x again.

NOTICE	
	<p><b>This check must <u>only be started with the belt disassembled</u>, because the flipper must move freely during the check.</b></p>

## 5 Control profiles

The combination of rotary switches described in the previous chapter indicates the different control profiles. One of these profiles should be selected depending on the required flexibility and available control options.

### 5.1 Profiles for belt control

#### 5.1.1 Belt direction and speed via an analog input

In order to control the belt direction and belt speed with input  $U_{A\_Csp}$ , the direction selection and belt speed switches must be turned to position 4. Now the belt can be stopped from turning clockwise or counterclockwise via the supplied voltage can be stops. The belt drive stops with a voltage of 5V. Reduction of the voltage turns the belt clockwise; if it is increased, the belt turns clockwise. There is a limit zone of  $\pm 0.4V$  in the range of 5V, which prevents an erroneous start-up of the belt. The greater the supplied value deviates from the stop value 5V, the greater the belt speed.

#### NOTICE



**The supply voltage in this mode should only be activated if 5V is connected at  $U_{A\_Csp}$ , otherwise the belt begins to run clockwise at maximum speed.**

#### 5.1.2 Belt direction and belt start via a digital input, manual belt speed

For this mode, the belt direction selector switch is moved to 2 and the belt speed selector switch is moved to 1. With this setting, the belt speed is defined with the belt speed potentiometer. This speed is used for clockwise and anticlockwise operation. Now the belt travel direction can be controlled via the digital input  $U_{D\_Cdir}$  (0V clockwise | 24V counterclockwise). As long as there is a high signal (24V) at  $U_{D\_Con}$ , the belt operation is started.

#### NOTICE



**If the input  $U_{D\_Cdir}$  does not have a fixed level (open end), the belt runs counterclockwise.**

#### 5.1.3 Belt direction and belt start via a digital input, analog belt speed control

For this mode, the belt direction selector switch is moved to 2 and the belt speed selector switch is moved to 2. In this setting mode, the belt travel direction is adjusted with the digital input  $U_{D\_Cdir}$  (0V[GND] counterclockwise | 24V clockwise). With a

change from a level of 0V to a voltage value (depending on selection of the desired belt speed) at  $U_{A\_Csp}$ , the belt is started.

## NOTICE



**If the input  $U_{D\_Cdir}$  does not have a fixed level (open end), the belt runs counterclockwise.**

## 5.2 Profiles of the flipper control

### 5.2.1 Flipper directions

Selection of the flipper direction is made with the flip direction switch; this can have an influence of the separation of the bulk material for the respective material and selected speed.

### 5.2.2 Profiles of the flipper modes

#### **Define flip duration and flip speed manually mode.**

In order to manually define the flip duration and speed, the flip mode switch (mod) is set to 6. In doing so, it is possible to adjust the flip duration and speed via the respective potentiometer. An increase of the respective value is achieved by turning the screw head clockwise in both potentiometers. With activation of the input  $U_{D\_Fon}$ , the flipping process is started. The process ends after the expiration of the adjusted time. If an additional change of the signal  $U_{D\_Fon}$  from Low to High takes place during the flipping process, the flip duration is restarted. End positioning is carried out after the time has expired if there is a High signal at  $U_{DO\_rdy}$  to signal that the belt is ready to flip again.

#### **Define flip duration manually and flipping speed dynamically mode**

In order to define the flip duration manually, but define the flipping speed dynamically via the analogue input  $U_{A\_Fsp}$ , the flip mode switch (mod) is set to 5. Now it is possible to adjust the flip duration via potentiometer and to change the flipping speed dynamically via the input  $A\_Fsp$  both before activation of the flipping process and during the rotational movement. With activation of the input  $U_{D\_Fon}$ , the flipping process is started. The process ends after the expiration of the adjusted time. If an additional change of the signal  $U_{D\_Fon}$  from Low to High takes place during the flipping process, the flip duration is restarted. End positioning is carried out after the time has expired if there is a High signal at  $U_{DO\_rdy}$  to signal that the belt is ready to flip again.

#### **Define flip duration dynamically and flip speed manually mode**

In order to define the flipping speed manually, but define the flip duration dynamically via the analogue input  $U_{A\_Fsp}$ , the flip mode switch (mod) is set to 4. Now it is possible to adjust the flipping speed via potentiometer and to change the flip duration dynamically via the input  $U_{A\_Fdur}$  before activation of the flipping process. With activation of the input  $U_{D\_Fon}$ , the flipping process is started. The process ends after the expiration of the adjusted time. If an additional change of the signal  $U_{D\_Fon}$  from Low to High takes place during the flipping process, the currently adjusted flip duration is restarted. End

positioning is carried out after the time has expired if there is a High signal at  $U_{DO\_rdy}$  to signal that the belt is ready to flip again.

### **Define flip duration and flipping speed dynamically mode**

In order to define the flipping speed and flip duration manually, but define the flip duration dynamically via the analogue inputs  $U_{A\_Fdur}$  and  $U_{A\_Fsp}$  the flip mode switch (mod) is set to 2. Now it is possible to adjust the flipping speed via  $U_{A\_Fsp}$  at any time and the flip duration via  $U_{A\_Fdur}$  before actuation of the flipping process. With activation of the input  $U_{D\_Fon}$ , the flipping process is started. The process ends after the expiration of the adjusted time. If an additional change of the signal  $U_{D\_Fon}$  from Low to High takes place during the flipping process, the currently adjusted flip duration is restarted. End positioning is carried out after the time has expired if there is a High signal at  $U_{DO\_rdy}$  in order to signal that the belt is ready to flip again.

### **Define flipping speed dynamically and flip duration according to signal length mode**

In order to define the flipping speed dynamically and to control the duration of the flip pulse according to the input signal, the flip mode switch is set to 3. Now it is possible to adjust the flipping speed via  $U_{A\_Fsp}$  at any time and to control the duration of the flipping with the presence of the signal at  $U_{D\_Fon}$ . After the signal has switched from High to Low, end positioning is carried out; when this is completed, a High signal is sent to  $U_{DO\_rdy}$  to signal that the belt is ready to flip again.

### **Define flipping speed manually and flip duration according to signal length mode**

In order to define the flipping speed manually and to control the duration of the flip pulse according to the input signal, the flip mode switch is set to 7. Now it is possible to adjust the flipping speed via potentiometer and to control the duration of the flipping with the presence of the signal at  $U_{D\_Fon}$ . After the signal has switched from High to Low, end positioning is carried out; when this is completed, a High signal is sent to  $U_{DO\_rdy}$  to signal that the belt is ready to flip again.

### **Continuous flipping mode**

If mode 8 is selected, flipping takes place continuously with the speed adjusted via potentiometer. The flipping direction can vary during the flipping.

## 6 LED displays

The LED status of the control modules must be checked in case of an error. A list of possible messages is provided below

Figure	Legend
	LED on
	LED off
	LED blinking

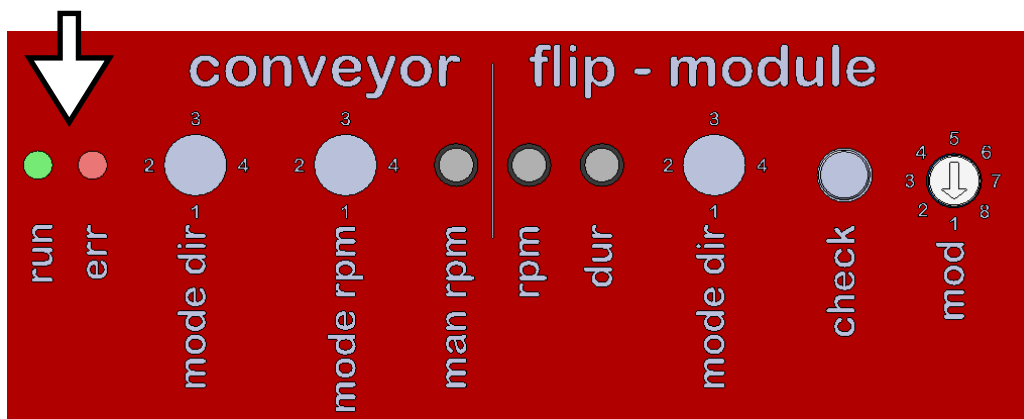












Table 7: Flipband LED display

run	err	Message
		IO
		Error occurred during operation
		Initialization
		Afag test mode
		Off

## 7 Error output

Overload errors of the belt motor or the flip motor's are shown by high frequency blink of the error LED and the digital error output.

Unexpected errors or an active referencing are shown by permanent switched on error LED and digital error output.

### 7.1 Error Acknowledgement

The Button "check" or the digital input  $U_{D\_AckErr}$  are used to acknowledge an error. The Acknowledgement pulse must be present for at least 100ms. The rising and the falling edge of the Acknowledgement pulse is prompted.

## 8 Maintenance instructions

NOTICE	
	<p>The flip belt is designed to be maintenance-free.</p> <p>However, if repairs or maintenance work are necessary, please contact the manufacturer of the Flipband.</p>

## 9 Ordering address:

### Germany:

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## 10 Disposal

Devices that are no longer used should not be disposed of as a complete unit. They should be dismantled and the parts should be sorted according to material type and recycled. Non-recyclable components must be disposed of correctly according to the type of component.

