

**SMARTDRIVE**  
Frequency Inverters  
**VF1000 Series S/M/L**  
(0,37 - 22 kW)  
Technical Specifications

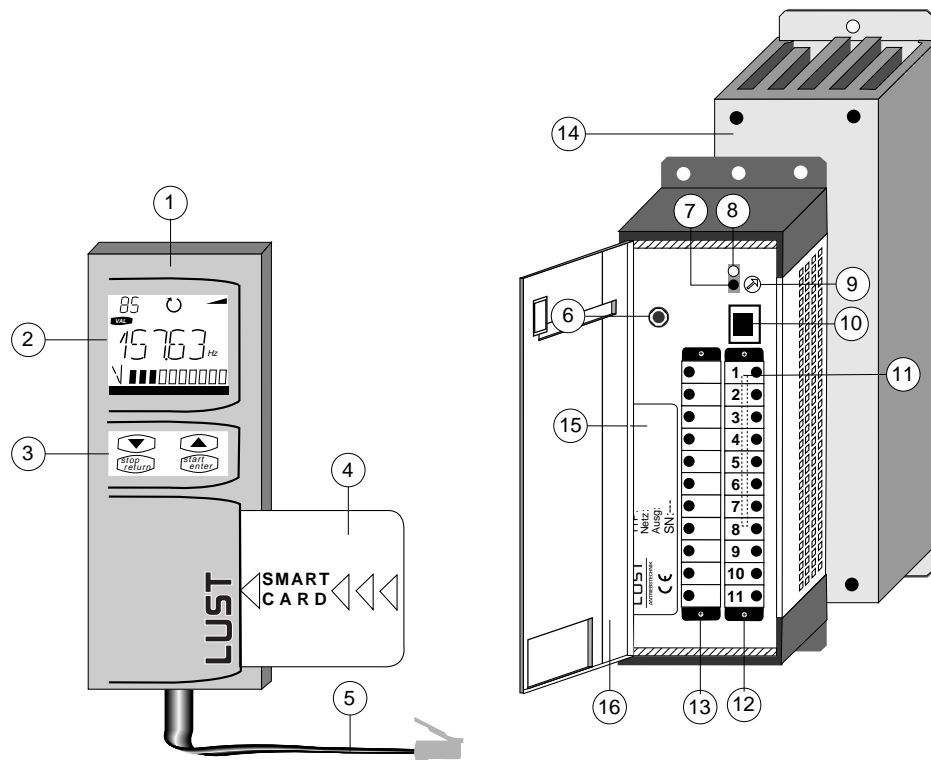


# CONTENTS

|                  |  |      |
|------------------|--|------|
| <b>CHAPTER 1</b> | Frequency inverter VF1000S (0.37 - 0.75 kW)                          |      |
|                  | Design and layout  | 1-2  |
|                  | Technical Specifications   | 1-3  |
|                  | Dimensional drawings   | 1-4  |
|                  | Power and control connections  | 1-6  |
|                  | Control connections, VF1000S,xx                                      | 1-7  |
|                  | Ordering Informations  | 1-8  |
|                  | Design codes   | 1-9  |
| <br>             |  |      |
| <b>CHAPTER 2</b> | Frequency Inverter VF1000M (1.1 - 4 kW)                              |      |
|                  | Design and layout  | 2-1  |
|                  | Technical Specifications   | 2-2  |
|                  | Power and control connections (230 V devices)                        | 2-4  |
|                  | Power and control connections (400/460 V devices)                    | 2-5  |
|                  | Ordering Informations  | 2-6  |
|                  | Design codes   | 2-7  |
| <br>             |  |      |
| <b>CHAPTER 3</b> | Frequency Inverters VF1000L and VF1000L, HF (4 - 22 kW)              |      |
|                  | Design and layout  | 3-1  |
|                  | Technical Specifications   | 3-2  |
|                  | Technical data VF1000L, HF (to 800/1600 Hz phase-sequence frequency) | 3-3  |
|                  | Dimensional drawings   | 3-4  |
|                  | Power and control connections  | 3-5  |
|                  | Ordering Informations  | 3-6  |
|                  | Design codes VF1000L and VF1000L, HF                                 | 3-7  |
| <br>             |  |      |
| <b>CHAPTER 4</b> | Accessories for VF1000S/M/L  |      |
|                  | Mains filters  | 4-2  |
|                  | Line chokes  | 4-4  |
|                  | Interface adapters for KEYPAD connection                             | 4-6  |
|                  | Control unit KEYPAD KP100  | 4-6  |
|                  | SMARTCARD  | 4-6  |
|                  | Braking resistor accessories for VF1000M                             | 4-7  |
|                  | Brake choppers BC1300/1400 for VF1000S                               | 4-8  |
|                  | Brake chopper unit BC4000 for VF1000L                                | 4-10 |
|                  | Accessories to PROFIBUS-DP   | 4-12 |
|                  | User information   | 4-14 |

# CHAPTER 1 FREQUENCY INVERTER VF1000S

## Design and layout



## Legend

| No. | Function   | No. | Function                                       |
|-----|--|-----|--|
| 1   | Control unit KEYPAD KP100 <sup>1)</sup>            | 9   | Integral potentiometer P1, programmable        |
| 2   | LCD display panel (140 seg.)                       | 10  | Socket for KEYPAD KP100                        |
| 3   | Membrane keypad                                    | 11  | Jumper strip (concealed behind control conn.)  |
| 4   | SMARTCARD <sup>1)</sup>                            | 12  | Terminal strip, control connections detachable |
| 5   | KEYPAD KP100 cable (length 0.35 m)                 | 13  | Terminal strip, power connections detachable   |
| 6   | ⊕ Connection point for protective earth and screen | 14  | Heat sink                                      |
| 7   | LED H1 (red), "error" indicator                    | 15  | Name plate                                     |
| 8   | LED H2 (green), "on" indicator                     | 16  | Housing cover                                  |

## Regulations and standards

|     |   |  |
|-----|---|--|
| CE  | Conformity under the terms of Machinery Directive 89/392/EEC  | All VF1000S devices  |
| UL  | UL-recognized, FILE: E146022  | All VF1000S devices  |
| EMC | Compliance with technical standards EN50081-1 (interference emission: residential environment)<br>EN50082-2 (interference immunity: industrial environment) | All VF1000S devices, with use of an appropriate mains filter <sup>1)</sup> |

<sup>1)</sup> For further information see "Accessories"

## Output motor-side

|  | Des.         | Dim. | VF1104S  | VF1202S          | VF1204S | VF1402S                      |
|--|--------------|------|--|------------------|---------|------------------------------|
| Rec. rated power with 4-pole standard motor              | P            | W    | 375  | 375              | 750     | 750                          |
| Device power referred to mains voltage <sup>1)</sup>     | S            | VA   | 670  | 840              | 1400    | 1450                         |
| Voltage  | U            | V    | 3x0...110  | 3x0...230        |         | 3x0...400/460                |
| Rated current <sup>1)</sup> (110 V)                      | $I_N$        | A    | 3,2  | -                | -       | -                            |
| Rated current <sup>1)</sup> (230 V)                      | $I_N$        | A    | -  | 1,9              | 3,2     | -                            |
| Rated current <sup>1)</sup> (400/460 V)                  | $I_N$        | A    | -  | -                | -       | 1,9/1,7                      |
| Continuous current <sup>1)</sup> (110 V)                 | $1,1xI_N$    | A    | 3,5  | -                | -       | -                            |
| Continuous current <sup>1)</sup> (230 V)                 | $1,1xI_N$    | A    | -  | 2,1              | 3,5     | -                            |
| Continuous current <sup>1)</sup> (400/460 V)             | $1,1xI_N$    | A    | -  | -                | -       | 2,1/1,9                      |
| Overload current <sup>1)</sup> for 60 s                  | $1,5xI_N$    | A    | 4,8  | 2,9              | 4,8     | 2,9                          |
| Phase-sequence frequency                                 | f            | Hz   | 0 ... 400  |                  |         |                              |
| Frequency resolution                                     | -            | %    | 0,1 from FMAX (0,05 Hz min.)                                   |                  |         |                              |
| Mains voltage  | U            | V    | 1 x 110<br>+30/-20%  | 1 x 230 +15/-20% |         | 3 x 400 -15%<br>3 x 460 +10% |
| Asymmetry of mains voltage                               | -            | %    | -  |                  |         | ≤ 3                          |
| Frequency  | F            | Hz   | 48 ... 62  |                  |         |                              |
| Rec. mains fusing  | I            | AT   | 1 x 10   | 1 x 10           | 1 x 10  | 3 x 10                       |
| Efficiency <sup>1) 3)</sup>                              | $\eta$       | %    | 95   | 96               | 95      | 94                           |
| Power loss <sup>3)</sup>                                 | $P_V$        | W    | 30   | 25               | 35      | 45                           |
| Cooling air temp. (1000 m above sea level)               | $T_N$        | °C   | 0 ... 40   |                  |         |                              |
| Type of cooling  |              |      | Convection   |                  |         |                              |
| Relative air humidity                                    | rF           | %    | 15 ... 85, non-condensing (VDE0160)                            |                  |         |                              |
| Power reduction as a function of cooling air temperature | $\Delta P_T$ | %/°C | 2,5 in range 40 ... 50 °C                                      |                  |         |                              |
| Power reduction as a function of mounting height         | $\Delta P_H$ | %/m  | 5 per 1000 m above seal level,<br>max. 2000 m above seal level |                  |         |                              |
| Storage temperature                                      | $T_L$        | °C   | -25 ... +55 (VDE0160)  |                  |         |                              |
| Transport temperature                                    | $T_T$        | °C   | -25 ... +70 (VDE0160)  |                  |         |                              |
| Permissible vibration                                    |              |      | 2 g (IEC 68-2-6)   |                  |         |                              |
| Protection   | -            | -    | (IP20, VBG4, NEMA 1) <sup>2)</sup>                             |                  |         |                              |
| Mounting   | -            | -    | Vertical wall mounting   |                  |         |                              |

1) Referred to power stage switching frequency of 8 kHz

2) Not for VF1000S,G8 + VF1000S,G10

3) At rated voltage and rated current

# CHAPTER 1 DIMENSIONAL DRAWINGS VF1000S,xx

**Standard  
VF1000S  
Protection IP20**

|                 | Des. | Dim. | Value  | Dimensional drawing |
|-----------------|------|------|--------|---------------------|
| Mass            | M    | kg   | ca.0,9 |                     |
| Dimen-<br>sions | A    | mm   | 32,5   |                     |
|                 | B    | mm   | ∅ 4,8  |                     |
|                 | C    | mm   | 183    |                     |
|                 | D    | mm   | 170    |                     |
|                 | E    | mm   | 65     |                     |
|                 | F    | mm   | 133    |                     |
| G               | mm   | 20   |        |                     |

**Design  
VF1000S,G8 <sup>1)</sup>  
Protection IP00**

|                 |   |    |        |  |
|-----------------|---|----|--------|--|
| Mass            | M | kg | ca.0,8 |  |
| Dimen-<br>sions | B | mm | ∅ 4,8  |  |
|                 | C | mm | 183    |  |
|                 | D | mm | 170    |  |
|                 | E | mm | 63     |  |
|                 | F | mm | 110    |  |
|                 | G | mm | 20     |  |

**Design  
VF1000S,K1  
Protection IP20**

|                 |    |     |        |  |
|-----------------|----|-----|--------|--|
| Mass            | M  | kg  | ca.1,1 |  |
| Dimen-<br>sions | A  | mm  | 32,5   |  |
|                 | B  | mm  | ∅ 4,8  |  |
|                 | C  | mm  | 206,5  |  |
|                 | D  | mm  | 196,5  |  |
|                 | E  | mm  | 65     |  |
|                 | F1 | mm  | 67,5   |  |
| F               | mm | 133 |        |  |

<sup>1)</sup> Control unit KEYPAD KP100 cannot be connected to the frequency inverter with this device version.

# CHAPTER 1 DIMENSIONAL DRAWINGS VF1000S,xx

**Design**  
VF1000S, G19, FA  
Protection IP20

|            | Des. | Dim. | Value  | Dimensional drawing |
|------------|------|------|--------|---------------------|
| Mass       | M    | kg   | ca.1,0 |                     |
| Dimensions | A    | mm   | 32,5   |                     |
|            | B    | mm   | ∅ 4,8  |                     |
|            | C    | mm   | 232,5  |                     |
|            | D    | mm   | 220    |                     |
|            | E    | mm   | 65     |                     |
|            | F    | mm   | 133    |                     |
|            | G    | mm   | 20     |                     |

**Design**  
VF1000S, G10, FA, K2 <sup>1)</sup>  
Protection IP00

|            |    |       |        |  |
|------------|----|-------|--------|--|
| Mass       | M  | kg    | ca.1,2 |  |
| Dimensions | A  | mm    | 32,5   |  |
|            | B  | mm    | ∅ 4,8  |  |
|            | C  | mm    | 256,5  |  |
|            | D  | mm    | 246,5  |  |
|            | E  | mm    | 63     |  |
|            | F  | mm    | 187,5  |  |
|            | F1 | mm    | 67,5   |  |
|            | F2 | mm    | 110    |  |
|            | H  | mm    | 220    |  |
| I          | mm | 232,5 |        |  |

**Design**  
VF1000S, M3 or  
VF1000S, M4  
(Protection IP20)

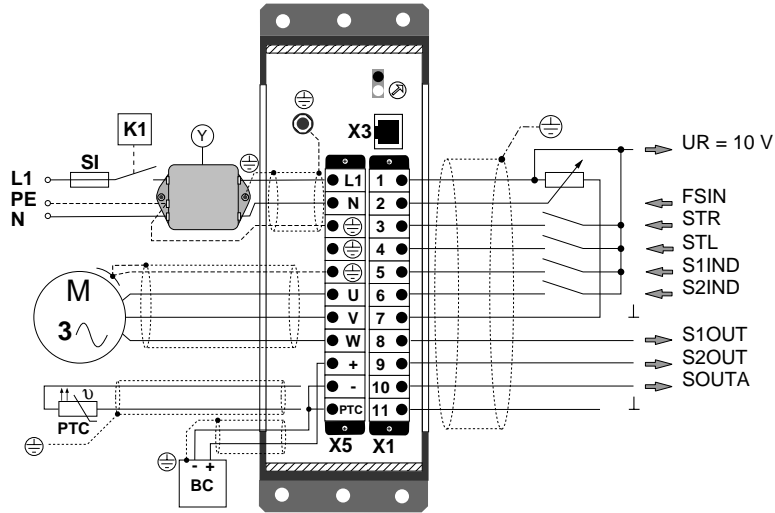
|            |                   |              |     |       |
|------------|-------------------|--------------|-----|-------|
| M3         | Screen connection | bottom       |     |       |
| M4         | Screen connection | top + bottom |     |       |
| Dimensions | B                 | mm           |     | ∅ 4,8 |
|            | E                 | mm           |     | 65    |
|            | L                 | mm           |     | 30,0  |
|            | F3                | mm           |     | 104   |
|            | K                 | mm           | 5,6 |       |

<sup>1)</sup> Control unit KEYPAD KP100 cannot be connected to the frequency inverter with this device version.

# CHAPTER 1 POWER AND CONTROL CONNECTIONS VF1000S

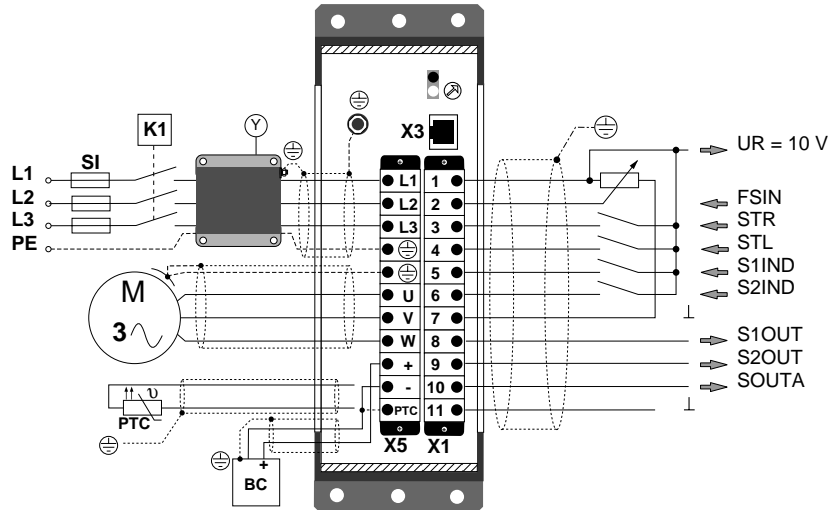
## Single-phase feed

VF1104S  
VF1202S  
VF1204S



## Three-phase feed

VF1402S



### Terminal assignment

| X5            | Power connections   |
|---------------|---|
| L1, N, ⊕      | Mains connection 1 x 110V for VF1104S<br>Mains connection 1 x 230 V for VF1202S<br>or VF1204S |
| L1, L2, L3, ⊕ | Mains connection 3 x 400/460 V for<br>VF1402S   |
| ⊕ U, V, W     | Motor connection  |
| +, -          | Connection for dc-link or ext. brake<br>chopper (BC1300/1400)                                 |
| -, PTC        | Connection for motor PTC  |
| K1            | Connection example, line contactor  |
| Y             | Connection example for external<br>mains filter   |
| ⊕             | Connection point for protective<br>earth and screen   |

| X1    | Des.  | Control connections   |
|-------|-------|---|
| 1     | UR    | 10 V for reference potentiometer                              |
| 2     | FSIN  | Reference frequency input<br>0-10 V, 2-10 V, 0-20 mA, 4-20 mA |
| 3     | STR   | Start-Right input   |
| 4     | STL   | Start-Left input  |
| 5     | S1IND | Programmable input, digital                                   |
| 6     | S2IND | Programmable input, digital                                   |
| 7, 11 | Frame | Controller reference point                                    |
| 8     | S1OUT | Prog. output LOW activev                                      |
| 9     | S2OUT | Prog. output LOW active                                       |
| 10    | SOUTA | Prog. output analog   |
| X3    |       | Socket for control unit<br>KEYPAD KP100                       |

# CHAPTER 1 CONTROL CONNECTIONS VF1000S,xx

## VF1000S, I1

| X1   | Des.  | Control section I1                             |
|------|-------|--|
| 1    | $U_E$ | Feed voltage for SOUTF, 10-15 V                |
| 2    | PWM   | Reference frequency, 0-100 % PWM, 20-100 % PWM |
| 3    | STR   | Start-Right input                              |
| 4    | STL   | Start-Left input                               |
| 5    | S1IND | Programmable input, digital                    |
| 6    | S2IND | Programmable input, digital                    |
| 7/11 | Frame | Control connection reference point             |
| 8    | S1OUT | Prog. output LOW active                        |
| 9    | S2OUT | Prog. output LOW active                        |
| 10   | SOUTF | Prog. output with PWM or clock signal          |

## VF1000S, I5 or VF1000S, I7

| X1 | Des.  | Control section I5, I7   |
|----|-------|--|
| 1  | $U_R$ | 10 V ref. for reference potentiometer  |
| 2  | FSIN  | Reference frequency<br>0-10V, 2-10V, 0-20mA, 4-20mA I5<br>0-100%PWM, 20-100%PWM I7 |
| 3  | STR   | Start-Right input  |
| 4  | STL   | Start-Left input   |
| 5  | RxD   | Interface RS232  |
| 6  | TxD   | Interface RS232  |
| 7  | GND   | Interface reference point  |
| 8  | S1OUT | Prog. output LOW active  |
| 9  | S2OUT | Prog. output LOW active  |
| 10 | SOUTA | Prog. output<br>with analog signal I5<br>with PWM or clock signal I7               |
| 11 | Frame | Control connection reference point   |

## VF1000S, I6

| X1 | Des.  | Control section I6                            |
|----|-------|---|
| 1  |       | No function                                   |
| 2  | FSIN  | Reference frequency 0-100 % PWM, 20-100 % PWM |
| 3  | STR   | Start-Right input                             |
| 4  | STL   | Start-Left input                              |
| 5  | A     | R/T A for RS485                               |
| 6  | B     | R/T B for RS485                               |
| 7  | GND   | Interface reference point                     |
| 8  | S1OUT | Prog. output LOW active                       |
| 9  | S2OUT | Prog. output LOW active                       |
| 10 |       | No function                                   |
| 11 | Frame | Control connection reference point            |



# CHAPTER 1 ORDERING INFORMATIONS FOR VF1000S

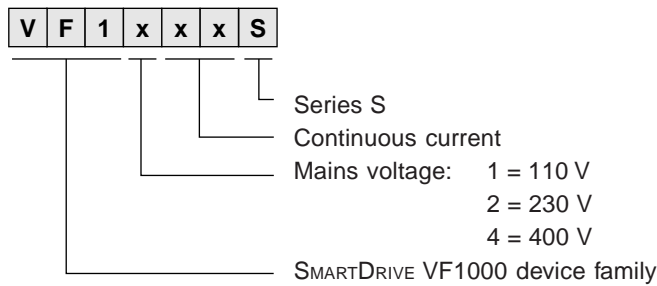
## General

The standard version of the VF1000S frequency inverter is identified by the type designation. Other non-standard designs are identified by suffix design codes appended to the order designation.

Each design code has its own special meaning (see design versions of VF1000S and VF1000S,xx). For inverters not quoted in the list design codes not given here are also used.

From the design options shown, only one design version per terminal location may be ordered.

## Order/type designation



### Standard design:

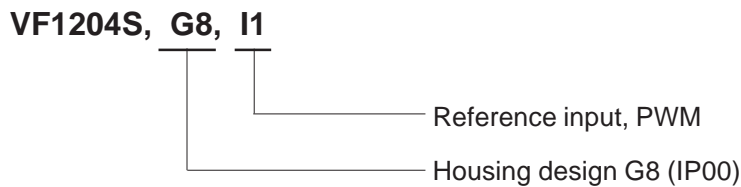
- Analog reference input, 2 digital control inputs
- Varnished all-metal housing with plastic cover for KEYPAD KP100 mounting, protection IP20
- Cold-plate design
- Live automatic circuit-breaker thermostat and thermistor evaluation
- Operation Manual in German

## Non-standard design code

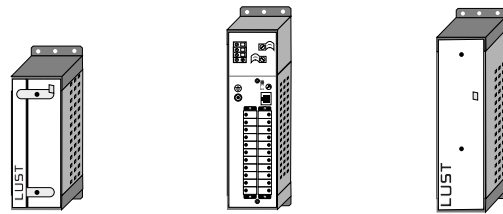


The design code is separated by a comma, and can be written in any order.

## Example



# CHAPTER 1 DESIGN CODES OF THE VF1000S



VF1000S

VF1000S,G10,FA

VF1000S,G19,FA

## Standard design:

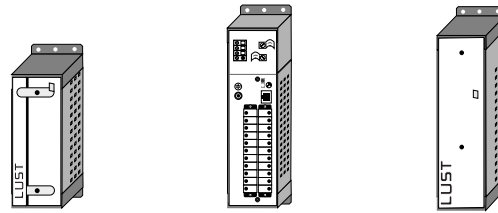
- Analog reference input, 2 digital control inputs
- Varnished all-metal housing with plastic cover for KEYPAD KP100 mounting, protection IP20
- Cold-plate design
- Live automatic circuit-breaker thermostat and thermistor evaluation
- Operation Manual in German

| Terminal location | Design code | Short description   |
|-------------------|-------------|---|
| Control section   | Standard    | Analog reference input, 2 digital control inputs  |
|                   | I1          | PWM reference input   |
|                   | I5          | Analog reference input + RS232 to terminals   |
|                   | I6          | PWM reference input + RS485 to terminals  |
|                   | I7          | PWM reference input + RS232 to terminals  |
| Housing           | Standard    | Varnished all-metal housing with plastic cover for KEYPAD KP100 mounting, protection IP20 |
|                   | G8          | Housing protection IP00, terminals without covering, no mounting option for KEYPAD KP100  |
| Cooling           | Standard    | Cold-plate design   |
|                   | K1          | Heat sink, for use on thermally insulated mounting surfaces                               |
| Mounting          | Standard    | Attach screen to earthing point   |
|                   | M3          | EMC earthing clamp (on underside of housing) for ease of screen attachment                |
|                   | M4          | EMC earthing clamp (on top and underside of housing) for ease of screen attachment        |

Only one design version per terminal location is possible.

**Note:** The KEYPAD KP100 control unit must be ordered separately. For further information see "Accessories".

# CHAPTER 1 DESIGN CODES OF THE VF1000S, G10, FA



VF1000S

VF1000S,G10,FA

VF1000S,G19,FA

## Standard

### VF1000S, G10, FA

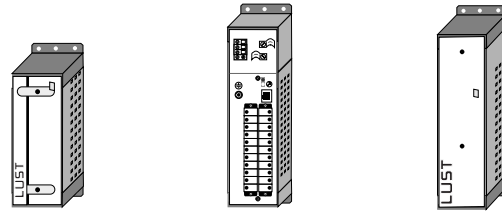
- Analog reference input, 2 digital control inputs
- All-metal housing, protection IP00, terminals without covering, no mounting option for KEYPAD KP100, (G10)
- Cold-plate design
- With built-in mains filter (FA) to comply with limit curve class A (industrial environment)
- Live automatic circuit-breaker thermostat and thermistor evaluation
- Operation Manual in German

| Terminal location     | Design code | Short description   |
|-----------------------|-------------|---|
| Control section       | Standard    | Analog reference input, 2 digital control inputs  |
|                       | I1          | PWM reference input   |
|                       | I5          | Analog reference input + RS232 to terminals   |
|                       | I6          | PWM reference input + RS485 to terminals  |
|                       | I7          | PWM reference input + RS232 to terminals  |
| Cooling               | Standard    | Cold-plate design   |
|                       | K2          | Heat sink, for use on thermally insulated mounting surfaces   |
| Mounting              | Standard    | Two EMC earthing clamps for ease of screen attachment (suitable for cable feed from above)  |
|                       | M3          | EMC earthing clamp (on underside of housing) for ease of screen attachment  |
| Integral mains filter | Standard    | With built-in mains filter (FA) to comply with limit curve class A (industrial environment)   |
|                       | FB          | With built-in mains filter to comply with limit curve class B (residential environment)<br><br><b>Attention:</b><br>Inverter type VF1402S is not available with built-in mains filter (FB). To comply with limit curve class B an external mains filter must be used (see "Accessories"). |

Only one design version per terminal location is possible.

**Note:** The KEYPAD KP100 control unit must be ordered separately. For further information see "Accessories".

# CHAPTER 1 DESIGN CODES OF THE VF1000S, G19, FA



VF1000S

VF1000S,G10,FA

VF1000S,G19,FA

## Standard

### VF1000S, G19, FA

- Analog reference input, 2 digital control inputs
- Varnished all-metal housing with metal cover for KEYPAD KP100 mounting, protection IP20, (G19)
- Cold-plate design
- With built-in mains filter (FA) to comply with limit curve class A (industrial environment)
- Live automatic circuit-breaker thermostat and thermistor evaluation
- Operation Manual in German

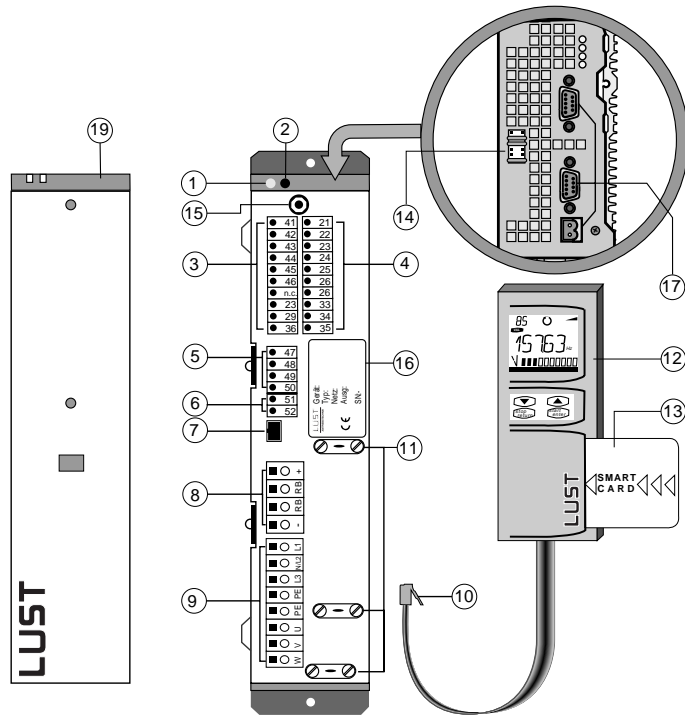
| Terminal location     | Design code | Short description   |
|-----------------------|-------------|---|
| Control section       | Standard    | Analog reference input, 2 digital control inputs  |
|                       | I1          | PWM reference input   |
|                       | I5          | Analog reference input + RS232 to terminals   |
|                       | I6          | PWM reference input + RS485 to terminals  |
|                       | I7          | PWM reference input + RS232 to terminals  |
|                       | C8          | INTERBUS-S interface for remote bus connection  |
|                       | C2          | CAN-Bus interface   |
|                       | CP          | Prepared for PROFIBUS Gateway type CP-DP1 (see "Accessories")   |
| Cooling               | Standard    | Cold-plate design   |
|                       | K2          | Heat sink, for use on thermally insulated mounting surfaces   |
| Mounting              | Standard    | Two EMC earthing clamps for ease of screen attachment   |
|                       | M3          | EMC earthing clamp (on underside of housing) for ease of screen attachment  |
| Integral mains filter | Standard    | With built-in mains filter (FA) to comply with limit curve class A (industrial environment)   |
|                       | FB          | With built-in mains filter to comply with limit curve class B (residential environment)   |
|                       |             | <b>Attention:</b> Inverter type VF1402S is not available with built-in mains filter (FB). To comply with limit curve class B an external mains filter must be used (see "Accessories"). |

Only one design version per terminal location is possible.

**Note:** The KEYPAD KP100 control unit must be ordered separately. For further information see "Accessories".

# CHAPTER 2 FREQUENCY INVERTER VF1000M

## Design and layout



### Legend

| No. | Function  | No. | Function   |
|-----|---|-----|--|
| 1   | LED H2 (green), "on" indicator                      | 11  | EMC earthing clamps for ease of screen attachment                    |
| 2   | LED H1 (yellow), "error" indicator                  | 12  | Control unit KEYPAD KP100 <sup>1)</sup>                              |
| 3   | Terminal strip, control outputs                     | 13  | SMARTCARD <sup>1)</sup>  |
| 4   | Terminal strip, control inputs                      | 14  | Jumper strip J1 to J6  |
| 5   | Term. strip for design C9 (RS485) or C12 (RS232)    | 15  | ⊕ Connection point for protective earth and screen                   |
| 6   | Term. strip for design PTC or PT1                   | 16  | Name plate   |
| 7   | Socket for KEYPAD KP100                             | 17  | D-sub plug-in connections for design C2 (CAN-Bus) or C8 (INTERBUS-S) |
| 8   | Term.strip for braking resistor/ DC-link connection | 18  | KEYPAD KP100 cable (length 0.35 m)                                   |
| 9   | Terminal strip for power connections                | 19  | Housing cover  |
| 10  | KEYPAD KP100 connector                              |     |  |

### Regulations and standards

|            |  |  |
|------------|--|--|
| <b>CE</b>  | Conformity under the terms of Machinery Directive 89/392/EEC   | All VF1000M devices  |
| <b>UL</b>  | UL-recognized, FILE: E146022   | Application for test mark submitted (PROJECT No.: 97ME12052)               |
| <b>EMC</b> | Compliance with technical standards EN50081-1 (interference emission: residential environment) EN50082-2 (interference immunity: industrial environment) | All VF1000M devices, with use of an appropriate mains filter <sup>1)</sup> |

<sup>1)</sup> For further information see "Accessories"

# CHAPTER 2 TECHNICAL SPECIFICATIONS VF1000M

**New!**  
Available  
from Sep.97

|   | Des.   | Dim.               | VF1205M | VF1207M                      | VF1404M | VF1406M                | VF1408M | VF1410M |         |
|---|--|--------------------|---------|------------------------------|---------|------------------------|---------|---------|---------|
| <b>Output motor-side</b>                                  | Rec. rated power with 4-pole standard motor          | P                  | kW      | 1,1                          | 1,5     | 1,5                    | 2,2     | 3       | 4       |
|   | Device power referred to mains voltage <sup>1)</sup> | S                  | kVA     | 1,9                          | 2,7     | 2,6                    | 3,8     | 5,4     | 6,3     |
|   | Voltage  | U                  | V       | 3 x 0 ... 230                |         | 3 x 0 ... 400/460      |         |         |         |
|   | Rated current <sup>1)</sup> (230 V)                  | I <sub>N</sub>     | A       | 4,5                          | 6,2     | -                      | -       | -       | -       |
|   | Rated current <sup>1)</sup> (400/460 V)              | I <sub>N</sub>     | A       | -                            | -       | 3,5/3,1                | 5/4,7   | 7,2/6,3 | 8,9/7,7 |
|   | Cont. current <sup>1)</sup> (230 V)                  | 1,1xI <sub>N</sub> | A       | 5                            | 6,8     | -                      | -       | -       | -       |
|   | Cont. current <sup>1)</sup> (400/460 V)              | 1,1xI <sub>N</sub> | A       | -                            | -       | 3,8/3,4                | 5,5/5,1 | 7,9/7,0 | 9,8/8,5 |
|   | Overload current <sup>1)</sup> for 60 s              | 1,5xI <sub>N</sub> | A       | 6,8                          | 9,8     | 5,3                    | 7,5     | 10,8    | 13,3    |
|   | Phase-sequence frequency                             | f                  | Hz      | 0...400                      |         |                        |         |         |         |
|   | Frequency resolution                                 | -                  | %       | 0,1 from FMAX (0,05 Hz min.) |         |                        |         |         |         |
| <b>Input mains-side</b>                                   | Mains voltage  | U                  | V       | 1 x 230 +15/-20%             |         | 3 x 400 -15%/ 460 +10% |         |         |         |
|   | Asymmetry of mains voltage                           |                    | %       | -                            |         | ≤ 3                    |         |         |         |
|   | Frequency  | f                  | Hz      | 48 ... 62                    |         |                        |         |         |         |
|   | Rec. mains fusing                                    | I                  | AT      | 1 x 16                       | 1 x 16  | 3 x 10                 | 3 x 10  | 3 x 10  | 3 x 16  |
|   | Efficiency <sup>1) 3)</sup>                          | η                  | %       | 94                           | 94      | 95                     | 95      | 96      | 95      |
|   | Power loss <sup>3)</sup>                             | P <sub>V</sub>     | W       | 65                           | 82      | 80                     | 100     | 120     | 150     |
| <b>Brake chopper with design version (BR1)</b>            | Peak braking power with integral braking res.        | P <sub>Sp</sub>    | kW      | 1,65 max.                    |         |                        |         |         |         |
|   | Cyclic braking                                       | P <sub>eff</sub>   | W       | 90                           | 90      | 90                     | 90      | 90      | 90      |
| <b>External braking resistor connection <sup>2)</sup></b> | Minimum braking res. for external mounting           | R <sub>min</sub>   | Ω       | 50                           | 50      | 180                    | 180     | 180     | 180     |
|   | Brake chopper starting voltage                       | U <sub>ZK</sub>    | VDC     | 390                          | 390     | 760                    | 760     | 760     | 760     |

<sup>1)</sup> Referred to power stage switching frequency of 8 kHz

<sup>2)</sup> Not permitted for design BR1

<sup>3)</sup> At rated voltage and rated current

# CHAPTER 2 TECHNICAL SPECIFICATIONS VF1000M

**New!**  
Available  
from Sep. 97

## Ambient conditions

|  | Bez.         | Dim. | VF1205M   | VF1207M | VF1404M | VF1406M        | VF1408M | VF1410M |
|--|--------------|------|---|---------|---------|----------------|---------|---------|
| Cooling air temperature (1000 m above sea level)         | $T_N$        | °C   | 0 ... 40  |         |         |                |         |         |
| Type of cooling  |              |      | Convection  |         |         | Forced cooling |         |         |
| Relative air humidity                                    | rF           | %    | 15 ... 85, non-condensing (VDE0160)                         |         |         |                |         |         |
| Power reduction as a function of cooling air temperature | $\Delta P_T$ | %/°C | 2,5 in range 40 ... 50 °C                                   |         |         |                |         |         |
| Power reduction as a function of mounting height         | $\Delta P_H$ | %/m  | 5 per 1000 m above sea level<br>max. 2000 m above sea level |         |         |                |         |         |
| Storage temperature                                      | $T_L$        | °C   | -25 ... +55 (VDE0160)                                       |         |         |                |         |         |
| Transport temperature                                    | $T_T$        | °C   | -25 ... +70 (VDE0160)                                       |         |         |                |         |         |
| Permissible vibration                                    |              |      | 2 g (IEC 68-2-6)  |         |         |                |         |         |
| Protection   | -            | -    | IP20, VBG4, NEMA 1  |         |         |                |         |         |
| Mounting   | -            | -    | Vertical wall mounting                                      |         |         |                |         |         |
| Mass   | m            | Kg   | 3,75  |         |         |                |         |         |
| Dimensions   | A            | mm   | 34,5  |         |         |                |         |         |
|  | B            | mm   | 4,8   |         |         |                |         |         |
|  | C            | mm   | 330/344 <sup>4)</sup>                                       |         |         | 344            |         |         |
|  | D            | mm   | 315   |         |         |                |         |         |
|  | E            | mm   | 69  |         |         |                |         |         |
|  | F            | mm   | 245   |         |         |                |         |         |
|  | F1           | mm   | 112 <sup>5)</sup>   |         |         |                |         |         |
|  | G            | mm   | 40  |         |         |                |         |         |
|  | I            | mm   | 220 <sup>6)</sup>   |         |         |                |         |         |
|  |              |      |   |         |         |                |         |         |

<sup>4)</sup> Forced cooling with attachment fan in design FA

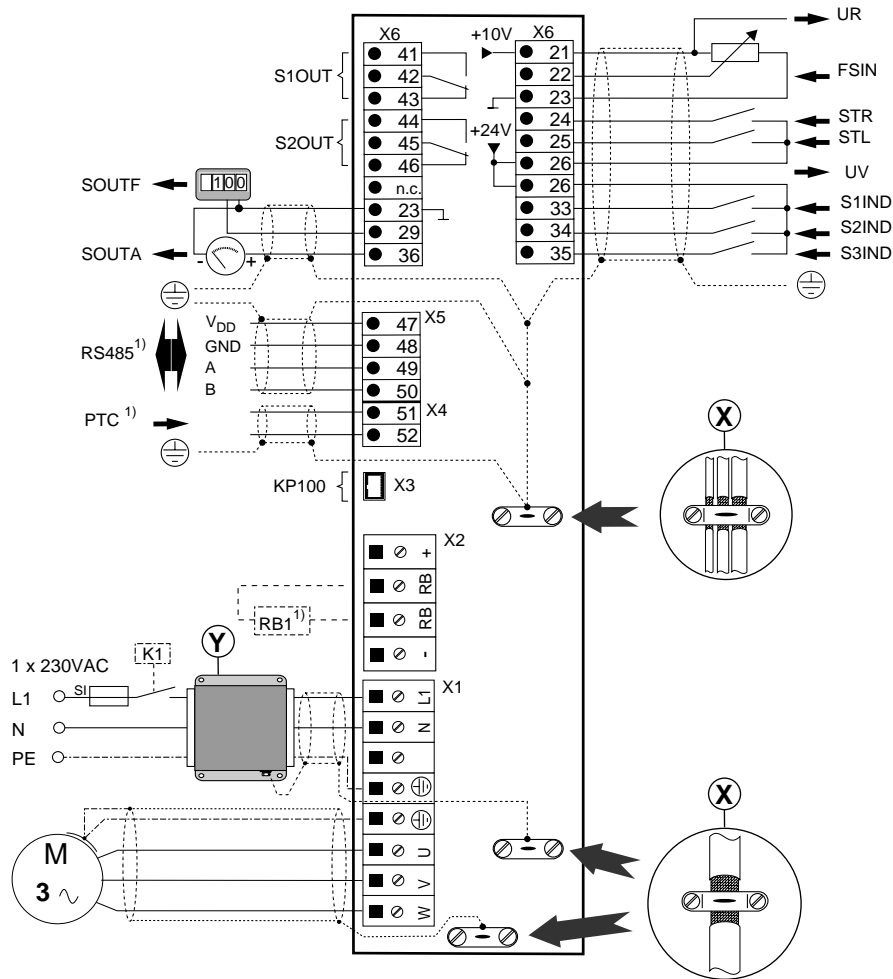
<sup>5)</sup> With flat device mounting, not possible with design FA

<sup>6)</sup> In design G16 (without terminal covering)

# CHAPTER 2 POWER AND CONTROL CONNECTIONS VF1200M

## Single-phase feed

VF1205M  
VF1207M



### Terminal assignment

| X6 | Des.  | Control connections  |
|----|-------|--|
| 21 | UR    | 10V for reference potentiometer  |
| 22 | FSIN  | Reference frequency input<br>0-10 V, 2-10 V, 0-20 mA, 4-20 mA<br>0-1 kHz, 0-10 kHz,<br>0-100 % PWM, 20-100 % PWM |
| 23 | Frame | Controller reference point   |
| 24 | STR   | Start-Right input  |
| 25 | STL   | Start-Left input   |
| 26 | UV    | Control voltage 24 V DC  |
| 29 | SOUTF | Digital frequency output   |
| 33 | S1IND | Programmable input, digital  |
| 34 | S2IND | Programmable input, digital  |
| 35 | S3IND | Programmable input, digital  |
| 36 | SOUTA | Prog. output analog  |
| 41 | S1OUT | NC contact of relay 1  |
| 42 |       | Center spring of relay 1   |
| 43 |       | NO contact of relay 1  |
| 44 | S2OUT | NC contact of relay 2  |
| 45 |       | Center spring of relay 2   |
| 46 |       | NO contact of relay 2  |

| X1                    | Power connections   |
|-----------------------|---|
| L1, N, $\oplus$       | Mains connection 1 x 230 V  |
| $\oplus$ U, V, W      | Motor connection 3 x 230 V  |
| X2/ +, -              | Connection for dc-link  |
| X2/ RB                | Connection for ext. braking resistor                                  |
| X3                    | Socket for control unit KeyPad KP100                                  |
| X4/51, 52             | Connection for motor PTC <sup>1)</sup>                                |
| X5/<br>47, 48, 49, 50 | Terminals for interface RS485 <sup>1)</sup><br>or RS232 <sup>1)</sup> |
| K1                    | Connection example, line contactor                                    |
| Y                     | Connection example for external mains filter                          |
| $\oplus$              | Protective earth  |
| X                     | EMC earthing clamps for ease of screen attachment                     |

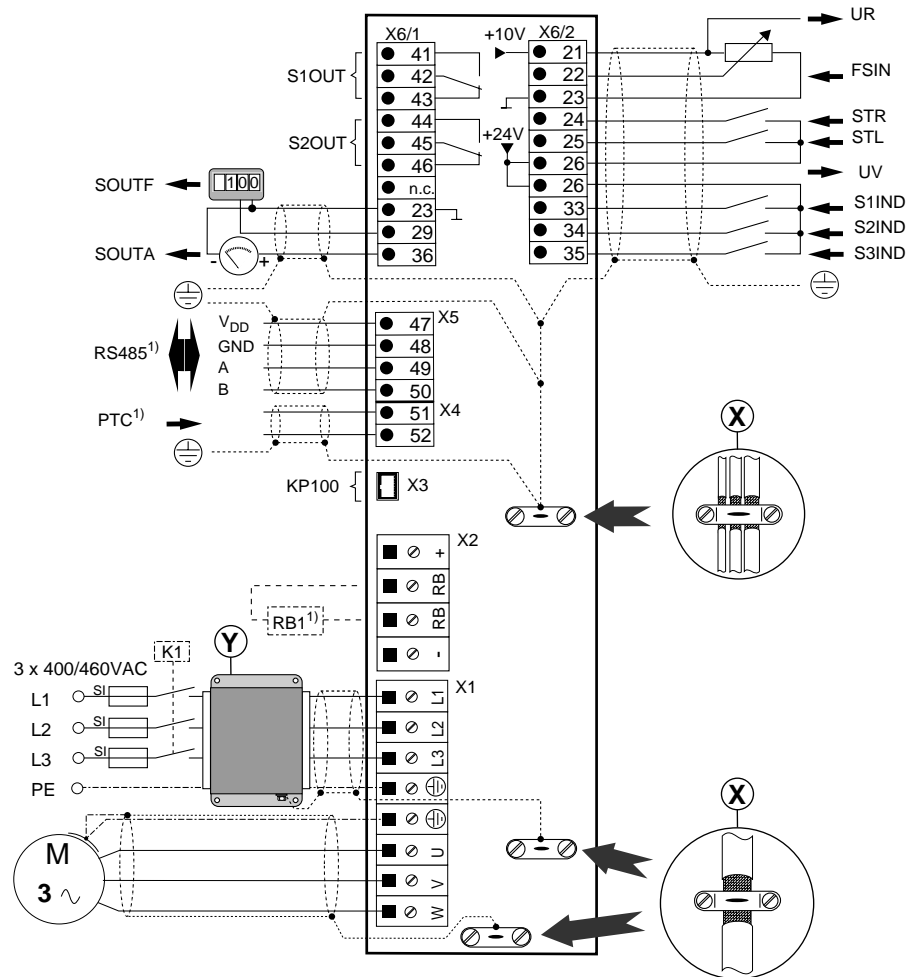
<sup>1)</sup> Terminal function depends on the design version ordered.



# CHAPTER 2 POWER AND CONTROL CONNECTIONS VF1400M

## Three-phase feed

VF1404M  
VF1406M  
VF1408M  
VF1410M



### Terminal assignment

| X6 | Des.  | Control connections  |
|----|-------|--|
| 21 | UR    | 10V for reference potentiometer  |
| 22 | FSIN  | Reference frequency input<br>0-10 V, 2-10 V, 0-20 mA, 4-20 mA<br>0-1 kHz, 0-10 kHz,<br>0-100 %PWM, 20-100 %PWM |
| 23 | Frame | Controller reference point   |
| 24 | STR   | Start-Right input  |
| 25 | STL   | Start-Left input   |
| 26 | UV    | Control voltage 24 V DC  |
| 29 | SOUTF | Digital frequency output   |
| 33 | S1IND | Programmable input, digital  |
| 34 | S2IND | Programmable input, digital  |
| 35 | S3IND | Programmable input, digital  |
| 36 | SOUTA | Prog. output analog  |
| 41 | S1OUT | NC contact of relay 1  |
| 42 |       | Center spring of relay 1   |
| 43 |       | NO contact of relay 1  |
| 44 | S2OUT | NC contact of relay 2  |
| 45 |       | Center spring of relay 2   |
| 46 |       | NO contact of relay 2  |

| X1                 | Power connections   |
|--------------------|---|
| L1,L2,L3 ⊕         | Mains connection 3 x 400/460 V  |
| ⊕ U,V,W            | Motor connection 3 x 400/460 V  |
| X2/ +, -           | Connection for dc-link  |
| X2/ RB             | Connection for ext. braking resistor                                  |
| X3                 | Socket for control unit KEYPAD KP100                                  |
| X4/51, 52          | Connection for motor PTC <sup>1)</sup>                                |
| X5/<br>47,48,49,50 | Terminals for interface<br>RS485 <sup>1)</sup> or RS232 <sup>1)</sup> |
| K1                 | Connection example, line contactor                                    |
| Y                  | Connection example for external mains filter                          |
| ⊕                  | Protective earth  |
| X                  | EMC earthing clamps for ease of screen attachment                     |

<sup>1)</sup> Terminal function depends on the design version ordered.

# CHAPTER 2 ORDERING INFORMATIONS FOR VF1000M

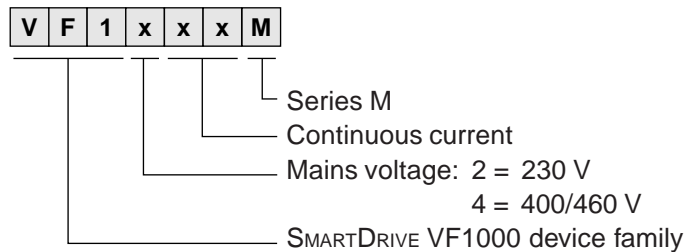
## General

The standard version of the VF1000M frequency inverter is identified by the type designation. Other non-standard designs are identified by suffix design codes appended to the order designation.

Each design code has its own special meaning (see design versions of VF1000M). For inverters not quoted in the list design codes not given here are also used.

From the design options shown, only one design version per terminal location may be ordered.

## Order/type designation



## Standard design:

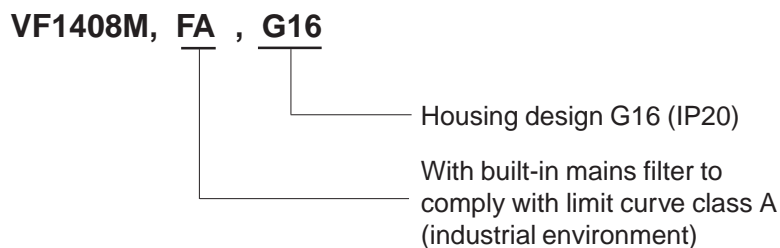
- Varnished all-metal housing with metal cover for KEYPAD KP100 mounting, protection IP20
- With brake chopper power electronics, without braking resistor in device heat sink
- Operation Manual in German

## Non-standard design code



The design code is separated by a comma, and can be written in any order

## Example



## CHAPTER 2 DESIGN CODES OF THE VF1000M

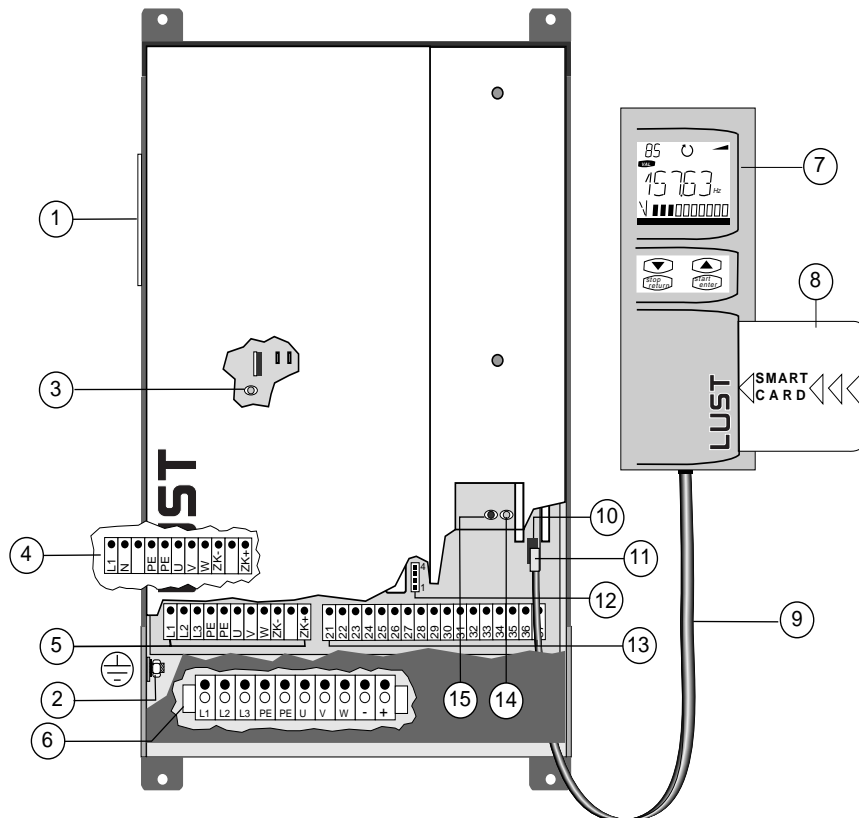
| Terminal location     | Design code | Short description   |
|-----------------------|-------------|---|
| Interface 1           | Standard    | No function   |
|                       | C2          | CAN-BUS interface   |
|                       | C8          | INTERBUS-S interface for remote bus connection  |
|                       | TR          | Technical Controller with an additional analog input ( $\pm 10$ V)  |
|                       | S58         | Technical Controller  |
|                       | CP          | Prepared for PROFIBUS Gateway type CP-DP1 (see "Accessories")   |
| Interface 2           | Standard    | No function   |
|                       | C9          | RS485 isolated to terminals   |
|                       | C12         | RS232 isolated to terminals   |
| Temperature monitor   | Standard    | No function   |
|                       | PTC         | Thermistor evaluation to DIN 44081/44082 with short-circuit monitoring  |
|                       | PT1         | Evaluation of an automatic circuit-breaker thermostat   |
| Braking resistor      | Standard    | Brake chopper power electronics, without braking resistor in device heat sink   |
|                       | BR1         | Brake chopper power electronics, with braking resistor in device heat sink  |
| Integral mains filter | Standard    | Without mains filter  |
|                       | FA          | With built-in mains filter to comply with limit curve class A (industrial environment)<br><b>Attention:</b> Inverter type VF1410M is not available with built-in mains filter FA. To comply with limit curve classes A and B an external mains filter must be used (see "Accessories"). |
| Housing               | Standard    | Varnished all-metal housing with metal cover for KEYPAD KP100 mounting  |
|                       | G16         | Standard housing design without terminal covering (metal cover), no mounting option for KEYPAD KP100  |

Only one design version per terminal location is possible.

**Note:** The KEYPAD KP100 control unit must be ordered separately. For further information see "Accessories".

# CHAPTER 3 FREQUENCY INVERTERS VF1000L AND VF1000L, HF

## Design and layout



## Legend

| No. | Function  | No. | Function                                       |
|-----|---|-----|--|
| 1   | Name plate  | 7   | Control unit KEYPAD KP100 <sup>1)</sup>        |
| 2   | Connection point for protective earth and screen          | 8   | SMARTCARD <sup>1)</sup>                        |
| 3   | LED (yellow) signals brake chopper activity               | 9   | KEYPAD KP100 cable (length 0.35 m)             |
| 4   | Terminal strip for power connections, VF1209L             | 10  | Terminal strip for interface RS485             |
| 5   | Terminal strip for power connections, VF1410L ... VF1414L | 11  | Socket for KEYPAD KP100                        |
| 6   | Terminal strip for power connections, VF1418L ... VF1445L | 12  | Jumper strip                                   |
|     |   | 13  | Terminal strip, control connections detachable |
|     |   | 14  | LED H1 (yellow), "error" indicator             |
|     |   | 15  | LED H2 (green), "on" indicator                 |

## Regulations and standards

|            |  |  |
|------------|--|--|
| <b>CE</b>  | Conformity under the terms of Machinery Directive 89/392/EEC | All VF1000L devices  |
| <b>UL</b>  | UL-recognized, FILE: E146022                                 | All VF1000L devices  |
| <b>EMC</b> | Compliance with technical standards                          | VF1209L/VF1410/14/18L with mains filter <sup>1)</sup>                      |
|            | EN50081-1 (interference emission: residential environment)   | VF1424/32/45L with mains filter <sup>1)</sup>                              |
|            | EN50082-2 (interference immunity: industrial environment)    | All VF1000L devices, with use of an appropriate mains filter <sup>1)</sup> |

<sup>1)</sup> For further information see "Accessories"

# CHAPTER 3 TECHNICAL SPECIFICATION VF1000L

## Output motor-side

## Input mains-side

## Brake chopper

## Ambient conditions

|  | Des.               | Dim. | VF1209L   | VF1410L                | VF1414L                 | VF1418L                 | VF1424L               | VF1432L               | VF1445L                 |
|--|--------------------|------|---|------------------------|-------------------------|-------------------------|-----------------------|-----------------------|-------------------------|
| Rec. rated power with 4-pole standard motor              | P                  | kW   | 2,2   | 4,0                    | 5,5                     | 7,5                     | 11                    | 15                    | 22                      |
| Device power referred to mains voltage                   | S                  | kVA  | 3,8 <sup>1)</sup>   | 6,7 <sup>1)</sup>      | 9,5 <sup>1)</sup>       | 12,6 <sup>1)</sup>      | 17,5 <sup>2)</sup>    | 22,8 <sup>2)</sup>    | 32,7 <sup>4)</sup>      |
| Voltage  | U                  | V    | 3x0...230   | 3 x 0 ... 400/460      |                         |                         |                       |                       |                         |
| Rated current (230 V)                                    | I <sub>N</sub>     | A    | 9,6 <sup>1)</sup>   | -                      | -                       | -                       | -                     | -                     | -                       |
| Rated current (400/460 V)                                | I <sub>N</sub>     | A    | -   | 8,9/7,8 <sup>1)</sup>  | 12,5/10,8 <sup>1)</sup> | 16,5/14,4 <sup>1)</sup> | 23/20 <sup>2)</sup>   | 30/26 <sup>2)</sup>   | 43/38 <sup>4)</sup>     |
| Continuous current (230 V)                               | 1,1xI <sub>N</sub> | A    | 10,5 <sup>1)</sup>  | -                      | -                       | -                       | -                     | -                     | -                       |
| Continuous current (400/460 V)                           | 1,1xI <sub>N</sub> | A    | -   | 9,8/8,6 <sup>1)</sup>  | 13,8/11,3 <sup>1)</sup> | 18,2/16 <sup>1)</sup>   | 25,3/22 <sup>2)</sup> | 33/28,6 <sup>2)</sup> | 47,3/41,8 <sup>4)</sup> |
| Overload current <sup>1)</sup> for 60 s                  | 1,5xI <sub>N</sub> | A    | 14,4 <sup>1)</sup>  | 13,5 <sup>1)</sup>     | 18,8 <sup>1)</sup>      | 25 <sup>1)</sup>        | 34,5 <sup>2)</sup>    | 45 <sup>2)</sup>      | 56 <sup>4)</sup>        |
| Phase-sequence frequency                                 | f                  | Hz   | 0...400   |                        |                         |                         |                       |                       | 0 ... 200               |
| Frequency resolution                                     | -                  | %    | 0,1 from FMAX (0,05 Hz min.)                                |                        |                         |                         |                       |                       |                         |
| Mains voltage  | U                  | V    | 1 x 230V<br>+15/-20%  | 3 x 400 -15%/ 460 +10% |                         |                         |                       |                       |                         |
| Asymmetry of mains voltage                               | -                  | %    | -   | ≤ 3                    |                         |                         |                       |                       |                         |
| Frequency  | f                  | Hz   | 48 ... 62   |                        |                         |                         |                       |                       |                         |
| Rec. mains fusing  | I                  | AT   | 1 x 16  | 3 x 16                 | 3 x 20                  | 3 x 25                  | 3 x 35                | 3 x 50                | 3 x 63                  |
| Efficiency <sup>1) 3)</sup>                              | η                  | %    | 95  | 96                     | 97                      | ≤ 97                    | ≤ 97                  | ≤ 97                  | ≤ 97                    |
| Power loss   | P <sub>V</sub>     | W    | 140   | 160                    | 180                     | 225                     | 330                   | 400                   | 500                     |
| Peak braking power                                       | P <sub>Sp</sub>    | kW   | 1,65  | 6,0                    |                         |                         |                       |                       |                         |
| Cyclic braking   | P <sub>eff</sub>   | W    | 90  | 60                     | 0                       | 40                      | 110                   | 0                     | 0                       |
| Cooling air temperature (up to 1000 m above sea level)   | T <sub>N</sub>     | °C   | 0 ... 40  |                        |                         |                         |                       |                       |                         |
| Type of cooling  |                    |      | Forced cooling  |                        |                         |                         |                       |                       |                         |
| Relative air humidity                                    | rF                 | %    | 15 ... 85, non-condensing (VDE 0160)                        |                        |                         |                         |                       |                       |                         |
| Power reduction as a function of cooling air temperature | ΔP <sub>T</sub>    | %/°C | 2,5 in range 40 ... 50 °C                                   |                        |                         |                         |                       |                       |                         |
| Power reduction as a function of mounting height         | ΔP <sub>H</sub>    | %/m  | 5 per 1000 m above sea level<br>max. 2000 m above sea level |                        |                         |                         |                       |                       |                         |
| Storage temperature                                      | T <sub>L</sub>     | °C   | -25 ... +55 (VDE0160)                                       |                        |                         |                         |                       |                       |                         |
| Transport temperature                                    | T <sub>T</sub>     | °C   | -25 ... +70 (VDE0160)                                       |                        |                         |                         |                       |                       |                         |
| Permissible vibration                                    |                    |      | 2 g (IEC 68-2-6)  |                        |                         |                         |                       |                       |                         |
| Protection   | -                  | -    | IP20, VBG4  |                        |                         |                         |                       |                       |                         |
| Mounting   | -                  | -    | Vertical wall mounting                                      |                        |                         |                         |                       |                       |                         |

<sup>1)</sup> Figures relate to a power stage switching frequency of 8 kHz

<sup>2)</sup> Figures relate to a power stage switching frequency of 3.9 kHz

<sup>3)</sup> At rated voltage and rated current

<sup>4)</sup> Figures relate to a power stage switching frequency of 1.9 kHz

# CHAPTER 3 TECHNICAL SPECIFICATION VF1000L, HF

## FMAX = 800 Hz

### Software setting

The data table is valid at a power stage switching frequency of 7.8 kHz (74-PWM = 2) and a phase-sequence frequency up to max. 800 Hz.

### Output motor-side

|  | Des.               | Dim. | VF1408L, HF             | VF1410L, HF | VF1414L, HF | VF1418L, HF | VF1424L, HF |
|--|--------------------|------|-------------------------|-------------|-------------|-------------|-------------|
| Device power                                 | S                  | kVA  | 4,9                     | 6,1         | 8,6         | 11,4        | 15,9        |
| Voltage                                      | U                  | V    | 3 x 0 ... 400/ 460      |             |             |             |             |
| Rated current <sup>1)</sup> (400/460 V)      | I <sub>N</sub>     | A    | 7,2/6,2                 | 8,9/7,8     | 12,5/10,8   | 16,5/14,5   | 23/20       |
| Continuous current <sup>1)</sup> (400/460 V) | 1,1xI <sub>N</sub> | A    | 8/6,8                   | 9,8/8,6     | 13,8/11,9   | 18,2/16     | 25,3/22     |
| Overload current <sup>1)</sup> for 60 s      | 1,5xI <sub>N</sub> | A    | 10,8                    | 13,5        | 18,8        | 25          | 34,5        |
| Phase-sequence frequency                     | f                  | Hz   | 0 ... 800               |             |             |             |             |
| Mains voltage                                | U                  | V    | 3 x 400 -15% / 460 +10% |             |             |             |             |
| Asymmetry of mains voltage                   | -                  | %    | ≤ 3                     |             |             |             |             |
| Frequency                                    | f                  | Hz   | 48 ... 62               |             |             |             |             |
| Rec. mains fusing                            | I                  | AT   | 3 x 16                  | 3 x 16      | 3 x 20      | 3 x 25      | 3 x 35      |
| Efficiency <sup>1) 3)</sup>                  | η                  | %    | 96                      | 96          | 97          | 97          | 97          |
| Power loss <sup>3)</sup>                     | P <sub>V</sub>     | W    | 130                     | 170         | 200         | 240         | 350         |

### Input mains-side

<sup>3)</sup> At rated voltage and rated current

## FMAX = 1600 Hz

### Software setting

The data table is valid at a power stage switching frequency of 15.6 kHz (74-PWM = 3) and a phase-sequence frequency up to max. 1600 Hz.

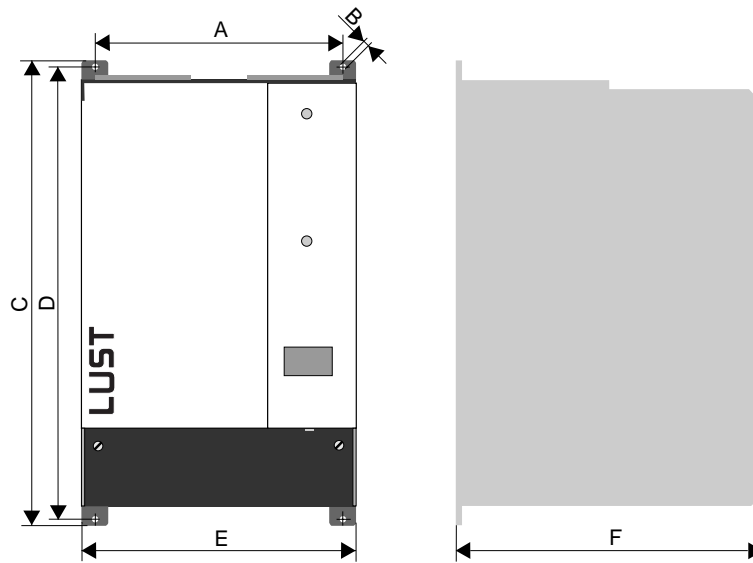
### Output motor-side

|  | Des.               | Dim. | VF1408L, HF             | VF1410L, HF | VF1414L, HF | VF1418L, HF | VF1424L, HF |
|--|--------------------|------|-------------------------|-------------|-------------|-------------|-------------|
| Device power                                 | S                  | kVA  | 3,8                     | 4,9         | 6,1         | 8,6         | 11,4        |
| Voltage                                      | U                  | V    | 3 x 0 ... 400/ 460      |             |             |             |             |
| Rated current <sup>1)</sup> (400/460 V)      | I <sub>N</sub>     | A    | 5,6/4,8                 | 7,2/6,2     | 8,9/7,8     | 12,5/10,8   | 16,5/14,4   |
| Continuous current <sup>1)</sup> (400/460 V) | 1,1xI <sub>N</sub> | A    | 6,2/5,3                 | 8/6,8       | 9,8/8,6     | 13,8/11,9   | 18,2/16     |
| Overload current <sup>1)</sup> for 60 s      | 1,5xI <sub>N</sub> | A    | 8,4                     | 10,8        | 13,5        | 18,8        | 25          |
| Phase-sequence frequency                     | f                  | Hz   | 0 ... 1600              |             |             |             |             |
| Mains voltage                                | U                  | V    | 3 x 400 -15% / 460 +10% |             |             |             |             |
| Asymmetry of mains voltage                   | -                  | %    | ≤ 3                     |             |             |             |             |
| Frequency                                    | f                  | Hz   | 48 ... 62               |             |             |             |             |
| Rec. mains fusing                            | I                  | AT   | 3 x 16                  | 3 x 16      | 3 x 20      | 3 x 25      | 3 x 35      |
| Efficiency <sup>1) 3)</sup>                  | η                  | %    | 95                      | 95          | 95          | 96          | 96          |
| Power loss <sup>3)</sup>                     | P <sub>V</sub>     | W    | 110                     | 130         | 170         | 200         | 240         |

### Input mains-side

<sup>3)</sup> At rated voltage and rated current

Dimensional drawing (referred to both dimension tables)

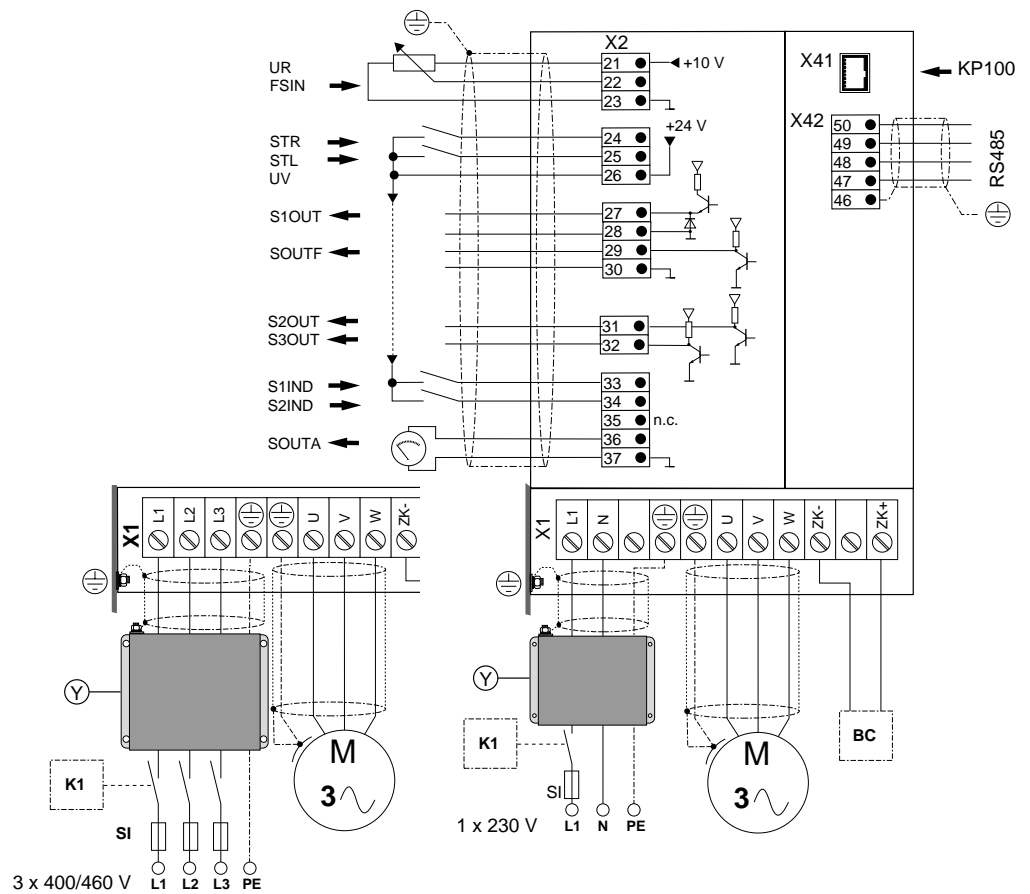


Dimension table VF1000L

|            | Des. | Dim. | VF1209L          | VF1418L | VF1424L  | VF1432L  | VF1445L  |
|------------|------|------|------------------|---------|----------|----------|----------|
|            |      |      | VF1410L, VF1414L |         |          |          |          |
| Mass       | M    | kg   | ca. 6,9          |         | ca. 10,1 | ca. 10,7 | ca. 11,5 |
| Dimensions | A    | mm   | 175              |         |          |          |          |
|            | B    | mm   | Ø 5,8            |         |          |          |          |
|            | C    | mm   | 350              |         |          |          |          |
|            | D    | mm   | 340              |         |          |          |          |
|            | E    | mm   | 210              |         |          |          |          |
|            | F    | mm   | 180              | 272     |          |          |          |

Dimension table VF1000L, HF

|            | Des. | Dim. | VF1408L, HF | VF1410L, HF | VF1414L, HF | VF1418L, HF | VF1424L, HF |
|------------|------|------|-------------|-------------|-------------|-------------|-------------|
|            |      |      | Mass        | M           | kg          | ca. 6,9     |             |
| Dimensions | A    | mm   | 175         |             |             |             |             |
|            | B    | mm   | Ø 5,8       |             |             |             |             |
|            | C    | mm   | 350         |             |             |             |             |
|            | D    | mm   | 340         |             |             |             |             |
|            | E    | mm   | 210         |             |             |             |             |
|            | F    | mm   | 180         | 272         |             |             |             |



In devices VF1418L ... 1445L the earthing stud  $\oplus$  is located on the right-hand side panel.

**Terminal assignment**

| X2          | Des.  | Control connections  |
|-------------|-------|--|
| 21          | UR    | 10 V for reference potentiometer   |
| 22          | FSIN  | Reference frequency input<br>0-10 V, 2-10 V, 0-20 mA, 4-20 mA<br>0-1 kHz, 0-10 kHz,<br>0-100 %PWM, 20-100 %PWM |
| 23,28,30,37 |       | Frame, controller reference point  |
| 24          | STR   | Start-Right input  |
| 25          | STL   | Start-Left input   |
| 26          | UV    | Control voltage 24 V DC  |
| 27          | S1OUT | Prog. output HIGH active   |
| 29          | SOUTF | Digital frequency output   |
| 31          | S2OUT | Prog. output LOW active  |
| 32          | S3OUT | Prog. output LOW active  |
| 33          | S1IND | Prog. input, digital   |
| 34          | S2IND | Prog. input, digital   |
| 36          | SOUTA | Prog. output analog  |

| X1                 | Power connections                                       |
|--------------------|---|
| L1,N, $\oplus$     | Mains connection 1 x 230 V                              |
| L1,L2,L3, $\oplus$ | Mains connection 3 x 400/460 V                          |
| $\oplus$ U,V,W     | Motor connection  |
| ZK-<br>ZK+         | Connection for external brake chopper (BC), e.g. BC4000 |

|            |   |
|------------|---|
| <b>X41</b> | Socket for control unit<br>KEYPAD KP100 |
|------------|---|

|                                |                                 |
|--------------------------------|---------------------------------|
| <b>X42/<br/>47, 48, 49, 50</b> | Terminal for interface<br>RS485 |
|--------------------------------|---------------------------------|

|           |  |
|-----------|--|
| <b>K1</b> | Connection example, line contactor               |
| <b>Y</b>  | Connection example for external mains filter     |
| $\oplus$  | Connection point for protective earth and screen |



# CHAPTER 3 ORDERING INFORMATIONS FOR VF1000L

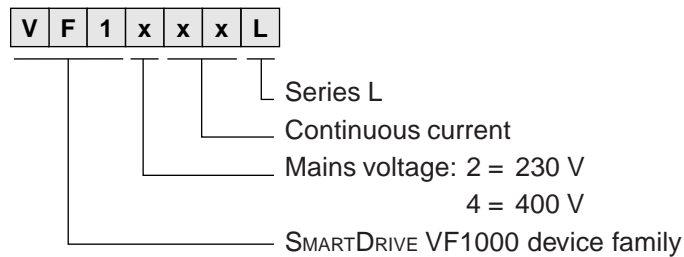
## General

The standard version of the VF1000L frequency inverter is identified by the type designation. Other non-standard designs are identified by suffix design codes appended to the order designation.

Each design code has its own special meaning (see design versions of VF1000L). For inverters not quoted in the list design codes not given here are also used.

From the design options shown, only one design version per terminal location may be ordered.

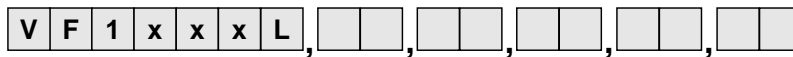
## Order/type designation



### Standard design:

- Varnished all-metal housing with metal cover for KEYPAD KP100 mounting, protection IP20
- With brake chopper power electronics and braking resistor in device heat sink
- With isolated RS485 interface
- Operation Manual in German

## Non-standard design code



The design code is separated by a comma, and can be written in any order.

## Example



## CHAPTER 3 DESIGN CODES OF THE VF1000L AND VF1000L, HF

### VF1000L

| Terminal location | Design code | Short description  |
|-------------------|-------------|--|
| Options           | Standard    | No function  |
|                   | C2          | CAN-Bus interface, isolated  |
|                   | OP1         | Direct clock input for reference input, without internal ramp generator function   |
|                   | OP2         | Thermistor evaluation to DIN 44081/44082 with short-circuit monitoring or automatic circuit-breaker thermostat evaluation of three-phase AC motors |
|                   | OP5         | 3rd digital control input  |
|                   | TR          | Technical Controller incl. 2 analog inputs ( $\pm 10$ V)   |
|                   | CP          | Prepared for PROFIBUS Gateway type CP-DP1 (see "Accessories")  |
| Software          | Standard    | Software function see operation manual   |
|                   | S58         | Technical Controller with one analog input (design codes C1, C2 and CP not possible)   |

Only one design version per terminal location is possible

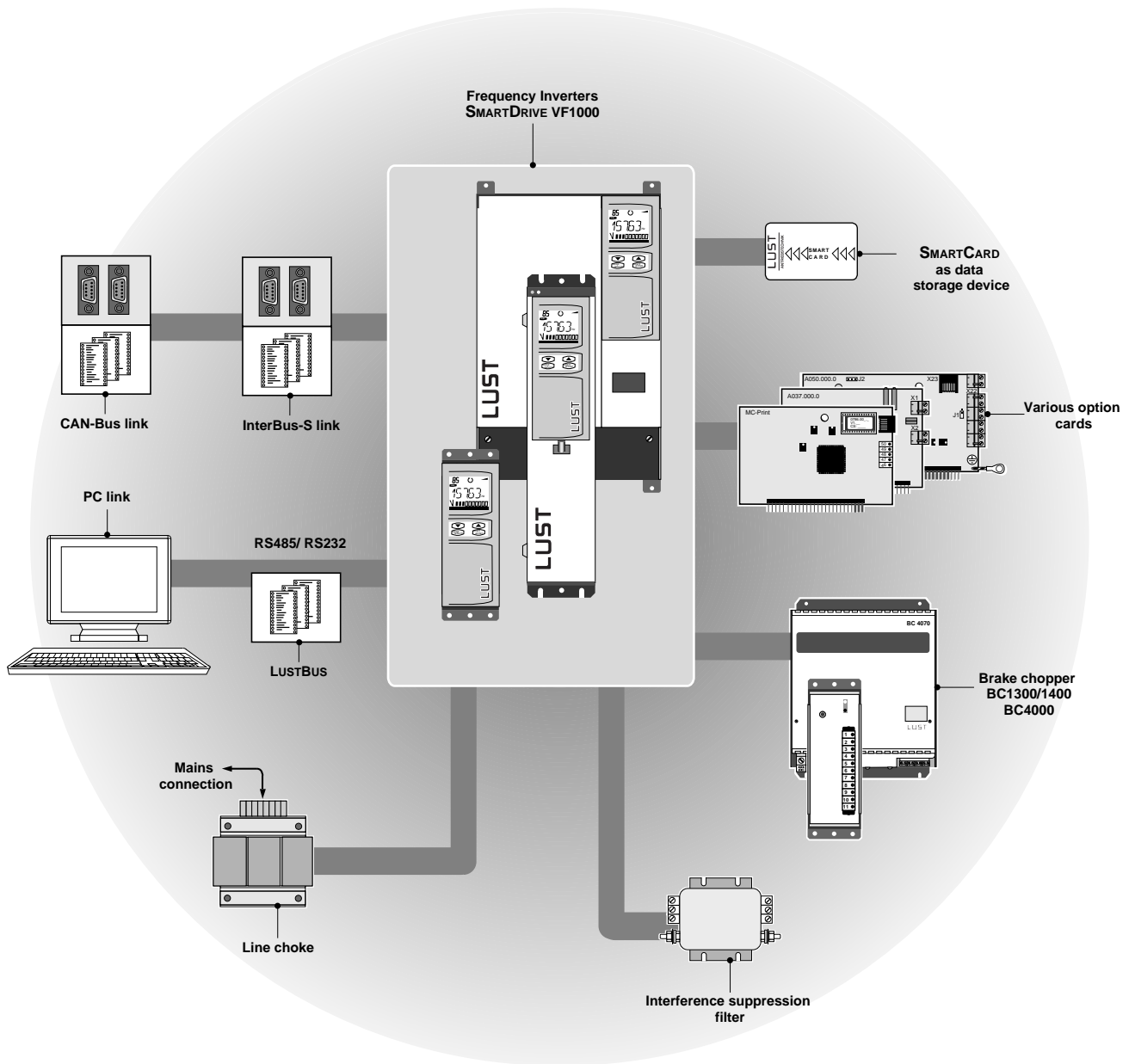
### VF1000L, HF

| Terminal location | Design code | Short description  |
|-------------------|-------------|--|
| Optionen          | Standard    | No function  |
|                   | OP1         | Direct clock input for reference input, without internal ramp generator function   |
|                   | OP2         | Thermistor evaluation to DIN 44081/44082 with short-circuit monitoring or automatic circuit-breaker thermostat evaluation of three-phase AC motors |
|                   | OP5         | 3rd digital control input  |

Only one design version per terminal location is possible

**Note:** The KEYPAD KP100 control unit must be ordered separately. For further information see "Accessories".

# CHAPTER 4 ACCESSORIES FOR VF1000S/M/L



# CHAPTER 4 MAINS FILTERS

The mains filters listed here enable EMC regulations to be met.

## Technical Specifications

| Inverter type                       | Order des.                    | Cable length                          | Limit curve   | Rated current                        | Leakage current   | Connections   |
|-------------------------------------|-------------------------------|---------------------------------------|---|--------------------------------------|---|---|
| VF1104S                             | NFE6.0<br>NFE12.3             | 5 m<br>25 m                           | Class B<br>Class B                                  | 6 A<br>12 A                          | $\leq 1,5$ mA<br>$\leq 5$ mA  | Tab connector A6,3 x 0,8<br>Terminals, 4 mm <sup>2</sup> max.   |
| VF1202S                             | NFE6.1<br>NFE12.3             | 5 m<br>25 m                           | Class B<br>Class B                                  | 6 A<br>12 A                          | 0,21 mA<br>$\leq 5$ mA  | Tab connector A6,3 x 0,8<br>Terminals, 4 mm <sup>2</sup> max.   |
| VF1204S                             | NFE6.0<br>NFE12.3             | 5 m<br>25 m                           | Class B<br>Class B                                  | 6 A<br>12 A                          | $\leq 1,5$ mA<br>$\leq 5$ mA  | Tab connector A6,3 x 0,8<br>Terminals, 4 mm <sup>2</sup> max.   |
| VF1402S                             | NFD4.1                        | 25 m                                  | Class B   | 4 A                                  | $\leq 22$ mA  | Terminals, 4 mm <sup>2</sup> max.   |
| VF1200M                             | NFE12.1<br>NFE12.3            | 15 m<br>100 m                         | Class A<br>Class B                                  | 12 A<br>12 A                         | $\leq 3,5$ mA<br>$\leq 5$ mA  | Line: term 1,5mm <sup>2</sup> , Load: cable<br>Terminals, 4 mm <sup>2</sup> max.  |
| VF1200M,FA                          | NFE12.1                       | 50 m<br>25 m                          | Class A<br>Class B                                  | 12 A<br>12 A                         | $\leq 7$ mA<br>$\leq 7$ mA  | Line: term 1,5mm <sup>2</sup> , Load: cable<br>Line: term 1,5mm <sup>2</sup> , Load: cable  |
| VF1400M                             | NFD10.1<br>NFD10.3<br>NFD12.1 | 15 m<br>100 m<br>25 m<br>25 m<br>15 m | Class A<br>Class A<br>Class B<br>Class A<br>Class B | 10 A<br>10 A<br>10 A<br>12 A<br>12 A | $\leq 5$ mA<br>$< 116$ mA<br>$< 116$ mA<br>$\leq 15$ mA<br>$\leq 15$ mA | Line: term 1,5mm <sup>2</sup> , Load: cable<br>Terminals 4 mm <sup>2</sup> max.<br>Terminals 4 mm <sup>2</sup> max.<br>Line: term 1,5mm <sup>2</sup> , Load: cable<br>Line: term 1,5mm <sup>2</sup> , Load: cable |
| VF1400M,FA <sup>1)</sup>            | NFD10.1                       | 25 m<br>15 m                          | Class A<br>Class B                                  | 10 A<br>10 A                         | $\leq 10$ mA<br>$\leq 10$ mA  | Line: term 1,5mm <sup>2</sup> , Load: cable<br>Line: term 1,5mm <sup>2</sup> , Load: cable  |
| VF1209L                             | NFE22.0                       | 25 m                                  | Class B   | 22 A                                 | $< 5$ mA  | Terminals, 4 mm <sup>2</sup> max.   |
| VF1410L<br>VF1414L<br>VF1408/10L,HF | NFD16.2                       | 100 m<br>*100 m                       | Class A<br>Class B                                  | 16 A<br>16 A                         | $< 178$ mA<br>$< 178$ mA  | Terminals, 4 mm <sup>2</sup> max<br>Terminals, 4 mm <sup>2</sup> max  |
| VF1418L<br>VF1414L,HF               | NFD25.1                       | 100 m<br>*100 m                       | Class A<br>Class B                                  | 25 A<br>25 A                         | $< 127$ mA<br>$< 127$ mA  | Terminals, 4 mm <sup>2</sup> max.<br>Terminals, 4 mm <sup>2</sup> max.  |
| VF1424L<br>VF1432L<br>VF1418/24L,HF | NFD35.0                       | 100 m<br>*100 m                       | Class A<br>Class B                                  | 35 A<br>35 A                         | $< 99$ mA<br>$< 99$ mA  | Terminals, 6 mm <sup>2</sup> max.<br>Terminals, 6 mm <sup>2</sup> max.  |
| VF1445L                             | NFD50.1                       | 100 m<br>*100 m                       | Class A<br>Class B                                  | 50 A<br>50 A                         | $< 140$ mA<br>$< 140$ mA  | Terminals, 16 mm <sup>2</sup> max.<br>Terminals, 16 mm <sup>2</sup> max.  |

\* With line choke

<sup>1)</sup> The inverter VF1410M is not available in design FA.

Using a mains filter does not limit the inverter power data.

Rated voltage: 1 x 230 V +10 % oder 3 x 480 V +10 %

Overload:  $1,5 \times I_N$  for 1 minute per 30 minutes

Inverter parameters: = Factory setting

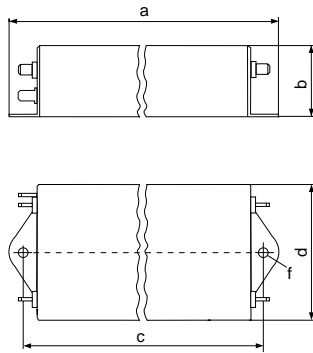
Line: = Filter input

Load: = Filter output

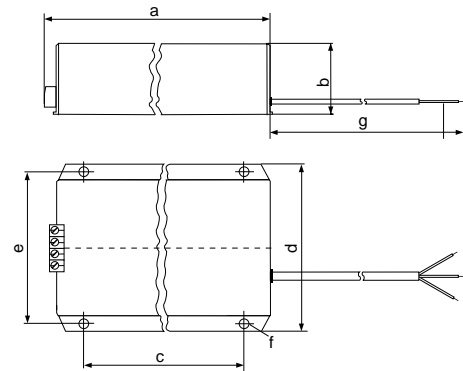
# CHAPTER 4 MAINS FILTERS

## Dimensional drawings

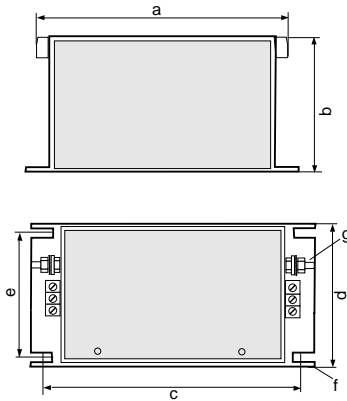
NFE6.0, NFE6.1



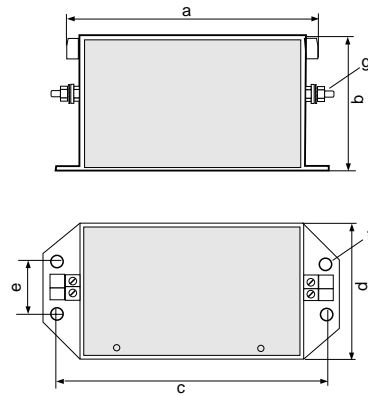
NFD10.1, NFD12.1, NFE12.1



NFE22.0, NFD10.3, NFD16.2  
NFD25.1, NFD35.0, NFD50.1



NFE12.3, NFD4.1



## Dimension table

| Order des.            | a    | b    | c   | d    | e  | f     | g   |
|-----------------------|------|------|-----|------|----|-------|-----|
| NFE6.0                | 159  | 44,5 | 143 | 50,8 | –  | Ø 4,7 | –   |
| NFE6.1                | 88,4 | 40   | 75  | 52   | –  | 5,3   | –   |
| NFE12.1 <sup>1)</sup> | 101  | 50   | 51  | 70   | 61 | Ø 4,7 | 550 |
| NFE12.3               | 120  | 65   | 110 | 65   | 35 | Ø 4,5 | M4  |
| NFE22.0               | 240  | 95   | 230 | 45   | 36 | Ø 4,5 | M5  |
| NFD4.1                | 130  | 68   | 120 | 80   | 35 | Ø 4,5 | M4  |
| NFD10.1 <sup>1)</sup> | 101  | 50   | 51  | 70   | 61 | Ø 4,7 | 550 |
| NFD10.3               | 240  | 95   | 230 | 45   | 36 | Ø 4,5 | M5  |
| NFD12.1 <sup>1)</sup> | 143  | 50   | 51  | 70   | 61 | Ø 4,7 | 550 |
| NFD16.2               | 255  | 95   | 245 | 73   | 64 | Ø 4,5 | M5  |
| NFD25.1               | 255  | 95   | 245 | 73   | 64 | Ø 4,5 | M5  |
| NFD35.0               | 255  | 95   | 245 | 73   | 64 | Ø 4,5 | M5  |
| NFD50.1               | 290  | 100  | 275 | 90   | 76 | Ø 7   | M5  |

1) With factory-assembled screened cable.

All dimensions in mm

## CHAPTER 4 LINE CHOKES

In accordance with VDE 0160 and VDE 0839, only limited system perturbations and commutation notches are permitted. In order to limit these perturbations when the frequency inverter is in operation, line chokes with 4% short-circuit voltage must be used.

### Technical Specifications

| Inverter type                       | Order and type des. | Rated current [A] | Power loss [W] | Inductance [mH] | Mass [kg] | Connection                          |
|-------------------------------------|---------------------|-------------------|----------------|-----------------|-----------|-------------------------------------|
| VF1202S                             | END4                | 4                 | 5,8            | 7               | 0,4       | Terminals, 2,5 mm <sup>2</sup> max. |
| VF1204S                             | END7                | 7                 | 8,2            | 4               | 0,75      | Terminals, 2,5 mm <sup>2</sup> max. |
| VF1402S                             | DND2                | 2                 | 6              | 14,6            | 0,5       | Terminals, 2,5 mm <sup>2</sup> max. |
| VF1205M                             | END10               | 10                | 12             | 3               | 0,75      | Terminals, 4 mm <sup>2</sup> max.   |
| VF1207M                             | END20               | 20                | 20             | 1,46            | 1,6       | Terminals, 4 mm <sup>2</sup> max.   |
| VF1404M                             | DND6                | 6                 | 18             | 4,8             | 1,6       | Terminals, 4 mm <sup>2</sup> max.   |
| VF1406M                             | DND6                | 6                 | 18             | 4,8             | 1,6       | Terminals, 4 mm <sup>2</sup> max.   |
| VF1408M                             | DND10               | 10                | 31             | 2,9             | 2,5       | Terminals, 4 mm <sup>2</sup> max.   |
| VF1410M                             | DND10               | 10                | 31             | 2,9             | 2,5       | Terminals, 4 mm <sup>2</sup> max.   |
| VF1209L                             | END20               | 20                | 20             | 3               | 0,75      | Terminals, 4 mm <sup>2</sup> max.   |
| VF1410L<br>VF1408L,HF<br>VF1410L,HF | DND10               | 10                | 31             | 2,9             | 2,5       | Terminals, 4 mm <sup>2</sup> max.   |
| VF1414L<br>VF1414L,HF               | DND14               | 15                | 39             | 2,0             | 3,8       | Terminals, 4 mm <sup>2</sup> max.   |
| VF1418L                             | DND18               | 18                | 51             | 1,6             | 3,8       | Terminals, 4 mm <sup>2</sup> max.   |
| VF1424L<br>VF1418L,HF<br>VF1424L,HF | DND24               | 25                | 54             | 1,2             | 3,8       | Terminals, 4 mm <sup>2</sup> max.   |
| VF1432L                             | DND32               | 34                | 75             | 0,86            | 3,8       | Terminals, 6 mm <sup>2</sup> max.   |
| VF1445L                             | DND45               | 50                | 96             | 0,58            | 6,5       | Terminals, 16 mm <sup>2</sup> max.  |

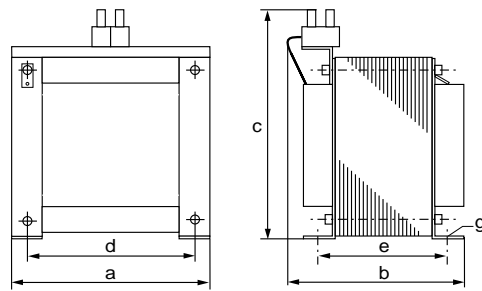
Rated voltage:    END  1 x 220 ... 240 V  
                       DND  3 x 380 ... 415 V, other voltages on request

Short-circuit  
 voltage.:        4 %

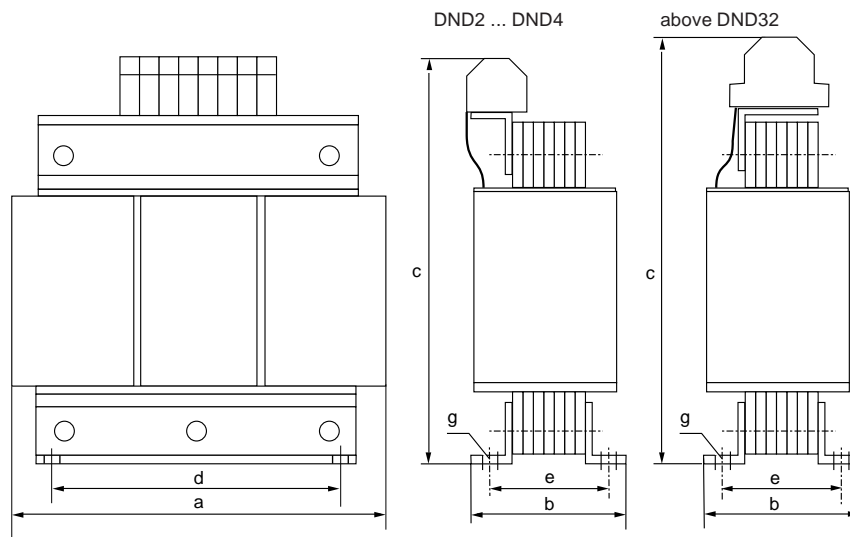
Insulation class: T40/B to VDE 0550/ 0532

# CHAPTER 4 LINE CHOKES

**Dimensional drawing,  
END**



**Dimensional drawing,  
DND**



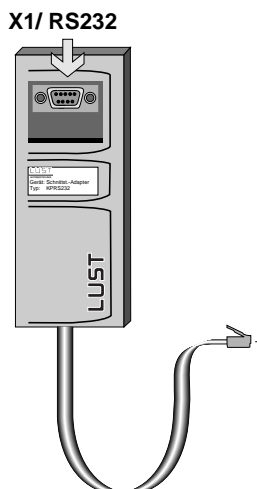
**Dimension table**

| Order and type des. | a   | b  | c   | d   | e  | g     |
|---------------------|-----|----|-----|-----|----|-------|
| END4                | 54  | 58 | 75  | 45  | 35 | Ø 3,5 |
| END7                | 60  | 72 | 72  | 50  | 50 | Ø 3,5 |
| END10               | 66  | 65 | 75  | 55  | 46 | Ø 4,5 |
| END20               | 84  | 70 | 90  | 70  | 52 | Ø 4,8 |
| DND2                | 80  | 44 | 92  | 50  | 30 | Ø 4,5 |
| DND6                | 100 | 60 | 105 | 60  | 44 | Ø 4,8 |
| DND10               | 120 | 64 | 120 | 84  | 55 | Ø 4,8 |
| DND14               | 150 | 67 | 167 | 113 | 49 | Ø 5,8 |
| DND18               | 150 | 67 | 167 | 113 | 49 | Ø 5,8 |
| DND24               | 150 | 67 | 190 | 113 | 49 | Ø 5,8 |
| DND32               | 150 | 67 | 190 | 113 | 49 | Ø 5,8 |
| DND45               | 180 | 76 | 195 | 136 | 57 | Ø 7,0 |

All dimensions in mm.

# CHAPTER 4 ACCESSORIES FOR DEVICE OPERATION

## Interface adapter KPRS232



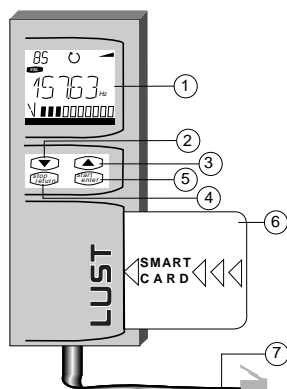
### Order designation KPRS232

The KPRS232 interface adapter allows an inverter of the VF1000 family to be connected to a computer with an RS232 serial port. It isolates the KEYPAD connection of the inverter from the computer. Power is supplied to the device from the inverter.

A standard commercially available interface cable can be used for the link from the interface adapter to the computer.

Dimensions: H x W x D  
158 x 62 x 21 [mm]

## Control unit KEYPAD KP100

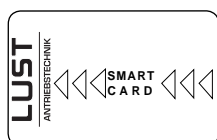


### Order designation KP100

| No. | Designation       | Function   |
|-----|-------------------|--|
| ①   | LCD display panel | 140 segments, backlit green/red                          |
| ②   | Down cursor       | Scroll back within the menu structure                    |
| ③   | Up cursor         | Scroll forward within the menu structure                 |
| ④   | Stop/return key   | Stop (CTRL menu), cancel or quit selected menu           |
| ⑤   | Start/enter key   | Start (CTRL menu), confirm or select menu                |
| ⑥   | SMARTCARD         | Chipcard data storage device, storage of device settings |
| ⑦   | Connecting cable  | Maximum length 0.35 m                                    |

Dimensions: H x W x D  
158 x 62 x 21 [mm]

## SMARTCARD



### Order designation SC

For data backup and transmission, all inverter parameters can be stored on the SMARTCARD and then transferred without problem onto other frequency inverters.



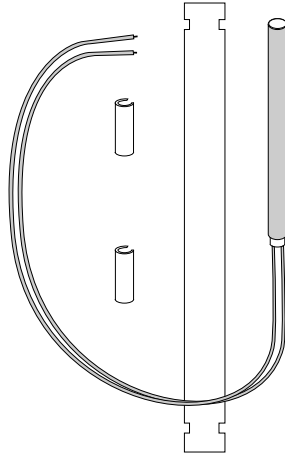
# CHAPTER 4 BRAKING RESISTOR ACCESSORIES FOR VF1000M

## Braking resistor ZBR5

### Order designation ZBR5

The ZBR5 add-on is designed for mounting in the heat sinks of inverters VF1205M and VF1207M.

|                    | Dim. | VF1205M<br>incl. ZBR5 | VF1207M<br>incl. ZBR5 |
|--------------------|------|-----------------------|-----------------------|
| Peak braking power | kW   | 1,65                  | 1,65                  |
| Cyclic braking     | W    | 90                    | 90                    |



## Braking resistor ZBR4

### Order designation ZBR4

The ZBR4 add-on is designed for mounting in the heat sinks of inverters VF1404M, VF1406M, VF1408M and VF1410M.

|                    | Dim. | VF1404M<br>incl. ZBR4 | VF1406M<br>incl. ZBR4 | VF1408M<br>incl. ZBR4 | VF1410M<br>incl. ZBR4 |
|--------------------|------|-----------------------|-----------------------|-----------------------|-----------------------|
| Peak braking power | kW   | 1,65                  | 1,65                  | 1,65                  | 1,65                  |
| Cyclic braking     | W    | 90                    | 90                    | 90                    | 90                    |

# CHAPTER 4 BRAKE CHOPPERS BC1300/1400 FOR VF1000S

## Technical Specifications

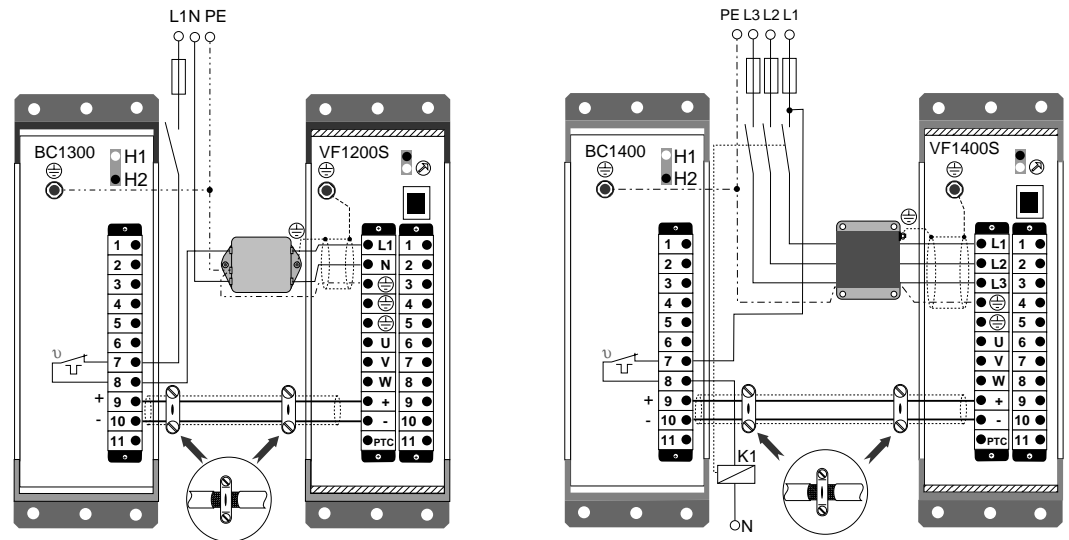
|                                 | Des.              | Dim.            | BC1300                               | BC1400 |
|---------------------------------|-------------------|-----------------|--------------------------------------|--------|
| Braking power at 100% cdf       | $P_{\text{eff}}$  | W               | 90                                   | 90     |
| Braking power at 50% cdf        | $P_{\text{eff}}$  | W               | 140                                  | 140    |
| Braking power at 25% cdf        | $P_{\text{eff}}$  | W               | 210                                  | 210    |
| Braking power at 12% cdf        | $P_{\text{eff}}$  | W               | 310                                  | 310    |
| Braking power at 6% cdf         | $P_{\text{eff}}$  | W               | 450                                  | 450    |
| Peak braking power              | $P_{\text{Sp}}$   | kW              | 1,5                                  | 1,5    |
| Autom. power red. (after 6 s)   | $P_{\text{red.}}$ | kW              | 0,7                                  | 0,7    |
| Braking current                 | $I_{\text{Br}}$   | A DC            | 4,0                                  | 2,7    |
| Starting voltage                | $U_{\text{ein}}$  | V DC            | 390                                  | 750    |
| Stopping voltage                | $U_{\text{aus}}$  | V DC            | 381                                  | 740    |
| Braking resistor design         | -                 | -               | Heating cartridge                    |        |
| Terminal cross-section          | A                 | mm <sup>2</sup> | 1,5                                  |        |
| Term. 9/10 DC-link connection   | -                 | -               | Maximum length 0.5 m                 |        |
| Thermostatic switching contact  | -                 | -               | 250 V~ 10 A                          |        |
| <b>Ambient conditions</b>       |                   |                 |                                      |        |
| Protection                      | -                 | -               | IP10 (when mounted)                  |        |
| Cooling air temperature         | T                 | °C              | 0 ... 40                             |        |
| Mounting height above sea level | H                 | m               | 1000 max.                            |        |
| Relative air humidity           | rF                | %               | 15 ... 85, non-condensing (VDE 0160) |        |
| Permissible vibration           | -                 | -               | 2 g (IEC 68-2-6)                     |        |
| Mounting                        | -                 | -               | Vertical wall mounting               |        |
| <b>Mechanics</b>                |                   |                 |                                      |        |
| Mass                            | M                 | kg              | 0,5                                  |        |
| Dimensions                      | A                 | mm              | 20                                   |        |
|                                 | B                 | mm              | Ø 4,8                                |        |
|                                 | C                 | mm              | 183                                  |        |
|                                 | D                 | mm              | 170                                  |        |
|                                 | E                 | mm              | 65                                   |        |
|                                 | F                 | mm              | 120                                  |        |
|                                 |                   |                 |                                      |        |

cdf = continuous duty factor with 120 s cycle duration

# CHAPTER 4 BRAKE CHOPPERS BC1300/1400 FOR VF1000S

The BC1300 brake chopper is designed for VF1000S frequency inverters with 230 V rated voltage, and the BC1400 for VF1000S inverters with 400 V. Both brake choppers have the braking resistor already built-in, and require no additional power supply.

## Connection diagram



## Terminal assignment

| BC-term. | Meaning   |
|----------|---|
| 5, 6     | Connections not occupied                                      |
| 7, 8     | Bimetal switch output for thermal monitoring of brake chopper |
| 4, 9     | (+) input, inverter DC-link                                   |
| 1, 10    | (-) input, inverter DC-link                                   |
| 11       | Connection not occupied                                       |
| 2, 3     | Connection of ext. braking resistor (on request)              |
| H1       | Red LED, brake chopper active                                 |
| H2       | Green LED, ready  |
| ⊕        | Connection point for protective earth and screen              |

**Note:** There is a direct correlation between the switching threshold of the brake chopper and the connected mains voltage of the inverter. For this reason, only the following combinations are possible:

BC1300 → VF1202S or VF1204S  
 BC1400 → VF1402S

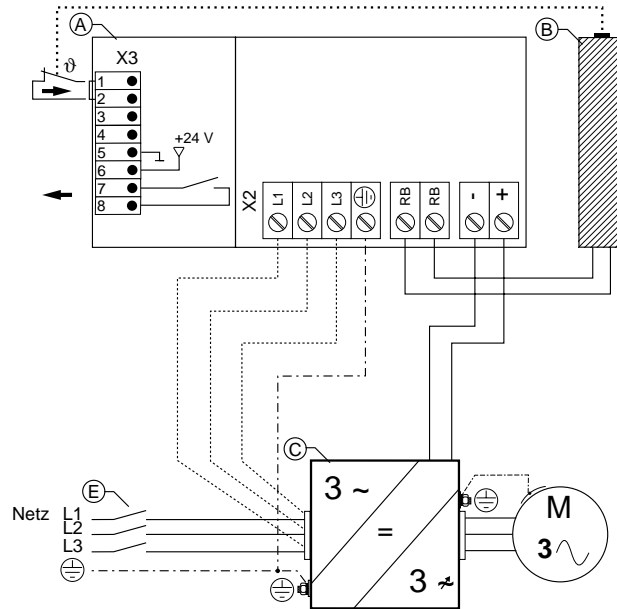
# CHAPTER 4 BRAKE CHOPPER UNIT BC4000 FOR VF1000L

## Technical Specifications

|   | Des.       | Dim.        | BC4020  | BC4070 |
|---|------------|-------------|---|--------|
| Suitable for inverter mains voltage         | $U_{UN}$   | V AC        | 230 (starting voltage $U_{dcl} = 365$ V DC)<br>400 (starting voltage $U_{dcl} = 635$ V DC)<br>460 (starting voltage $U_{dcl} = 725$ V DC) |        |
| Min. braking resistance ( $U_{UN} = 230$ V) | $R_{min.}$ | $\Omega$    | 18  | 5,1    |
| Min. braking resistance ( $U_{UN} = 400$ V) | $R_{min.}$ | $\Omega$    | 33  | 9,1    |
| Min. braking resistance ( $U_{UN} = 460$ V) | $R_{min.}$ | $\Omega$    | 37  | 11     |
| Peak braking current                        | $I_{SP}$   | A DC        | 20  | 70     |
| Continuous braking current                  | $I_D$      | A DC        | 5   | 30     |
| <b>Ambient conditions</b>                   |            |             |   |        |
| Protection                                  | -          | -           | IP10 (when mounted)   |        |
| Cooling air temperature                     | T          | $^{\circ}C$ | 0 ... 40  |        |
| Mounting height above sea level             | H          | m           | 1000 max.   |        |
| Relative air humidity                       | rF         | %           | 15 ... 85, non-condensing   |        |
| Permissible vibration                       | -          | -           | 2 g (IEC 68-2-6)  |        |
| <b>Mechanics</b>                            |            |             |   |        |
| Mounting                                    | -          | -           | Vertical wall mounting  |        |
| Mass  | M          | kg          | 0,98  | 5,1    |
| Dimensions                                  | A          | mm          | 100   | 176    |
|   | B          | mm          | $\varnothing 5$   |        |
|   | C          | mm          | 256   |        |
|   | D          | mm          | 246   |        |
|   | E          | mm          | 137   | 216    |
|   | F          | mm          | 77  | 162    |
|   |            |             |   |        |

The BC4000 brake chopper unit is designed for VF1000L frequency inverters. It consists of the switching electronics, and for braking it additionally requires external braking resistors. No mains connection is required to supply power to the unit (with the starting voltage adjusted manually by means of the jumper strip).

Connection diagram (schematic)



Legend

| No. | Meaning                     |
|-----|-----------------------------|
| A   | Brake chopper BC4000        |
| B   | Braking resistor (external) |
| C   | Frequency inverter          |
| E   | Inverter power switch       |

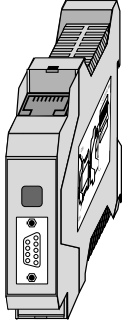
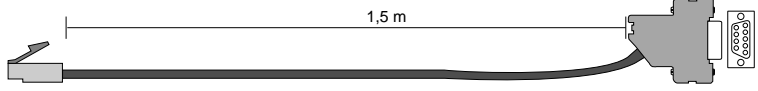



Terminal assignment

| X2       | Meaning  |
|----------|--|
| L1,L2,L3 | Mains connection, only required with automatic adjustment of starting power to mains power |
| ⊕        | Connection point for protective earth and screen   |
| RB       | Connections for braking resistor (external)  |
| +, -     | Connections for inverter DC-link   |
| X3       | Meaning  |
| 1,2      | Input, braking resistor temperature switch   |
| 3,4      | Unoccupied   |
| 5        | Frame reference point  |
| 6        | Control voltage 24 V DC ± 20%  |
| 7,8      | Relay output, ready  |

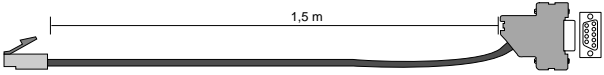
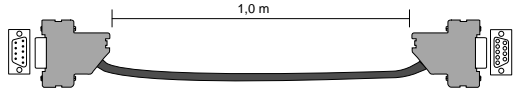
# CHAPTER 4 ACCESSORIES FOR PROFIBUS-DP

## PROFIBUS-DP Gateway

Order designation: CP-DP1

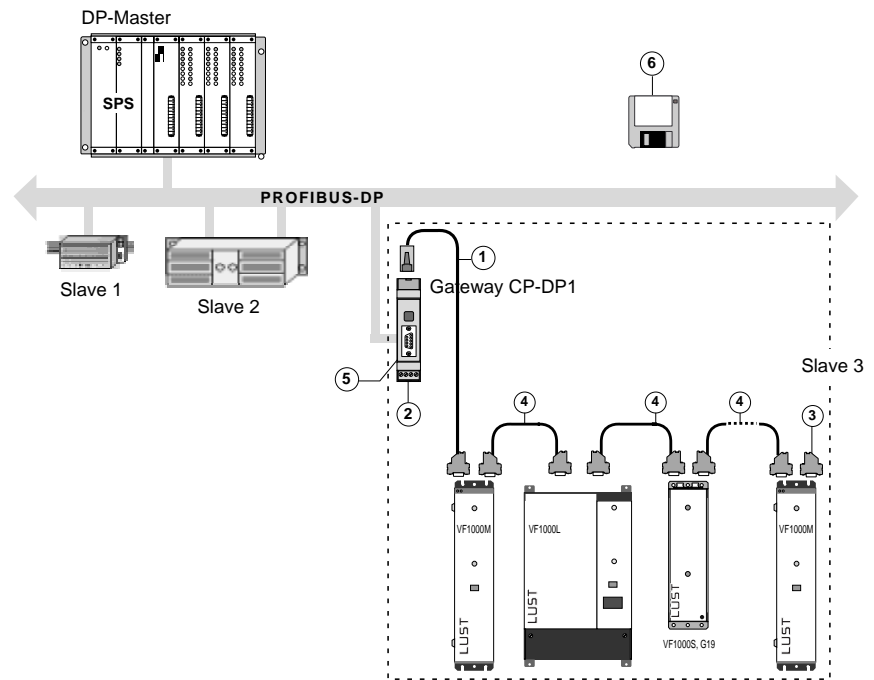
| Device  | Supplied accessories   |   |
|---|--|---|
|  | Gateway cable<br>                            |   |
|   | 8-pin western plug for 9-pin D-SUB socket<br> |   |
|   | bus termination plug<br>                      | disk with GSD data files<br> |

## Technical data

|                                      | PROFIBUS-DP Gateway CP-DP1  |
|--------------------------------------|---|
| suitable for inverter                | VF1000S,G19,FA,CP,xx<br>VF1000M,CP,xx<br>VF1000L,CP   |
| hardware/protocol                    | DIN19245 T1+T3 / EN50170 volume 2   |
| transmission rate                    | 9,6 kBit/s to 12MBit/s adjustable   |
| transmission length                  | 12000 m to 100 m (see transmission rate)  |
| stations per Gateway                 | Max. 10 stations  |
| Gateway cable                        | <br>belongs to the scope of supply of the Gateway |
| Lust system bus cable                | <br>belongs to the scope of supply of the drive   |
| disk with GSD and ASCII data files   | belongs to the scope of supply of the Gateway   |
| bus termination plug                 | belongs to the scope of supply of the Gateway   |
| PPO (parameter-process-data objects) | PPO type 1 and 3 are supported  |
| supply voltage                       | 24 V DC $\pm$ 20 %  |
| current input                        | 1,2 A DC $\pm$ 10 %   |
| mounting                             | 35 mm DIN-rail  |
| dimensions                           | 22,5 x 99 x 119 mm (BxHxT)  |
| ambient temperature                  | 0 - 50 °C non-condensing  |

# CHAPTER 4 ACCESSORIES FOR PROFIBUS-DP

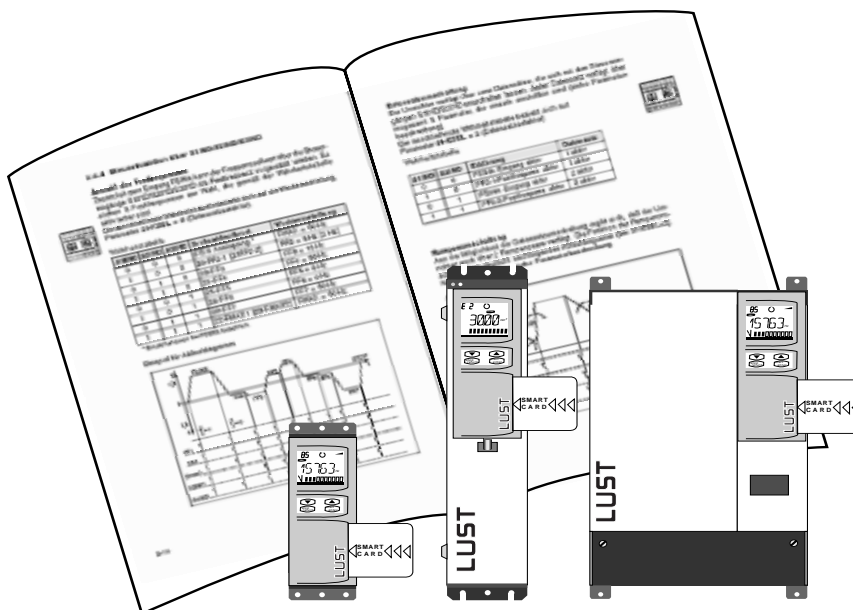
## Networking example



## Legend

| No. | Function   |
|-----|--|
| 1   | Gateway cable (supplied with the Gateway)              |
| 2   | connection 24 V supply voltage                         |
| 3   | bus termination plug (supplied with the Gateway)       |
| 4   | Lust system bus cable type I (supplied with the drive) |
| 5   | connection to the PROFIBUS-DP                          |
| 6   | disk with GSD data files (supplied with the drive)     |

# CHAPTER 4 USER INFORMATION FOR VF1000S/M/L



## Frequency inverters

| Device type | Order des. | Language       | Description   |
|-------------|------------|----------------|---|
| VF1000S     | 0720.01B.0 | German         | Operation manual for standard device, incl. designs I1, I5, I6, I7, G8, G10, K1 |
|             | 0720.21B.0 | English        | Operation manual for standard device, incl. designs I1, I5, I6, I7, G8, G10, K1 |
|             | 0720.11B.0 | German/English | Version description, G19  |
|             | 0720.02B.0 | German/English | Version description, M3, M4   |
|             | 0720.03B.0 | German/English | Version description, C8   |
|             | 0720.04B.0 | German/English | Version description, C2   |

|         |            |         |   |
|---------|------------|---------|---|
| VF1000M | 0809.01B.0 | German  | Operation manual for standard device, incl. designs C2, C8, PTC, PT1, FA, G16 |
|         | 0809.21B.0 | English | Operation manual for standard device, incl. designs C2, C8, PTC, PT1, FA, G16 |
|         | 0809.03B.0 | German  | Mounting instructions, ZBR4 and ZBR5  |
|         | 0809.23B.0 | English | Mounting instructions, ZBR4 and ZBR5  |
|         | 0809.02B.0 | German  | Version description S58, TR   |
|         | 0809.22B.0 | English | Version description S58, TR   |



## CHAPTER 4

## USER INFORMATION FOR VF1000S/M/L

### Frequency inverters

| Device type | Order des. | Language | Description  |
|-------------|------------|----------|--|
| VF1000L     | 0786.01B.0 | German   | Operation manual for standard device, incl. designs HF, C1, C2 |
|             | 0786.21B.0 | English  | Operation manual for standard device, incl. designs HF, C1, C2 |
|             | A050.01B.0 | German   | Version description, OP1, OP2                                  |
|             | A050.21B.0 | English  | Version description, OP1, OP2                                  |
|             | A037.01B.0 | German   | Version description, OP5                                       |
|             | A037.21B.0 | English  | Version description, OP5                                       |
|             | 0809.02B.0 | German   | Version description S58, TR                                    |
|             | 0809.22B.0 | English  | Version description S58, TR                                    |

### Accessories

| Device type  | Order des.    | Language           | Description  |
|--------------|---------------|--------------------|--|
| KEYPAD KP100 | A021.02B.0    | German             | Operation manual for control unit                        |
|              | A021.21B.0    | English            | Operation manual for control unit                        |
| KPRS232      | A044.01B.0    | German             | Operation manual for interface adapter                   |
|              | A044.21B.0    | English            | Operation manual for interface adapter                   |
| BC1300/1400  | A031.01B.0    | German             | Operation manual for brake chopper, designed for VF1000S |
|              | A031.21B.0    | English            | Operation manual for brake chopper, designed for VF1000S |
| BC4000       | 0743.00B.0    | German             | Operation manual for brake chopper, designed for VF1000L |
|              | 0743.21B.0    | English            | Operation manual for brake chopper, designed for VF1000L |
| CP-DP1       | 0841.01B.0-00 | German/<br>English | Instruction manual for PROFIBUS-DP Gateway               |

## CHAPTER 4 USER INFORMATION FOR VF1000S/M/L

### Non-product-specific information sources

| For product | Order des.    | Language | Description  |
|-------------|---------------|----------|--|
| VF1000S/M/L | A040.02B.0    | German   | LUSTBUS data transfer protocol                                       |
| VF1000S/M/L | A040.22B.0    | English  | LUSTBUS data transfer protocol                                       |
| VF1000S/M/L | A047.02B.0    | German   | CAN-Bus data transfer protocol                                       |
| VF1000S/M/L | A047.22B.0    | English  | CAN-Bus data transfer protocol                                       |
| VF1000S/M/L | 0718.50B.0    | German   | INTERBUS-S data transfer protocol                                    |
| VF1000S/M/L | 0718.51B.0    | English  | INTERBUS-S data transfer protocol                                    |
| VF1000S/M/L | 0841.02B.0-00 | German   | PROFIBUS-DP data transmission protocol                               |
| VF1000S/M/L | 0841.22B.0-00 | English  | PROFIBUS-DP data transmission protocol                               |
| VF1000S/M/L | 0792.50B.0    | German   | Installation instructions for interconnection of LUSTBUS and CAN-Bus |
| VF1000S/M/L | 0792.51B.0    | English  | Installation instructions for interconnection of LUSTBUS and CAN-Bus |
| VF1000S/M/L | 0786.04B.0    | German   | Parameter description (total package)                                |
| VF1000S/M/L | 0786.24B.0    | English  | Parameter description (total package)                                |
| VF1000S/M/L | 0646.08B.0    | German   | Practical design hints to avoid system perturbations                 |

