

# COMBIVERT



Safety Stop in accordance with EN 954-1

# Table of Contents

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GB	1.2	Identification .....	3
	1.3	Functional Description „Safety Stop Category 3“ according to EN 954-1 .....	3
	1.4	Restrictions .....	3
	1.5	Principle Safety Stop .....	4
	2.	Safety Instructions.....	5
	2.1	Additional Installation Instructions.....	5
	2.2	Emergency Stop .....	5
	2.3	Restart after Error.....	5
	2.4	Error Behaviour .....	5

## 1. Supplement „Safety Stop“

### 1.1 Intended use

The following supplement describes the KEB COMBIVERT with the option „safety stop“. The supplement is only valid in connection with the unit specific instruction manual.

### 1.2 Identification

The variant „safety stop“ can be identified at the 6. digit of the part number.

xx.F5.xAx-xxxx bis xx.F5.xKx-xxxx

### 1.3 Functional Description „Safety Stop Category 3“ according to EN 954-1

With the function "safety stop" one of the following conditions must be fulfilled:

- the power supply to the drive must be interrupted (double security).
- no torque at the drive

The KEB COMBIVERT fulfills the condition no torque with a safe disconnection for the phase sequence formation necessary driver signals of the power modules (IGBT). No voltage disconnection takes place .

This is guaranteed by a two-channel processing holding signal. On of the two channels is developed in programmed electronics. The second channel consists of an electro-mechanical relay. The function of the relay is cyclically monitored by programmed electronics.

**Through the safety no further measure is needed for the KEB COMBIVERT (e.g. feedback via relay contact) since an individual error in the control does not lead to the loss of the stop function.**



This was checked and confirmed in the report No.: 01/YMA128910b of the TÜV north CERT GMBH.

### 1.4 Restrictions

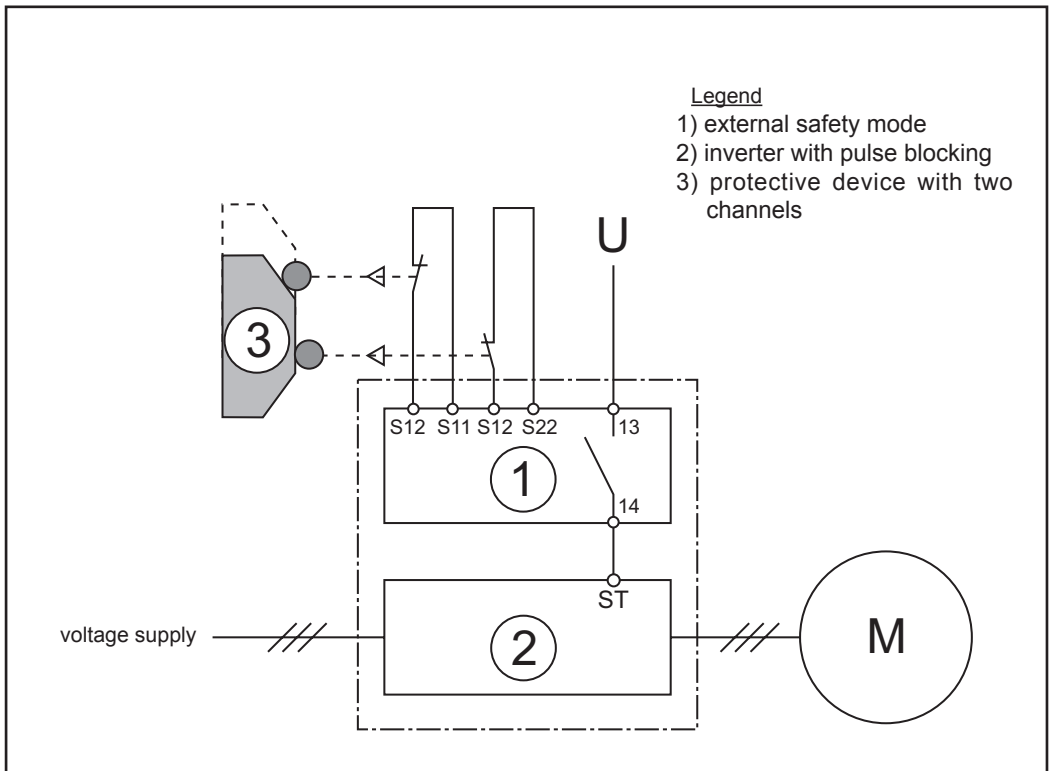
As a result of the design changes of the version "safety stop" the following restrictions or characteristics must be taken into consideration:

- the control of the KEB COMBIVERT F5 to the digital inputs occurs only with positive voltage (PNP logic).
- with fast switching applications a delay time of 20... 40 ms must be taken into consideration caused by the bounce time of the safety relay at the control release.
- input voltage 18...26VDC
- the rate of voltage rise and the voltage drop must be bigger than 10V/ms.
- the control release may not be used to clock the drive, because the lifetime is limited (theoretically 7 mill. circuits) and e.g. by clocking, tapping with a pushbutton the preset switching times cannot be observed, so the error message „E.dri“ is displayed.
- the control release shall only be used for a safety-relevant "standstill" of the drive, analog to switching of a line contactor. Other functions must be used for a switching off the modulation in standstill (reduction of the motor heating).
- the control release input is not protected against polarity reversal. In case of incorrectly connection of + and - at this input it comes to a defect at this input.
- the current input at control release input is approx. 20 mA at 24 V.
- error display „E.dri“, can only be reset by pressing „Power-On-Reset“ (error safety relay).

## 1.5 Principle Safety Stop

With this circuit the frequency inverter must be "save" in accordance to EN 954-1 categorie 3. That means the KEB COMBIVERT is internally equipped with a two-channel pulse blocking. At least two channels are And-linked for each protective device in the safety mode. If one condition is not fulfilled the supply of the control release is disconnected and the pulse blocking is active. A feedback must not occur in this combination.

*Principle „Safety Stop in categorie 3 without feedback“*



## 2. Safety Instructions

### 2.1 Additional Installation Instructions

The function „safety stop“ requires some characteristics at installation:

- during tripping of the function "safety stop" the engine runs out freely, i.e. no more torque at the engine axle. An auxiliary brake must be incorporated if it shall be guaranteed that the drive is fixed. This receives special attention to the operating mode raising/lowering.
- the cable to the control release (pulse blocking) must be secured against short-circuits or cross-circuits.
- the function of the safety circuits must be checked after installation by qualified personnel

### 2.2 Emergency Stop

The function „safety stop“ is no replacement for "emergency stop", because galvanic isolation is necessary for "emergency stop".

### 2.3 Restart after Error

The protection before restart after the error "E.dri" is realized by the KEB COMBIVERT. The KEB COMBIVERT can only be restarted by Power-On-Reset after error removal.

### 2.4 Error Behaviour

The KEB COMBIVERT contains dangerous voltages which can cause death or serious injury. All work at the unit shall be carried out after the power supply is switched off and a capacitor discharge time of min.5 minutes. The pulse blocking does not generate a galvanic separation.



The output terminals can be energized with voltage if the power modules of the frequency inverters are defective (despite pulse blocking). The engine can make a rest rotary motion of up to a half revolution.







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