

Operating Instructions  
for Belt Drive Controller

EBF-05

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## Declaration of Conformity

According to the Low-Voltage Directive 2014/35/EU  
and Electromagnetic Compatibility Directive 2014/30/EU

We hereby declare that the product meets the following requirements:

Low-Voltage Directive 2014/35/EU  
Electromagnetic Compatibility Directive 2014/30/EU

Applied harmonised standards:           DIN EN 60204 T1  
  EN 61439-1

Remarks:

Rhein-Nadel-Automation  
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## 1. About this document



### Attention

Read this document carefully and observe the safety directives before commencing any work.

### Document description:

This document provides assistance in choosing your product. You will also find information on mechanical and electrical installation, operation, product extensions and accessories.

Non-observance may cause trouble with the product or the environment, reduce the product lifetime or lead to other damage.

## 2. Safety Information

### 2.1. Design of safety directives



### Notice

This symbol identifies useful tips for use of the controller.



### Attention!

This symbol identifies hazardous situations.

Non-observance of such warnings may cause irreversible injury or even death!

### 2.2. Fundamental safety directives

Non-observance of the following fundamental safety measures and directives may lead to severe injury and damage to property!

Meeting the requirements given in the related documentation is a precondition for safe and trouble-free operation and for achieving the product properties specified. Further additional safety directives in the other sections must be observed as well.

### 2.3. Personnel



### Attention!

Any work on electrical equipment of the machine/system shall be carried out exclusively by a professional electrician, or by instructed persons working under the direction and supervision of a professional electrician, according to electrotechnical rules.

Only qualified professionals are allowed to work on or with the product. IEC 60364 or CENELEC HD 384 define the qualification of these persons:

- They are familiar with set-up, installation, commissioning and operation of the product.
- They possess the qualification required for performance of their work.
- They know all regulations for the prevention of accidents, directives and laws applicable to set-up, installation and commissioning on site, and they are able to apply the same.
- They have knowledge and skills of First Aid.

## 2.4. Intended use

Please observe the following directives for intended use of the controllers:

- The devices herein described must only be stored, fitted and operated under the conditions specified in this documentation.
- Here you are not concerned with domestic devices! They are solely intended to be used as components for commercial or professional applications pursuant to EN 61000-3-2.
- They satisfy the protection requirements of 2014/35/EU: Low Voltage Directive.
- They do not constitute a machine as defined by 2006/42/EU: Machinery Directive.
- A machine comprising the product must not be commissioned or put into operation for the intended use until it has been declared to be in conformity with the EC Directive 2006/42/EU: Machinery Directive; Observe EN 60204-1.
- Commissioning or starting operation for the intended use is only permitted in compliance with the EMC Directive 2014/30/EU.
- Use of the product in living areas may lead to EMC disturbance. The user is responsible for taking interference suppression measures.
- They are optimised for operation of RNA belt feeders, hoppers and incline conveyors. Observe the limits indicated in the technical specification.

### Attention!



- Prior to start-up make sure that the protective earth conductor is connected and in proper condition. Make the PE conductor test with approved test devices only.
- Never start up despite detected damage.
- Do not make any technical modifications to the device, except as described in this document.
- Never start up in an incompletely installed state.
- Never operate the device without the required guards in place.
- Connect, disconnect or change any electrical connections only in the absence of voltage.

## 2.5. Residual hazards

Residual hazards may remain even if all directives have been observed and protective measures taken. Such residual hazards must be considered by the user in the risk assessment of his machine/equipment. Non-observance may lead to severe injury and damage to property!

### 2.5.1. Device

Pay attention to the warning signs fitted to the device!

Symbol	Description
	<b>Hazardous voltage:</b> Prior to commencing any work on the product check for absence of voltage on all power connections.
	<b>Leakage current:</b> Make fixed installation and PE connection according to EN 60204-1!



### Attention

Before opening the controller, pull the mains plug and wait for 15 minutes, allowing the DC link circuit capacitors to discharge down to a safe voltage level.

### 2.5.2. Protection of the drive system

Certain device parameter settings may cause overheating of the connected motor, e.g., due to prolonged operation with the wrong nominal current setting, or the frequency set too low.

### 2.5.3. Degree of protection - Protection of persons and equipment

- All specifications relate to installed condition ready for operation.
- All slots not used must be closed by protection caps or dummy plugs in order not to reduce the protection against accidental contact.

## 3. Product information

### 3.1. Characteristic features

The compact controller is designed for operation of RNA belt feeders, hoppers, incline conveyors and step feeders driven by three-phase motors.

The unit offers the following characteristic features:

- Motor connection for 0.18KW, 0.37KW or 0.75KW motors, depending on system configuration, variable
- Frequency range for  
Ruhrgetriebe motors: 17Hz up to 85Hz  
Rotek motors: 12Hz bis 60Hz  
For third party manufacturers: Observe manufacturer's specifications for minimal and maximal frequency/speed
- Adjustable speed via front panel potentiometer
- Enabling input (external start/stop)
- Relay output for status message (fault)
- Bipolar main disconnect switch.

### 3.2. EC conformity

The controller is compliant with the following standards:

**EC EMC Directive 2014/35/EU**  
**EC Low-Voltage Directive 2014/30/EU**

Applied harmonised standards:

**DIN EN 60204, part 1**  
**EN 61439-1**

### 3.3. Technical data EBF05

<b>Mains voltage:</b>	230 Volt AC +10% / -15% 50/60 Hz
<b>Output voltage:</b>	3 x 0-230 Volt AC at 230V mains voltage
<b>Inverter 180W</b>	
<b>Motor rating:</b>	180W
<b>Nominal inverter current (output):</b>	1.4A
<b>Max. mains current:</b>	2.8A
<b>370W inverter</b>	
<b>Motor rating:</b>	370W
<b>Nominal inverter current (output):</b>	2.4A
<b>Max. mains current:</b>	4.9A
<b>750W inverter</b>	
<b>Motor rating:</b>	750W
<b>Nominal inverter current (output):</b>	4.2A
<b>Max. mains current:</b>	8.5A
<b>Output frequency</b>	For Ruhrgetriebe motors: 17 - 85Hz For Rotek motors: 12 - 60Hz
<b>Speed setpoint</b>	Potentiometer 10kΩ
<b>Enabling input:</b>	Floating contact or 24VDC
<b>Status output (fault):</b>	Relay (max. 6A 250VAC) 1 floating contact
<b>Dimensions (WxHxD)</b>	150 x 205 x 180
<b>Ambient temperature:</b>	0 ... 50° C
<b>Cooling:</b>	free convection
<b>Mounting:</b>	Vertical, vibration-free
<b>Degree of protection:</b>	IP54
<b>180W inverter min. circuit breaker:</b>	6A
<b>370W inverter min. circuit breaker:</b>	10A
<b>750W inverter min. circuit breaker:</b>	10A
<b>Leakage current:</b>	>3.5mA

## 4. Notes on start-up

### Attention:

Make sure that following points are checked prior to making connection to power supply and switching on the controller:



- Is the controller casing properly closed with all screws tightened?
- Are all cables and glands in proper condition?
- Is operation for the INTENDED USE made sure?
- Does the supply voltage specified on the controller match the local supply system?
- Are the parameters matching the connected motor correctly set at the controller?
- Is sufficient cooling of the controller ensured?
- Is the controller mounting vibration-free?

Only if you can clearly answer all the above questions with "Yes" should the controller be put into operation.

### Attention:

Set the controller to minimum speed before switching-on for commissioning or start-up after repairs or replacement of controllers/motors. Then check for proper operation while the speed is increased.



### Attention:

After the controller is connected to the mains and power is switched on, the conveyor belt starts to run. A restart inhibit after power failure is not intended for these controllers.



### Attention:

The connecting cable between controller and motor must be shielded and the shield must be connected to the protective earth conductor.



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**The maximum cable length is 2 metres.**

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#### 4.1. Factory settings

The controller is programmed to process the setpoint from a potentiometer.

If a controller is delivered together with a belt conveyor, the operating parameters for this belt conveyor are already programmed.

If the data of the drive motor are unknown, the following setting is made.

- Minimal frequency 17Hz;
- Maximal frequency 85Hz;
- Current limiting 0 A;
- Start/stop ramp 1 sec. each

**These parameters must be adapted in accordance with the motor used.**



#### **Attention!**

To set the parameters you must open the device: be sure to observe the safety directives in chapter 2

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For further information on parametrization, see operating instructions of variable frequency drive units (inverters).

The variable frequency drive units installed are from Schneider Electric:

ATV12H018M2 (180W inverter)

ATV12P037M2 (370W inverter)

ATV12P075M2 (750W inverter)

#### 4.2. Standard programming of variable frequency drive units in EBF 05

Standard programming of variable frequency drive units in EBF05 applies to a mains voltage of 230V and a mains frequency of 50 or 60Hz. The three-phase motors must be connectable to 3x230V/50Hz. Standard motors for 3x230/400V must therefore be connected in delta and the corresponding current in delta connection must be considered.

Values for motor rating and nominal motor current for the motors most frequently used by RNA:

Manufacturer Company	Motor type	Nominal rating	Nominal voltage	Nominal current	Nominal frequency	Inverter size
Rotek	84.X-S7.H-IKTX various gearboxes	85W	3x230/400V	0.35/0.2A	50Hz	180W
Ruhrgetriebe	Various	90W	3x230/400V	0.64/0.37A	50Hz	180W
	Various	120W	3x230/400V	0.66/0.35A	50Hz	180W
	Various	180W	3x230/400V	1.05/0.6A	50Hz	180W
	Various	370W	3x230/400V	1.75/1.0A	50Hz	370W
	Various	550W	3x230/400V	2.8/1.6A	50Hz	750W
	Various	750W	3x230/400V	3.5/2.0A	50Hz	750W

**Always observe the indications on the motor terminal board.**

**Adapted parameters for the use of RNA standard motors.**

**All other parameters keep their factory settings.**

**Motor rating and nominal motor current according to rating plate of motor.**



Parameters	Meaning Setting range	Setting value
bfr	Standard motor frequency according to rating plate	50 Hz
tFr	Max. output frequency	85Hz for Ruhrgetriebe motors: 60Hz for Rotek motors:
ACC	Run-up time	1 sec
dEC	Run-down time	1 sec
LSP	Low frequency (Setting range 0.0 - HSP)	17Hz for Ruhrgetriebe motors: 12Hz for Rotek motors:
HSP	High speed (Setting range LSP - tFr)	85Hz for Ruhrgetriebe motors: 60Hz for Rotek motors:
nPr	Motor rating according to rating plate 180W VFD: max. 180W 370W VFD: max. 370W 750W VFD: max. 750W	Depending on motor and inverter Setting to motor rating Be sure not to exceed the nominal power of the variable frequency drive unit.
nCr	Nominal motor current according to rating plate 180W VFD: max. 1.4A (setting range 0.35...2.1A) 370W VFD: max. 2.4A (setting range 0.6...3.6A) 750W VFD: max. 4.4A (setting range 1.0...6.3A)	Depending on motor and inverter Setting to nominal motor current. Be sure not to exceed the nominal current of the variable frequency drive unit.
tCC	Type of control	ACT - 2C (2 wire control)
tct	Logic 0 or 1 is considered for switching on or off	LEL
Atr	Automatic restart	nO
OPL	Loss of motor phase	nO

For further information on parametrization, see operating instructions of variable frequency drive units (inverters).



**Attention:**

If the variable frequency drive unit is not used with an RNA drive, the VFD unit is to be selected according to the motor rating.  
Take care to observe the right circuit of the motor (star or delta) and the corresponding voltage and current.  
Always observe the indications on the motor terminal board.  
Faulty connection may lead to damage to the motor and variable frequency drive.

### 4.3. Connection of external enabling signal and alarm relay

If the external enabling signal or the fault feedback is to be connected, a signal cable must be fed into the EBF05 and connected to the terminal block XK1.  
Remove the lateral blanking plug and replace it by a M12x1.5 cable gland.  
Make sure that the required protection rating (IP54) is maintained. Take care to ensure that the cable gland corresponds to at least protection class IP54 when installed. It is also mandatory to observe the required torques and cable diameters according to manufacturer specifications.



**Attention!**

You must open the device to connect enabling signal or fault message contact: be sure to observe the safety directives in chapter 2

## 4.4. External enabling signal

You can select one of the following options for external enabling:

### 4.4.1. Voltage signal:

This type of enabling should be preferred.

If a direct voltage between 16 and 30 V is present with the correct polarity the motor starts. The input is protected against polarity reversal.

Observe the following directives:

- Cable length max. 10m.
- Avoid cable routing in the immediate vicinity of high-energy switching devices or strong interference fields.

### 4.4.2. Floating contact:

If no 24 V signal is available, enabling is also possible via a floating contact. Closing of the contact enables the controller and starts the motor.

Observe the following directives:

- Cable length max. 5m.
- Use shielded cable for lengths of 3m and more.
- Avoid cable routing in the immediate vicinity of high-energy switching devices or strong interference fields.

Take care to remove the wire jumper between terminals 10 and 11 (if installed).

Use terminals 11 (+24V) and 12 (GND) to connect the external enabling voltage.

Use terminals 10 and 11 to connect the floating contact.

See also connection diagram EBF05.

## 4.5. Fault/status message

The contact of the fault message relay is closed when the variable frequency drive unit is connected to power and no fault is active. In case of a fault (or if the converter is not connected to power) the contact drops out.

The floating contact of the fault message relay is connected to terminals 8 and 9 of terminal block XK1.

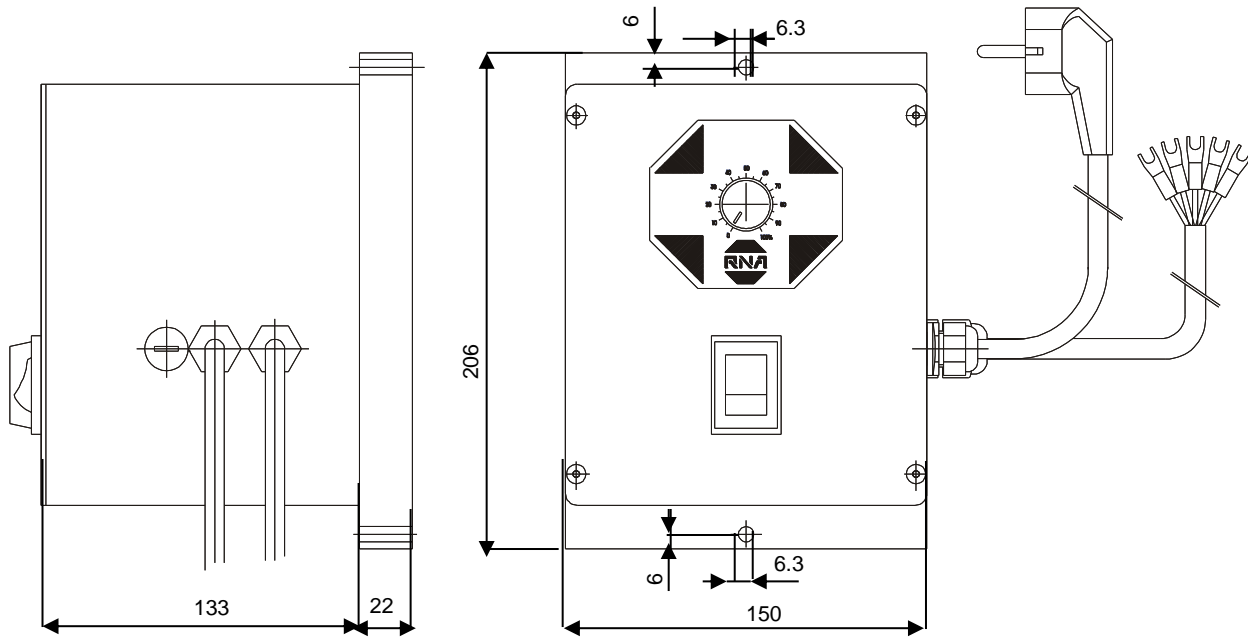
See also connection diagram EBF05.

## 4.6. Resetting faults

Reset a fault as follows:

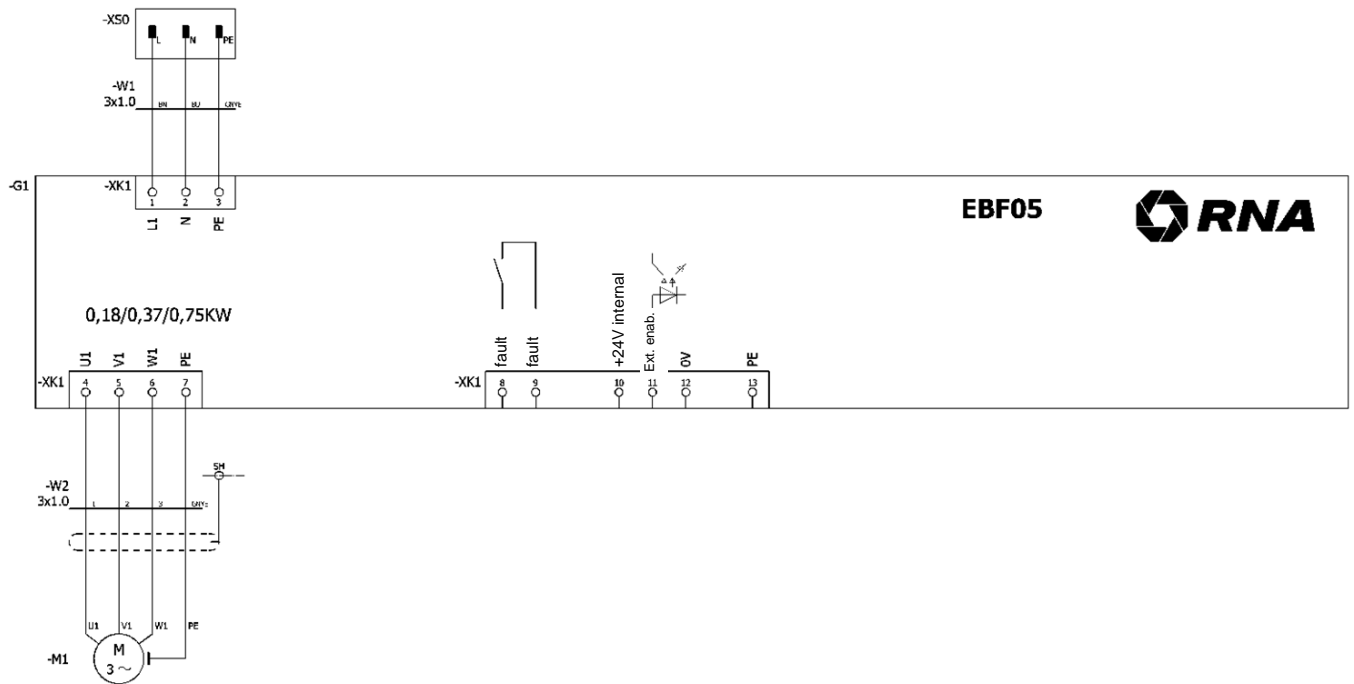
Switch off the inverter and wait until the indicator light extinguishes, then switch the inverter back on.

## 5. Dimensioned drawing



## 6. Connection diagram.

Mains connection 230V . 50/60Hz





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