

## Contents

<b>1. Symbols</b>	<b>3</b>
Purpose of the Manual	3
<b>2. Safety</b>	<b>5</b>
High Voltage Warning	5
Safety Regulations	5
Warning against Unintended Start	5
General Warning	5
<b>3. Installation</b>	<b>7</b>
Mechanical Installation	7
Electrical Installation	7
Connection Diagram, Power Section	7
Connection of Terminals	8
Control Section	8
Status And Alarm Messages	9
Status Display	9
Reset After A Fault	9
Standard Connection Control Terminals	9
EMC-correct Installation	10
Technical Data	11
<b>4. Connection Examples</b>	<b>13</b>
One direction of rotation with analogue reference (voltage) and reset via mains cut off	13
One direction of rotation with analogue reference (voltage) and reset via terminal	13
2 RPM values + 2 directions of rotation	14
Motor Potentiometer	15
Profibus	15
<b>5. Accessories</b>	<b>17</b>
Reference Potentiometer	17
PC Software - MCT 10	17
Control panel (LCP 2)	18
Plug Kit	19
Remote Mounting Kit	20
Local Operation Panel (LOP)	21
Service Plug Kit	22
Brake Control	22
<b>6. Parameter List</b>	<b>25</b>

Operation and Display	25
Load and Motor	25
References and Limits	26
Inputs and Outputs	26
Special Functions	27
Serial Communication	28
Technical Functions	29

# 1. Symbols

1

## 1.1.1. Purpose of the Manual

These Operating Instructions include safety regulations and are intended as a user's guide to ensure quick installation and commissioning of Eta-K motors. A detailed description of all parameters and the telegram format of the serial interface can be seen from the Design Guide.

## 1.1.2. Symbols

When reading these Operating Instructions, you will come across different symbols that require special attention. The symbols used are the following.

**NB!**

Indicates something to be noted by the reader.



Indicates a general warning.



Indicates a high-voltage warning.

\*

Indicates default setting



## 2. Safety

2

### 2.1.1. High Voltage Warning



The voltage of the Eta-K is dangerous whenever the equipment is connected to the mains. Incorrect installation may cause equipment failure, serious personal injury or even death. Consequently, the instructions in this manual, as well as applicable national and international rules and safety regulations, must be complied with. Touching the electrical parts may be fatal - even after the equipment has been disconnected from mains. Wait at least 4 minutes.

- The installation must be properly protected and isolated.
- All covers must be in place.



#### NB!

The user or the electrician installing the equipment is responsible for ensuring that proper earthing and protection of the unit are carried out in accordance with applicable national and local regulations and standards.

### 2.1.2. Safety Regulations

1. The Eta-K must be disconnected from mains if repair work is to be carried out. Check that the mains supply has been disconnected and that the necessary time (4 minutes) has passed.
2. It is to be ensured that, in accordance with local and national regulations, correct earthing of the equipment is established, the user is protected against supply voltage, and the ETA-K is protected against overload.  
RFI-switch, protective multiple earthing or normal earthing can be used as extra protection, taking into account any applicable, local safety regulations.  
In the case of an earthing fault, a DC voltage content may develop in the fault current. If RFI-switches are used, local regulations must be complied with. The relays used must be suitable for protection of three-phase AC units with bridge rectifier and for a short discharge upon power-up.
3. The earth leakage current is higher than 3.5 mA. Consequently, a permanent installation and extra protective earthing are required for the Eta-K.

### 2.1.3. Warning against Unintended Start

1. The motor can be brought to a stop by means of a digital command, a bus command or a setpoint, even if the Eta-K is still connected to mains.  
If, however, personal safety considerations make it necessary to ensure that no unintended start occurs, these stop functions are not sufficient.
2. During programming of the Eta-K, the motor may start without warning.
3. A motor that has been stopped may start if the electronics of the Eta-K are defective, or if a temporary overload or a fault in the supply voltage ceases.

### 2.1.4. General Warning



Touching the electrical parts may be fatal - even after the equipment has been disconnected from mains. Wait at least 4 minutes.



**Installation at high altitudes:**

At altitudes above 2000 m, please contact Danfoss Drives regarding PELV.

# 3. Installation

## 3.1. Mechanical Installation

To avoid overheating of the frequency converter, it must be ensured that the ambient temperature does not exceed 40°C and the 24-hour average temperature does not exceed 35°C. If the ambient temperature is in the range of 40-55°C, only a reduced output load is available for continuous operation. See also the section on derating in the Design Guide.

If several Eta-K motors are installed close to each other, it is to be ensured that no recirculation of hot output air occurs.

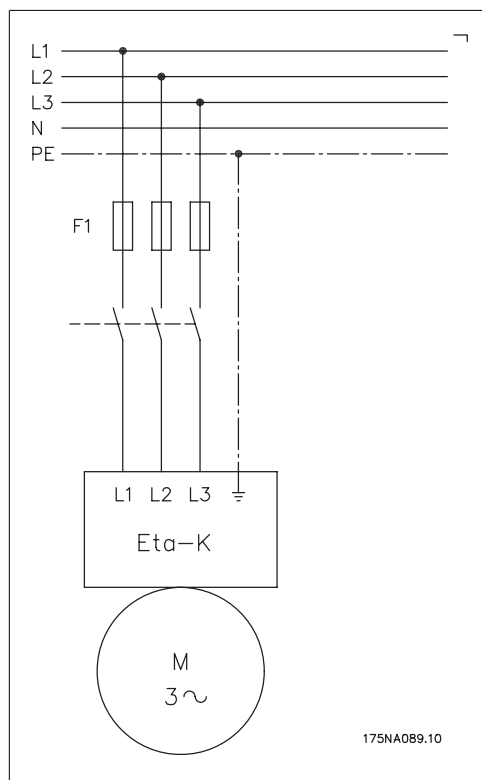
**3**

## 3.2. Electrical Installation

All terminals are located in the converter housing, which can be accessed by removing the cover fastened by four screws.

Remove the blind plug and feed the cable through the orifices. For correct cable and union sizes see Technical Data.


### 3.2.1. Connection Diagram, Power Section




Mains Connection:

Mains terminals	L1, L2 and L3
Mains voltage	3 x 380-480 V ± 10%, 50/60 Hz

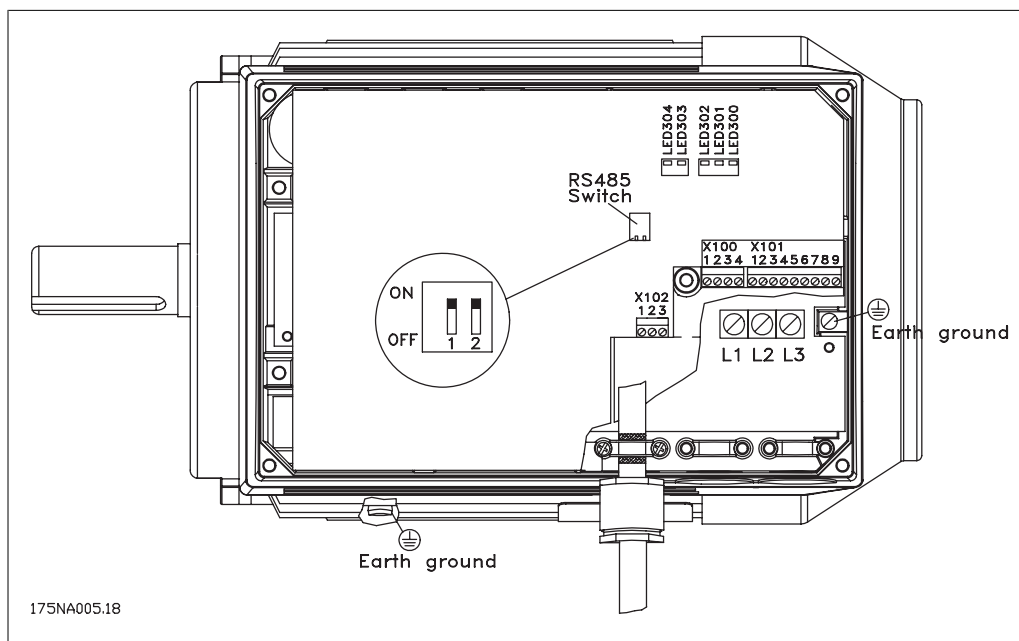
Connect the three mains phases to terminals L1, L2, and L3 and connect the earthing to the appropriate terminal.

**NB!**  
 Reversing the direction of rotation of the motor by switching two phases is not possible. The motor shaft turns clockwise as standard (forward).

**NB!**  
 Eta-K motors are suitable for operation on TT, TN and IT mains. Where the version with radio interference filter 1B (Domestic) is used, operation on TT and TN mains is possible.

3

### 3.2.2. Connection of Terminals



### 3.2.3. Control Section

Terminal No.	Function	Technical data
1	Analog current input	0-20 mA, $R_i$ approx. 300 $\Omega$
2	Analog voltage/digital input	0-10 V DC, $R_i$ approx. 10 k $\Omega$ / 0-24 V DC, $R_i$ approx. 2 k $\Omega$
3	Digital input	0-24 V DC, $R_i$ approx. 2 k $\Omega$
4	Digital input	< 5 V = logic "0"
5	Digital input	> 10 V = logic "1"
6	24 V DC supply for digital inputs	Max. 150 mA
7	10 V DC supply for potentiometer	Max. 15 mA
8	0 V DC for terminals 1-7 and 9	
9	Analog current/digital output	0-20 mA, max. 500 $\Omega$ / 0-24 V DC, max. 25 mA

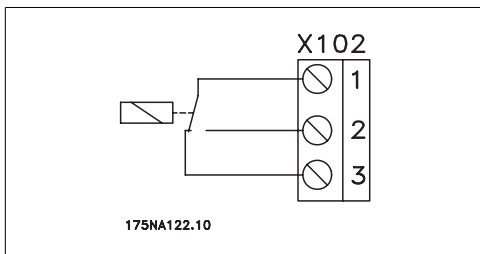
Table 3.1: X101: Terminal block for analog/digital control signals



Terminal No.	Function
1-2	Make (normally open)
1-3	Brake (normally closed)

Table 3.2: X102: Terminal block for relay output

See parameter 323 (relay output) for programming of relay output.



Terminal No.	Function	Description
1	P RS 485	For connection
2	N RS 485	to bus or PC
3	5 VDC	Supply for RS
4	0 VDC	485 bus

Table 3.3: Serial interface  
X100: Terminal block for data communication

If connection is established via the serial communication interface RS 485, the bus must be closed at both ends by a resistor network. This can be obtained by setting both of the RS 485 switches to ON. For a description of the PRO-FIBUS version, see Manual MG97LXYY.

### 3.3. Status And Alarm Messages

#### 3.3.1. Status Display

LED 300-304	Message
LED 300 (red)	Fault trip
LED 301 (yellow)	Warning
LED 302 (green)	Power on
LED 303-304	Communication

#### 3.3.2. Reset After A Fault

After correction of the fault the Eta-K must be reset by a signal to digital input (see 3.4 *Standard connection control terminals*) or by cutting off mains supply.

**NB!**  
Certain faults are causing a trip lock. In these cases the Eta-K only can be reset by cutting off mains supply.

### 3.4. Standard Connection Control Terminals

Eta-Ks have their parameters set in the factory, as shown in the connection diagram for operation in 2 directions of rotation with analogue reference by a voltage value of 0 to 10 V and reset after a fault via an external signal or by cutting off mains supply. To change these settings, use the optional control panel LCP2 or a PC with MCT 10 software (see 5. *Accessories*).

3

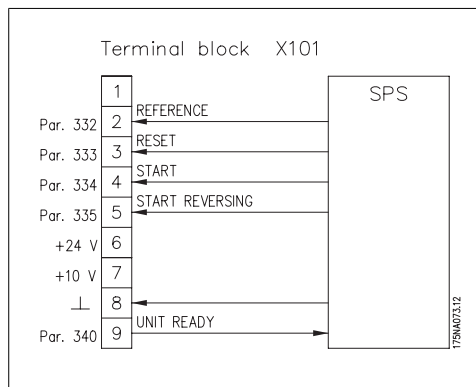
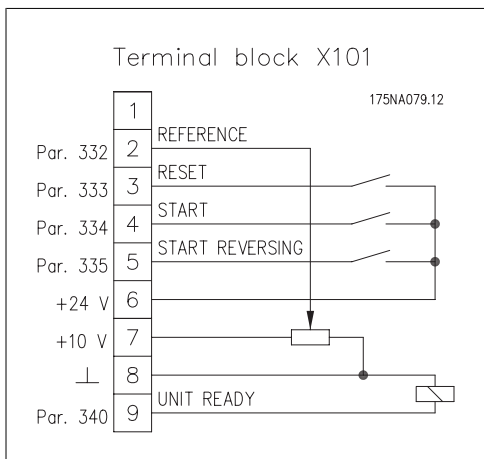


Illustration 3.2: Control signals from SPS

Illustration 3.1: The value of an external potentiometer for the reference must be between 1 kOhm and 5 kOhm.

Par. No.	Value	Comment
200	132 Hz BOTH DIRECT.	Allows operation in both directions of rotation
331	NO OPERATION	
332	REFERENCE	0 .. 10VDC
333	RESET	Short signal resets converter after fault trip back to ready mode
334	START	Logic "1" Terminal 4 Right rotation
335	START REVERSING	Logic "1" Terminal 5 Left rotation
340	UNIT READY	Eta-K ready (no fault) Output 24V DC
405	RESET AT POWER-UP	Automatic reset after fault trip at switching on mains supply

### 3.5. EMC-correct Installation

To obtain EMC-correct electrical installation, the control cables must be screened/armoured. The screen/armour is to be earthed at both ends. Avoid installation with twisted screen ends (so-called pigtailed), as this reduces the screening/armouring effect at high frequencies. Use cable clamps instead.

### 3.6. Technical Data

Eta-K type		K305	K307	K311	K315	K322	K330	K340	K355	K375
<b>Output</b>										
Output voltage	V	3 x 0 ... U <sub>MAINS</sub>								
Output frequency	Hz	0 ... 132								
Ramp times, adjustable	s	0.15 - 3600								
<b>Input</b>										
Supply voltage	V	3 x 380 ... 480 +/- 10%								
Input current at 380 V	A	1.4	1.7	2.5	3.3	4.7	6.4	8.0	11.0	15.5
Input current at 480 V	A	1.1	1.3	2.0	2.6	3.7	5.1	6.3	8.7	12.3
Supply frequency	Hz	50/60								
Max. mains cable cross-section	mm <sup>2</sup>	4.0	4.0	4.0	4.0	4.0	4.0	4.0	10	10
Max. control cable cross-section	mm <sup>2</sup>	1.5								
Max. cable cross-section for serial interface	mm <sup>2</sup>	1.5								
Max. prefuse	UL <sup>1)</sup> [A]	10	10	10	10	10	15	15	25	25
Max. prefuse	IEC <sup>1)</sup> [A]	25	25	25	25	25	25	25	25	25
Power factor / cos phi		max. 0.9 / 1.0 at rated load								
Switching on supply input	Nos./2 min.	approx. 1								
Enclosure		IP 65								
Ambient temperature range	°C	(-10)...0 to +40 (24-hour average max. +35) for operation / -25 to +65/70 for storage/transport								
Relative humidity	%	max. 95 (IEC 68-2-3) for storage/transport/operation								
Vibration test (IEC 68)	g	1								
Gland sizes		3 x M20x1.5							1x M25x1.5, 2x M20x1.5	

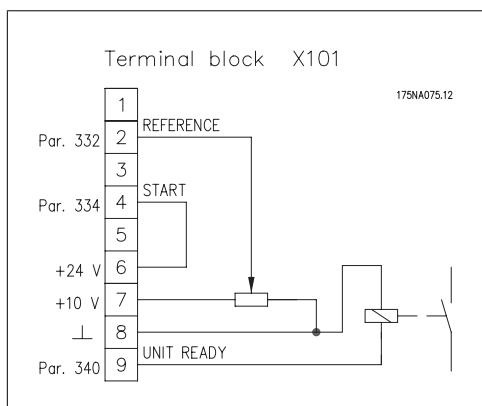
<sup>1)</sup>Type gG prefuses must be used. If you want to maintain UL/cUL you must use prefuses of the type Bussmann KTS-R 500 V or Ferraz Shawmut, ATMR Class C (max. 30A). The fuses must be placed for protection in a circuit that is capable of supplying a maximum of 100,000 amps RMS (symmetrical), 500 V maximum.



## 4. Connection Examples

### 4.1.1. One direction of rotation with analogue reference (voltage) and reset via mains cut off

The direction of rotation of the motor can be changed by changing the start signal from terminal 4 (motor shaft right rotation) to terminal 5 (motor shaft left rotation) or by re-programming Parameter 334 to "START REVERSING"



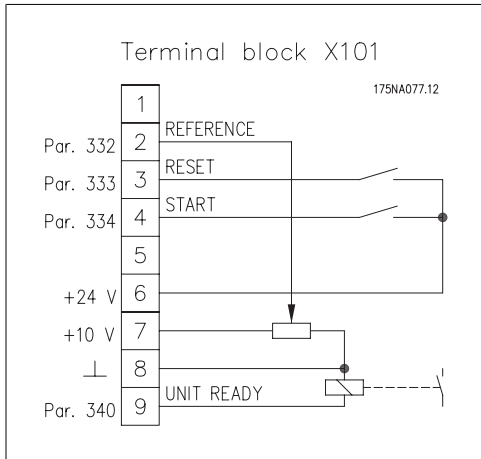
Par. No.	Value	Comment
331	NO OPERATION	
332	REFERENCE	
333	NO OPERATION	
334	START	
335	START REVERSING	
340	UNIT READY	Eta-K ready
405	RESET AT POWER UP	Automatic reset

In combination with the reference potentiometer (see 5.1.1), this connection variant is recommended as a replacement for mechanical adjustable gear motors. The motor is stopped by the supply of a reference of 0 or mains off.

### 4.1.2. One direction of rotation with analogue reference (voltage) and reset via terminal

The direction of rotation of the motor can be changed by changing the start signal from terminal 4 (motor shaft right rotation) to terminal 5 (motor shaft left rotation) or by re-programming Parameter 334 to "START REVERSING".

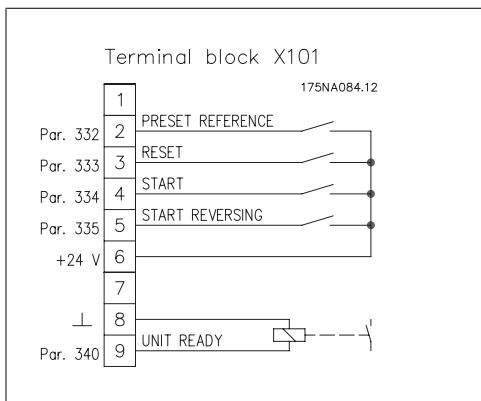
4



Par. No.	Value	Comment
331	NO OPERATION	
332	REFERENCE	
333	RESET	
334	START	
335	NO OPERATION	
340	UNIT READY	
405	MANUAL RESET	Manual reset via terminal

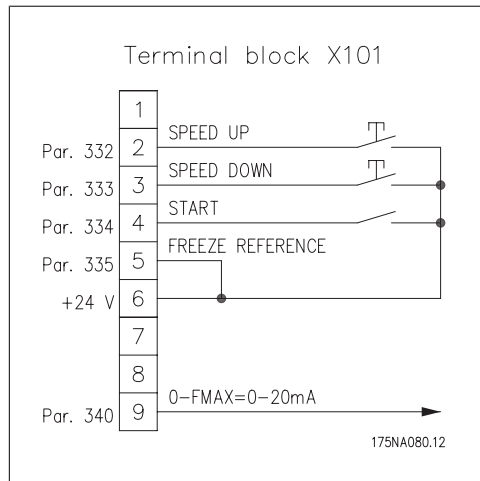
### 4.1.3. 2 RPM values + 2 directions of rotation

Right rotation or left rotation of the motor is obtained by a signal to terminal 4 or 5. With this connection variant, the drive can be used as a replacement for change pole motors.



Par. No.	Value	Comment
331	NO OPERATION	
332	PRESET REFERENCE	Logic "0" corresponds to preset reference 1 (par. 215) Logic "1" corresponds to preset reference 2 (par. 216)
333	RESET	
334	START	
335	START REVERSING	
340	UNIT READY	

### 4.2.1. Motor Potentiometer



4

Par. No.	Value	Comment
331	NO OPERATION	
332	SPEED UP	A voltage pulse of min. 20ms and pause of min. 20ms will lead to a RPM change of 0.1%
333	SPEED DOWN	
334	START	
335	FREEZE REFERENCE	The current reference is stored
340	0-FMAX = 0-20 mA	Output of an electrical signal proportional to the current frequency
405	RESET AT POWER UP	

### 4.3.1. Profibus

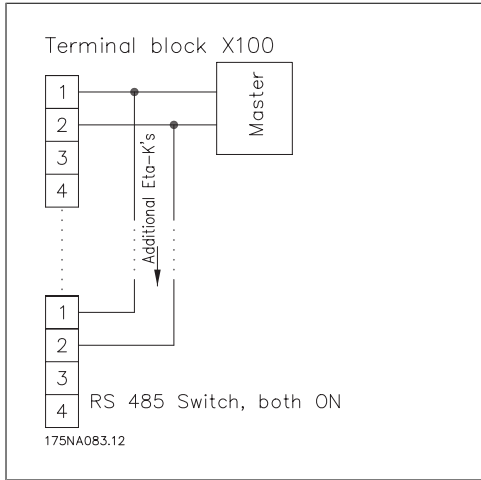
In the Profibus version, the Eta-K has an integrated Profibus DP interface (max. baudrate: 3 or 12 Mbaud). You can download the GSD data file from the Internet: [www.danfoss.com/BusinessAreas/DrivesSolutions](http://www.danfoss.com/BusinessAreas/DrivesSolutions) → Software Download → Fieldbus → Setup Files. After the download choose the appropriate file for FCM 300.

Par. No.	Value	Comments
904	e.g. PPO TYPE 1	depends on use
918	e.g. 6	enter station address



**NB!**

Description of the PROFIBUS version - see PROFIBUS manual MG.97.LX.YY.



4



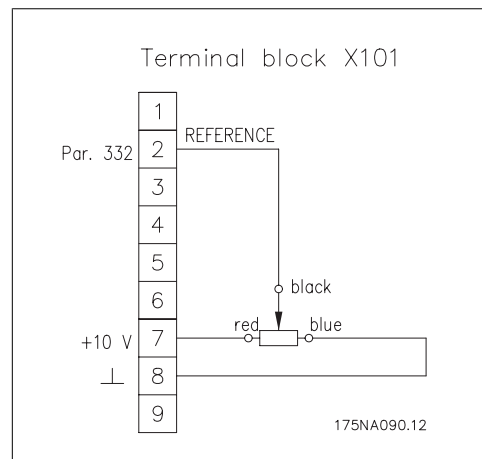
## 5. Accessories

### 5.1.1. Reference Potentiometer

For local supply of the RPM reference, a potentiometer with enclosure IP 65 is available. The potentiometer is already mounted from outside in the middle gland of the converter and also complete wired at the factory.

Resistance 1 kOhm, angle of rotation 270°.

Identification No. 3126561



5

### 5.2.1. PC Software - MCT 10

All Eta-K's are equipped with a serial communication port RS 485. For communication between PC and Eta-K a PC tool (MCT 10) is available on CD-ROM.

#### MCT 10 Setup Software

MCT 10 has been designed as an easy to use interactive tool for setting parameters in our frequency converters.

#### The MCT 10 Setup Software will be useful for:

- Planning a communication network off-line. MCT 10 contains a complete frequency converter database
- Commissioning frequency converters online
- Saving settings for all frequency converters
- Replacing a drive in a network
- Expanding an existing network
- Future developed drives will be supported

#### The MCT 10 Setup Software Modules

The following modules are included in the software package:

#### MCT 10 Setup Software

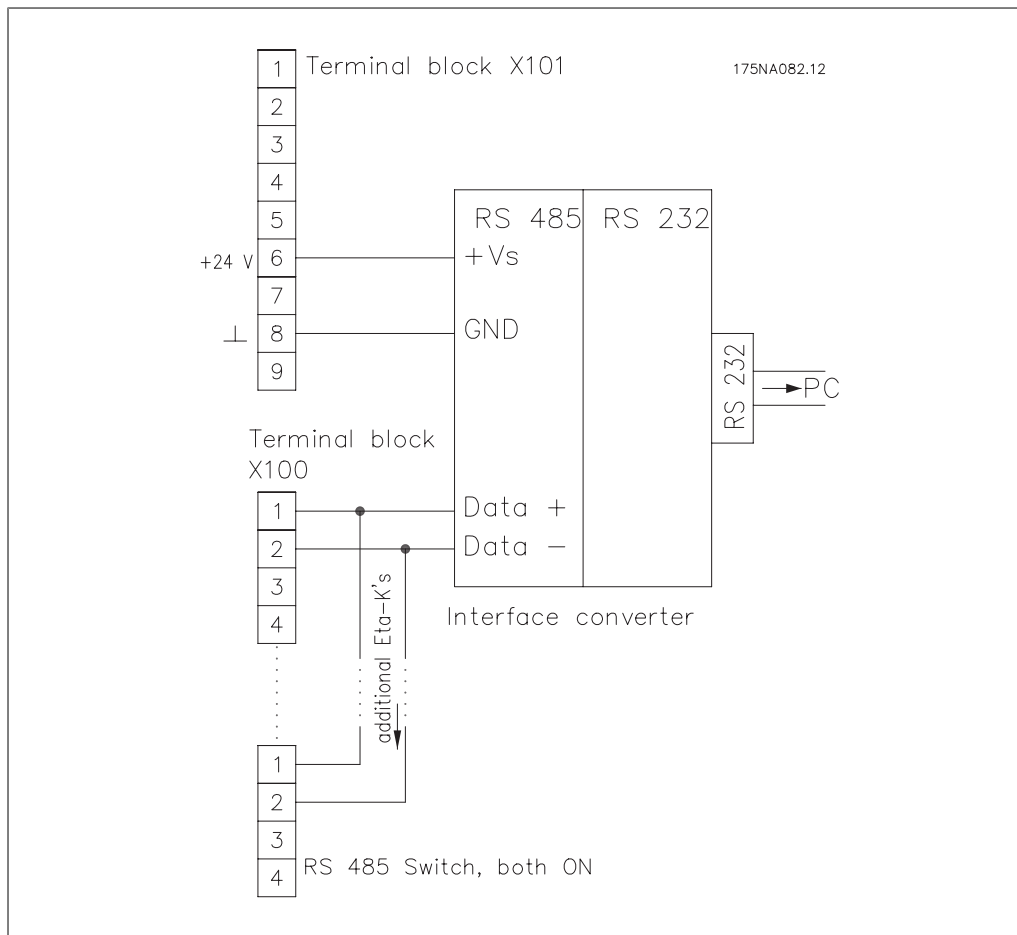
- Setting parameters
- Copy to and from frequency converters
- Documentation and print out of parameter settings incl. diagrams

**SyncPos**

Creating SyncPos programme

**NB!**  
 Please note that an interface converter (RS 232 PC interface to RS 485 converter interface) is required to connect a PC to the Eta-K.

5



Note: A light version of the MCT 10 software can be downloaded from the Internet: [www.danfoss.com/BusinessAreas/DrivesSolutions](http://www.danfoss.com/BusinessAreas/DrivesSolutions) → Software Download → PC Software Download

**5.3.1. Control panel (LCP 2)**

Eta-K optionally features a Local Control Panel - LCP 2 which makes up a complete interface for operation and monitoring of the Eta-K. IP 65 on front. Identification No.: 1495801

**NB!**  
 The LCP from the VLT 5000 Series (code number 175Z0401) cannot be used for the Eta-K. However, the general LCP 2 (code number 175N0131) can be used for both the FCM 300, Eta-K, VLT 2800 and the VLT 5000 Series.

**LCP installation**

The LCP 2 is connected to the terminal X100, 1-4

### LCP functions

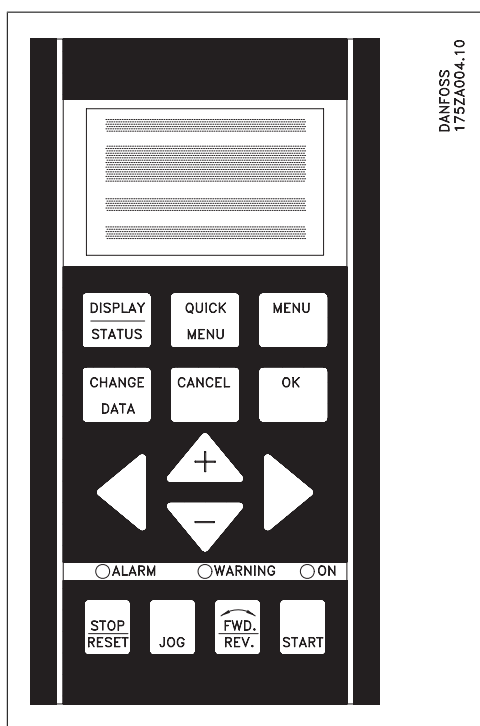
The functions of the control panel can be divided into three groups:

- display
- keys for changing program parameters
- keys for local operation

All data are indicated by means of a 4-line alpha-numeric display, which in normal operation is able to show 4 measurements and 3 operating conditions continuously. During programming, all the information required for quick, effective parameter Setup of the Eta-K will be displayed. As a supplement to the display, there are three LEDs for voltage, warning and alarm.

All program parameters of the Eta-K can be changed immediately from the control panel, unless this function has been blocked via parameter 018.

A detailed description of the LCP can be found in the Design Guide MG.97.GX.YY.



Two cable versions are available for connection to the Eta-K:

- Cable for direct connection of the LCP to terminal block X100. Identification No.1495844.
- Cable for plug kit. Identification No.1495836. Used together with plug kit (see 5.4) or service plug kit (see 5.7)

#### 5.4.1. Plug Kit

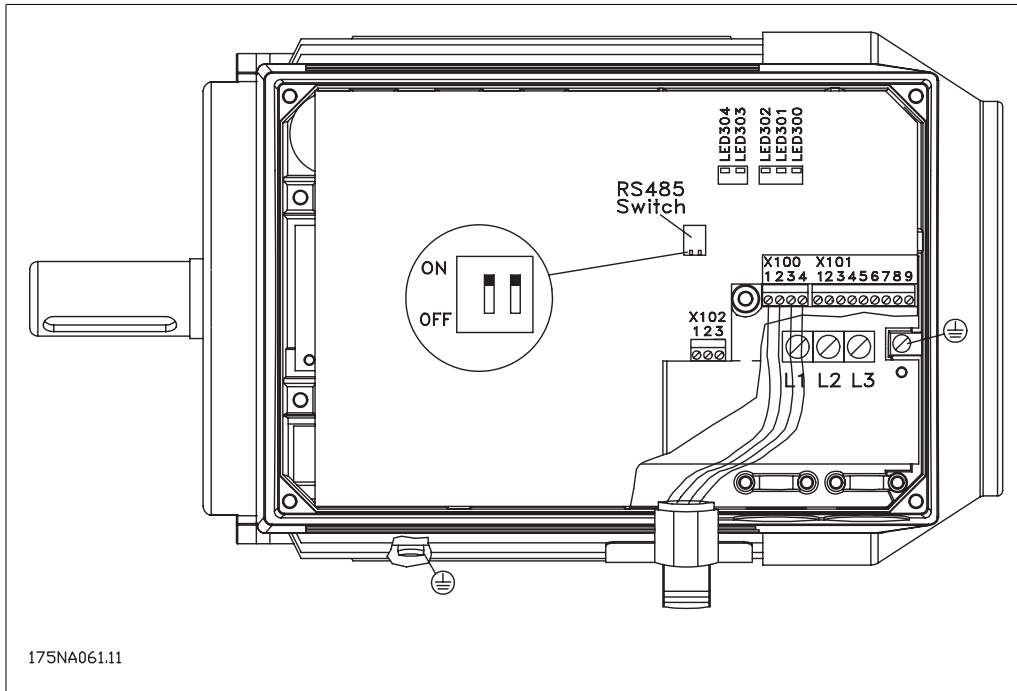
##### Purpose:

To make a plugable connection between LCP2 and Eta-K.

Identification no.: 2547503

Used together with cable for plug kit (see 5.3).

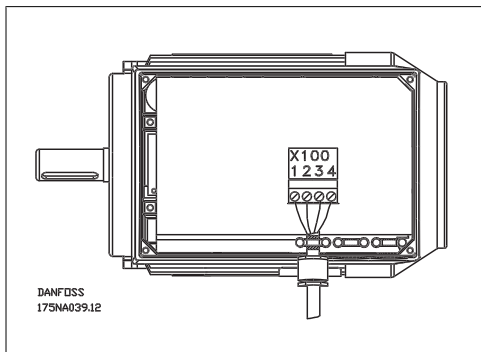
5



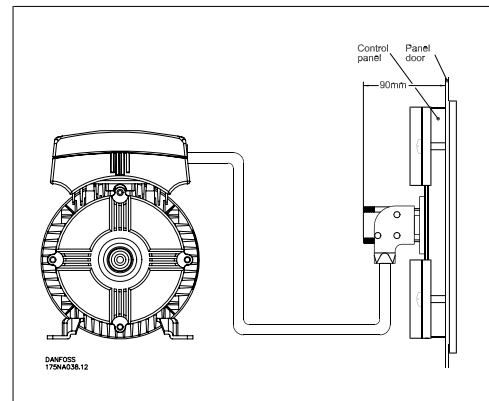
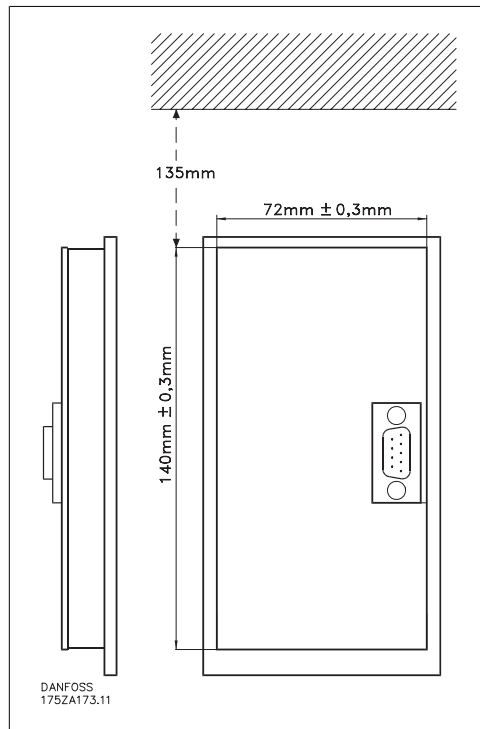
### 5.5.1. Remote Mounting Kit

Identification No.1495810

Connections:

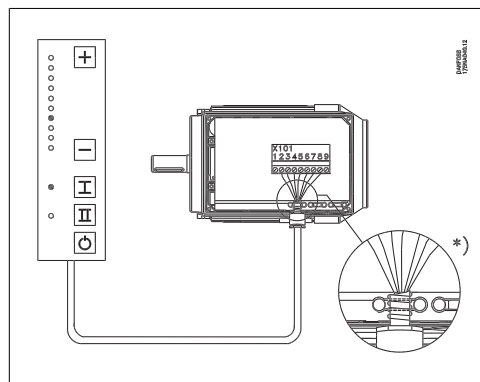


Colour of wire/	Terminal X100/	D-Sub-pin
yellow	1	8
green	2	9
red	3	2
blue	4	3



### 5.6.1. Local Operation Panel (LOP)

Identification No. 1495798



Use the +/- keys to set reference

Colour of wire	Terminal	Function
White	2	Reference
Brown	3	Reset
Purple* or Grey	4	See table under key I
Green	5	See table under key II
Red	6	+ 24V
Yellow	7	+ 10V
Blue	8	Ground

Table 5.1: Wiring

\* Can be orange in some cables.

Functions/Settings	Key I (Start)	Key II (Start)	Key (Stop)
Default - Dual direction operation (connect grey wire)	Run Forward	Run reverse	Stop (and reset* - if trip)
No changes to factory setting.			
Function 2 - Dual mode operation (connect purple wire)	Run with Setup 1	Run with Setup 2	Stop (and reset* - if trip)
Select desired modes of operation in Setups 1 and 2 (use par. 4-6)			
Parameter 335 = 18 (select Setup)			
Function 3 - Dual speed operation (connect purple wire):	Run on set reference (+/-)	Run on 10 Hz** jog speed	Stop (and reset* - if trip)
Parameter 335 = 13 (Jog)			

\* If no reset is required, do not connect the brown wire

\*\* or set parameter 213

At power up the unit will always be in stop mode. Set reference will be stored during power down. If permanent start mode is desired, connect terminal 6 to terminal 4 and do not connect purple/grey wire to terminal 4. This means the stop function on LOP is disabled.

5

### 5.7.1. Service Plug Kit

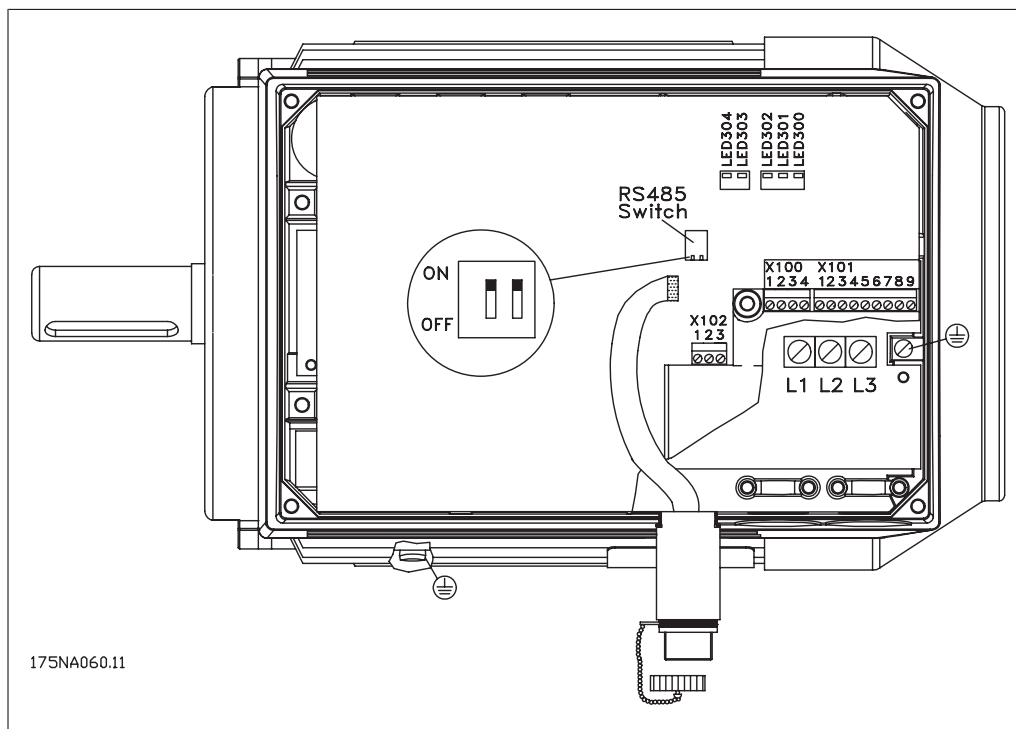
**Purpose:**

To run LCP2 and PROFIBUS at the same time.

The service plug can be used with Eta-K of serial number 03Gxxx and software version as from 2.03.

Identification No. 2547511

Used together with cable for plug kit (see 5.3)



### 5.8.1. Brake Control

This external switching unit serves to supply and control a mechanical brake.

For Eta-K 305-340 it is mounted in the left gland, for Eta-K 355-375 on the lid of the converter.

**Identification No.**

For Eta-K 305-340: 1495861

For Eta-K 355-375: 3109577

Control of the brake is carried out via the output of the converter by means of parameters 138 and 139. The output frequencies at which the brake is to be released or engaged can be set. The switching unit has 2 relay outputs for the messages "Eta-K ready" (X4 contact closed) and "Fault brake control" (X5 contact open). The output signal "Eta-K ready" is no longer available at the control terminals of the converter when brake control is in use.

Through the rectifier of the switching unit, different braking voltages are generated that depend on the mains voltage. The corresponding values are given in the following table.

**Max. load of the relay contacts X4 and X5:**

DC: 220 V, 2 A, 60 W

AC: 250 V, 2 A, 125 VA

Mains voltage AC	Brake voltage DC
380...420 V	180 V
440...480 V	210 V

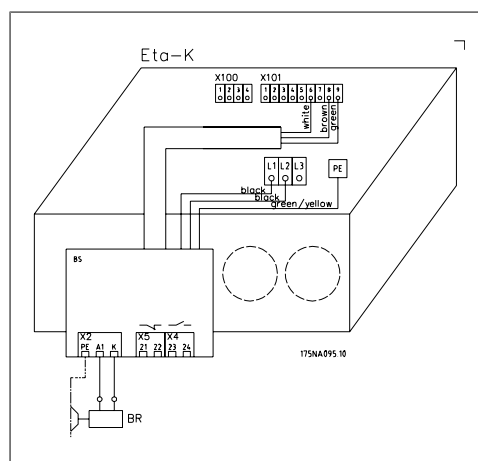
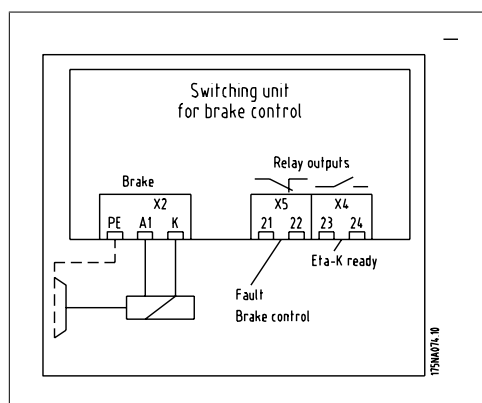


Illustration 5.1: Electrical connection of brake control to Eta-K





## 6. Parameter List

### 6.1.1. Operation and Display

Parameter No.	Function	Range/number of settings/value	Factory Setting
001	Language	6	German
002	Local/remote control	2	Remote control
003	Local reference		000.000
004	Active Setup	4	Setup 1
005	Programming Setup	4	Active setup
006	Copying of Setups	4	No copying
007	LCP copy	4	No copying
008	Display scaling of motor frequency		100
009	Display line 2	24	Frequency [Hz]
010	Display line 1.1	24	Reference [%]
011	Display line 1.2	24	Motor current [A]
012	Display line 1.3	24	Power [kW]
013	Local control/configuration	5	LCP digital control/par. 100
014	Local stop	2	Possible
015	Local jog	2	Not possible
016	Local reversing	2	Not possible
017	Local reset of trip	2	Possible
018	Lock for data change	2	Not locked
019	Operating state at power up, local c.	3	Forced stop, use saved ref.

### 6.1.2. Load and Motor

Parameter No.	Function	Range/number of settings/value	Factory Setting
100	Configuration	2	Speed, open loop mode
101	Torque characteristics	4	Constant torque
102	Motor power	XX.XX kW - dep. on unit	
103	Motor voltage	XX.XX V - dep. on unit	
104	Motor frequency	XX.X Hz - dep. on unit	
105	Motor current	XX.XX A - dep. on unit	
106	Rated motor speed	XX rpm - dep. on unit	
117	Resonance damping	OFF - 100%	OFF %
126	DC braking time	0.0 (off) - 60.0 sec.	10.0 sec.
127	DC brake cut-in frequency	0.0 Hz - $f_{MAX}$	0.0 Hz
128	Motor thermal protection	2	Motor dependent
132	DC braking voltage	0 - 100 %	0 %
133	Start Voltage	0.00 - 100.00 V	Motor dependent
134	Start compensation	0.0 - 300.0 %	80.0 %
135	U/f ratio	0.00 - 20.00 V/Hz	Motor dependent
136	Slip compensation	-500.0 - +500.0 %	100.0 %
137	DC holding voltage	0 - 100 %	0 %
138	Brake cut out frequency	0.5 - 132 Hz	3.0 Hz
139	Brake cut in frequency	0.5 - 132 Hz	3.0 Hz

### 6.1.3. References and Limits

Parameter No.	Function	Range/number of settings/ value	Factory Setting
200	Rotation direction	3	Both directions, 0-132 Hz
201	Min. output frequency ( $f_{MIN}$ )	0.0 Hz - $f_{MAX}$	0.0 Hz
202	Max. output frequency ( $f_{MAX}$ )	$f_{MIN}$ - $f_{RANGE}$	$f_{RANGE}$ (132 Hz)
203	Reference/feedback range	Min. - max./-max.- +max.	Min. - Max.
204	Minimum reference	-100,000.000 - Ref <sub>MAX</sub>	0.000
205	Maximum reference	Ref <sub>MIN</sub> - 100,000.000	as ordered from customer
207	Ramp-up time 1	0.05 - 3600.00 sec.	3.00 sec.
208	Ramp-down time 1	0.05 - 3600.00 sec.	3.00 sec.
209	Ramp-up time 2	0.15 - 3600.00 sec.	3.00 sec.
210	Ramp-down time 2	0.15 - 3600.00 sec.	3.00 sec.
211	Jog ramp time	0.05 - 3600.00 sec.	3.00 sec.
212	Quick stop ramp-down time	0.05 - 3600.00 sec.	3.00 sec.
213	Jog frequency	0 Hz - $f_{max}$	10.0 Hz
214	Reference function	2	Sum
215	Preset reference 1	-100.00 % - +100.00 %	0.00 %
216	Preset reference 2	-100.00 % - +100.00 %	0.00 %
219	Catch up/slow down value	0.00 - 100.00 %	0.00 %
221	Current limit for motor mode	Min.- max. limit in % of I <sub>RATED</sub>	160.0 %
229	Frequency bypass, bandwidth	0 (off) - 100 %	0 %
230	Frequency bypass 1	0.0 - 132 Hz	0.0 Hz
231	Frequency bypass 2	0.0 - 132 Hz	0.0 Hz
241	Reference preset 1	-100.00 % - +100.00 %	0.00 %
242	Reference preset 2	-100.00 % - +100.00 %	0.00 %
243	Reference preset 3	-100.00 % - +100.00 %	0.00 %
244	Reference preset 4	-100.00 % - +100.00 %	0.00 %
245	Reference preset 5	-100.00 % - +100.00 %	0.00 %
246	Reference preset 6	-100.00 % - +100.00 %	0.00 %
247	Reference preset 7	-100.00 % - +100.00 %	0.00 %

### 6.1.4. Inputs and Outputs

Parameter No.	Function	Range/number of settings/ value	Factory Setting
317	Time out	1 -99 sec.	10 sec.
318	Function after time out	Off/Stop and trip	Off
323	Terminal X102, relay function	14	No operation
327	Pulse reference/feedback, max. freq.	100 - 70000 Hz	5000 Hz
331	Terminal 1, analog input current	3	No operation
332	Terminal 2, digital input	31	Reference
333	Terminal 3, digital input	31	Reset
334	Terminal 4, digital input	30	Start
335	Terminal 5, digital input	29	Start Reversing
336	Terminal 1, min. scaling	0.0 - 20.0 mA	0.0 mA
337	Terminal 1, max. scaling	0.0 - 20.0 mA	20.0 mA
338	Terminal 2, min. scaling	0.0 - 10.0 V	0.0 V
339	Terminal 2, max. scaling	0.0 - 10.0 V	10.0 V
340	Output functions	24	Unit ready

### 6.1.5. Special Functions

Parameter No.	Function	Range/number of settings/ value	Factory Setting
400	Brake function	Off/AC braking	AC braking
403	Sleep mode timer	0 - 300 sec.	Off
404	Sleep frequency	000,0 - par. 407	0,0 Hz
405	Reset function	11	Reset at power up
406	Boost setpoint	1 - 200%	100%
407	Wake up frequency	Par 404 - $f_{MAX}$	50 Hz
411	Switching frequency	1.5 - 6.0 kHz	Unit dependent
412	Variable switching frequency	3	Temp. dep. sw. freq.
413	Overmodulation function	Off/On	On
414	Minimum feedback	-100000 - $FB_{HIGH}$	0
415	Maximum feedback	$FB_{LOW}$ - 100,000	1500
416	Reference/feedback unit	42	%
437	Process PID normal/inverse ctrl.	Normal/inverse	Normal
438	Process PID anti windup	Disable/Enable	Enable
439	Process PID start frequency	$f_{MIN}$ - $f_{MAX}$	$f_{MIN}$
440	Process PID proportional gain	0.00 (off) - 10.00	0.01
441	Process PID integral time	0.01 - 9999 sec. (off)	9999 sec.
442	Process PID differentiation time	0.00 (off) - 10.00 sec.	0.00 sec.
443	Process PID different. gain limit	5 -50	5
444	Process PID lowpass filter time	0.1 - 10.00 sec.	0.1 sec.
445	Flying start	4	Disable
446	Switching pattern	2	SFAVM
455	Frequency range monitor	Disable/Enable	Enable
461	Feedback conversion	Linear or square root	Linear

## 6.1.6. Serial Communication

Parameter No.	Function	Range/number of settings/ value	Factory Setting
500	Bus address	1 - 126	1
501	Baudrate	300 - 9600 Baud/6	9600 Baud
502	Coasting	4	Logic or
503	Quick-stop	4	Logic or
504	DC-brake	4	Logic or
505	Start	4	Logic or
506	Reversing	4	Logic or
507	Selection of setup	4	Logic or
508	Selection of speed	4	Logic or
509	Bus jog 1	0.0 - $f_{MAX}$	10.0 Hz
510	Bus jog 2	0.0 - $f_{MAX}$	10.0 Hz
512	Telegram profile	Profidrive/FC Drive	FC Drive
513	Bus time interval		1 sec.
514	Bus time interval function	6	Off
515	Data read-out: Reference	XXX.X	
516	Data read-out: Refer. unit	Hz/rpm	
517	Data read-out: Feedback		
518	Data read-out: Frequency	Hz	
519	Data read-out: Frequency x scale	Hz	
520	Data read-out: Current	A x 100	
521	Data read-out: Torque	%	
522	Data read-out: Power	kW	
523	Data read-out: Power	hp	
524	Data read-out: Motor voltage	V	
525	Data read-out: DC link voltage	V	
527	Data read-out: FC therm.	0 - 100 %	
528	Data read-out: Digital input		
533	Data read-out: External reference	-200.0 - +200.0 %	
534	Data read-out: Status word, binary		
537	Data read-out: FC temperature	°C	
538	Data read-out: Alarm word, binary		
539	Data read-out: Control word, binary		
540	Data read-out: Warning word, 1		
541	Data read-out: Warning word, 2		
542	Data read-out: Terminal 1, analog input	mA X 10	
543	Data read-out: Terminal 2, analog input	V X 10	
561	Protocol	FC protocol/Modbus RTU	FC protocol
570	Modbus parity and message framing	4	Even/1stopbit
571	Modbus Communications timeout	10-2000 ms	100 ms

### 6.1.7. Technical Functions

Parameter No.	Function	Range/number of settings/val- ue	Factory Setting
600	Operating data: Operating hours	0 - 130,000.0 hours	
601	Operating data: Hours run	0 - 130,000.0 hours	
603	Operating data: Number of power-up's	0 - 9999	
604	Operating data: Number of overtemp.	0 - 9999	
605	Operating data: Number of overvoltages	0 - 9999	
615	Fault log, read-out: Error code	Index XX - XXX	
616	Fault log, read-out: Time	Index XX - XXX	
617	Fault log, read-out: Value	Index XX - XXX	
619	Reset of hours-run counter	No reset/reset	No reset
620	Operation mode	3	Normal function
621	Nameplate: Eta-K type	Depends on unit	
624	Nameplate: Software version no.	Depends on unit	
625	LCP version	Depends on unit	
626	Nameplate: Database identification no.	Depends on unit	
628	Nameplate: Application option type		
630	Nameplate: Communication option type		
632	BMC software identification		
633	Motor database identification		
634	Unit identification for communication		
635	Software part No.		
678	Configure Control Card	3	



**NB!**

Changes in parameters can be made via the control panels LCP2, PC or Profibus. For a detailed description, see Design Guide MG.97.GX.YY.