FREQUENCY INVERTER

E800

0,2kW – 110kW (IP20)

Safety instructions Installation & operating manual

Mechanical construction

There are two different basic concepts:

Inverter with power range from 0,75 to 22 kW: POLYCARBONATE enclosure, build on a constructional base (heatsink) with the keypad integrated on the cover (not removable) – **framesize E1 – E6**

Inverter with power range from 18,5 to 90 kW: Steel panel, power and control terminals inside, with the keypad integrated in the cover and removable - **framesize C3 – C6**

Appearance of an E800 - Size E2 inverter

Technical data – inverter series E800

Power supply	Rated voltage	3-Phase 380…460V - 3 Ph. 220...240V - 1Ph. 220...240V - Tol. +/- 15%
	Input frequency	44….67 Hz
	EMC filter	Integrated for 2. Environment – C3 (up to 90 kW)
Output	Output voltage	0……...U-input
	Output frequency	0……...650 Hz
	Resolution of output frequency	0,01 Hz
	Overload capability	120% - 60 sec. / 10 Min
Control mode	PWM control-modes	V/Hz - Mode Permanentmagnet Synchronmotor control (Software option)
	PWM frequency	0,8…10 kHz
	V/Hz characteristic	Linear, quadratic, and user-programmable curve
	Torque boost	Automatic / Manual
	Motor data input	Manual input / intelligent AUTOTUNING function
	DC-Brake	Freq. threshold, duration and intensity programmable
	Brake chopper	Integrated chopper transistor (Brake resistors – see product table)
Display	7 Segment LED display -4- digit	For programming and visualization of different operating parameters
I/O Channels, control functions	Inverter control - Start/Stop	To configure: terminals / operation panel / serial link
	Digital control inputs	8 (5) digital inputs (HIGH/LOW configurable), pulse input
	Speed reference signal	Potentiometer (on operating panel / Extern), analogue input (terminals), operating panel keys, pulse input, serial link
	Reference analogue channels	2 Analogue channels 12 BIT 0…10V, 0..(4)20 mA (with programmable offset, gain – to concatenate mathematically each other)
	Analogue outputs	2 (1) analogue output channels, both programmable in gain, different functions to assign (0…10V, 0..20 mA)
	Digitale outputs	2 (1) digital outputs (different functions to assign)
	Relays output	1 switchover contact 5 A 230 V (programmable for different functions)
	Interface	Serial link (MODBUS – ASCI/RTU)
	Special function - control options	Jog mode, 12V / 50 mA auxiliary power supply on terminals
		PI-control
		Fixed frequency control "Catch on the fly function", AUTORESET/RESTART functions
Protection functions, incl. fault memory	Electrical protection functions	Overvoltage, Undervoltage
		Overcurrent, Overload, Motor-Overload, Output-short
		Phaseloss, Motor-Phase imbalance
	Thermal protection functions	Heatsink overtemperature – Motor overtemperature (PTC/KLIXON), Motor I^2xt
Optionals	Operating panel	Remote keypad / programming tool
	Brake resistors	High power resistors for heavy duty operation
	Filter / chokes	PFC chokes – dv/dt limiting output filter - sinusfilter
	PC-Link Software (via MODBUS)	Special tool for programming, control and diagnostic (parameter set memory)
Environmental conditions	Protection	IP20 – IP21 (optional)
	Operating temperature	-10……+50 °C
	Humidity	Max. 90 % not condensing, no corrosion
	Elavation	1000 m - 1% derating / 100m above
	Vibration	Max. 0,5 g
Power range		0,2……400 kW
Standards	EMC	EN61800-3(2004)
	Safety	EN61800-5-1 2003

Product range - framesize

Inverter 230V – 1 Phase

Model	Rated power / Current	Size	Enclosure	Dimensions (wxHxD - mm)	BR.Chopp.	Minimum brake resistor value
E800-0002 S2	0,2 kW - 1,5A	E1	POLYCARBONATE	80x138x135	INTEGRATED	80 Ohm / 100W
E800-0004 S2	0,4 kW - 2,5A	E1				
E800-0007 S2	0,75 kW - 4,5A	E1				
E800-0011 S2	1,1 kW - 7A	E2		106x180x150		
E800-0015 S2	1,5 kW - 7A	E2				
E800-0022 S2	2,2 kW - 10A	E2				

Inverter 230V – 3 Phase

Model	Rated power / Current	Size	Enclosure	Dimensions (WxHxD - mm)	BR.Chopp.	Minimum brake resistor value
E800-0002 S2	0,2 kW - 1,5A	E1	POLYCARBONATE	80x138x135	INTEGRIERT	80 Ohm / 100W
E800-0004 S2	0,4 kW - 2,5A	E1				
E800-0007 S2	0,75 kW - 4,5A	E1				
E800-0011 S2	1,1 kW - 7A	E2		106x180x150		
E800-0015 S2	1,5 kW - 7A	E2				
E800-0022 S2	2,2 kW - 10A	E2				

Inverter 400V – 3 Phase

| Model	Rated power / Current	Size	Enclosure	Dimensions (WxHxD - mm)	BR.Chopp.	Minimum brake resistor value
E800-0002 T3	0,2 kW – 0,6 A	E1	POLYCARBONATE	80x138x135	INTEGRATED	200 Ohm / 100W
E800-0004 T3	0,4 kW – 1 A	E1				
E800-0005 T3	0,55 kW – 1,5 A	E1				
E800-0007 T3	0,75 kW - 2 A	E2		106x180x150		150 Ohm / 100W
E800-0011 T3	1,1 kW – 3 A	E2				100 Ohm / 100W
E800-0015 T3	1,5 kW – 4 A	E2				
E800-0022 T3	2,2 kW - 6,5 A	E2				
E800-0037 T3	3,0 kW - 8 A	E4		138x235x152		80 Ohm / 300W
E800-0040 T3	4,0 kW - 9 A	E4				
E800-0055 T3	5,5 kW - 12 A	E4				
E800-0075 T3	7,5 kW - 17 A	E5		156x265x170		80 Ohm / 600W
E800-0110 T3	11 kW - 23 A	E5		205x340x196		50 Ohm / 600W
E800-0150 T3	15 kW - 32 A	E6				30 Ohm / 1000W
E800-0185 T3R	18,5 kW - 38 A	E6				
E800-0220 T3R	22 kW - 44 A	E6				
E800-0300 T3R	30 kW - 60 A	C3	SHEET METAL	270x435x235		20 Ohm / 1500W
E800-0370 T3R	37 kW - 75 A	C3				
E800-0450 T3R	45 kW - 90 A	C4		315x480x235		15 Ohm / 2000W
E800-0550 T3R	55 kW - 110 A	C5		369x555x265		
E800-0750 T3R	75 kW - 150 A	C5				10 Ohm / 3000W
E800-0900 T3R	90 kW - 180 A	C6		410x630x300		8 Ohm / 10000W

4) Electrical connection of E800 Inverters
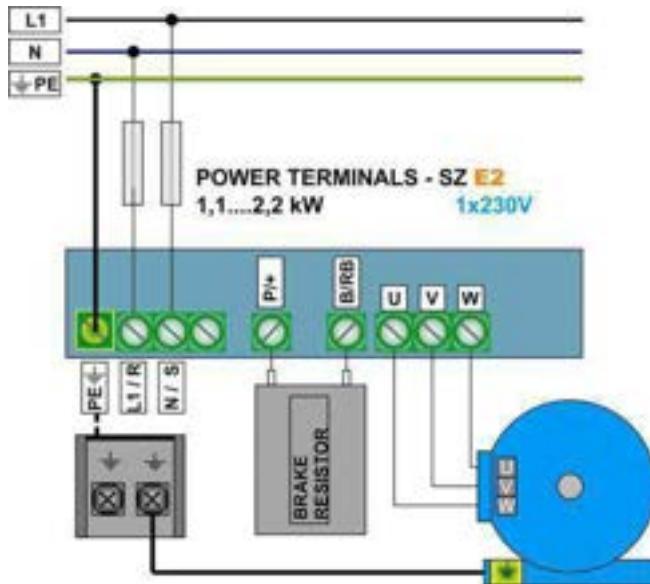
E800 inverters have separate terminals for power- and control-connection. Adequate cables are requested for wiring the inverter, all safety rules, reported in the first chapter of this manual are to observe.
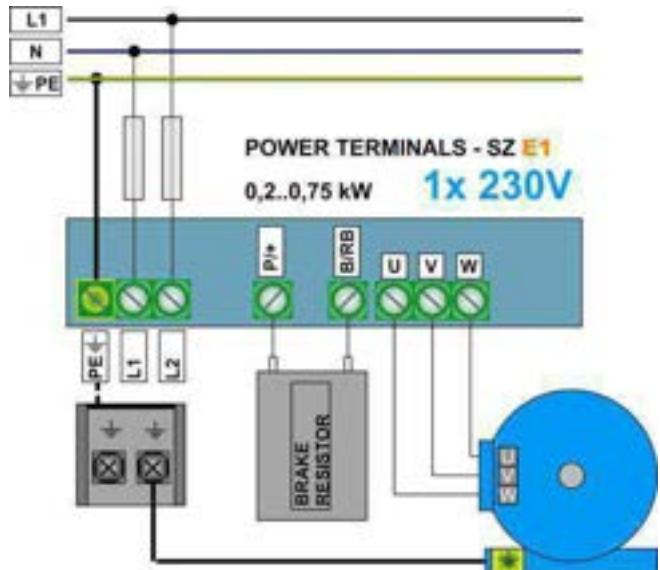
Power terminals:
There are different arrangements for power terminals, depending on inverter size and number of input phases.

230V Singlephase
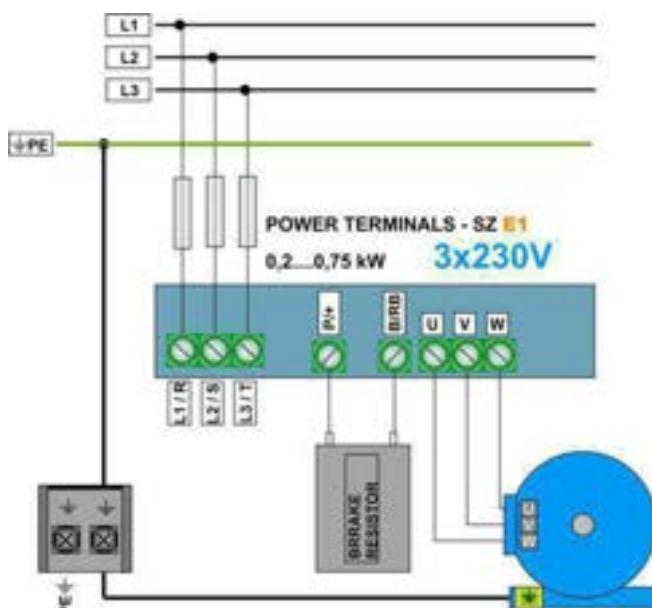
**0.2 – 0,75 kW – Framesize E1**
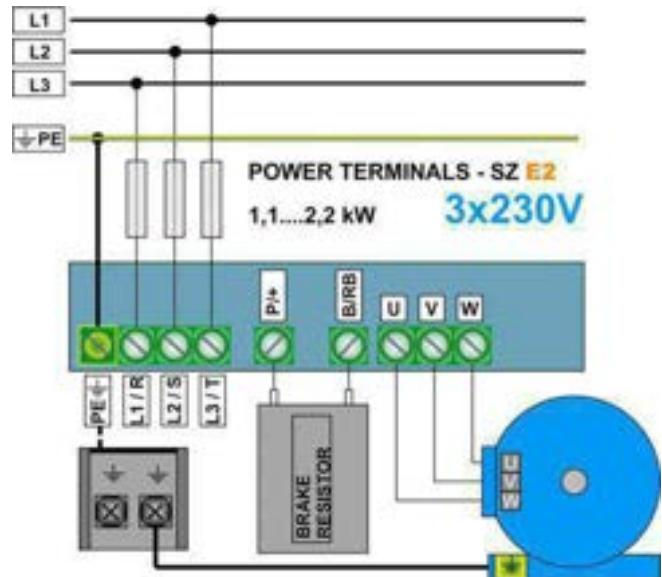
1,5 - 2,2 kW - Framesize E2

230V Threephase

0.2 – 0,75 kW – Framesize E1
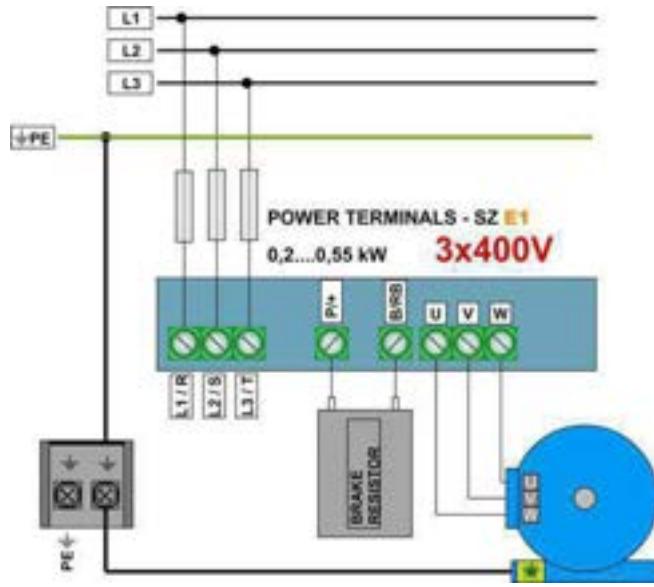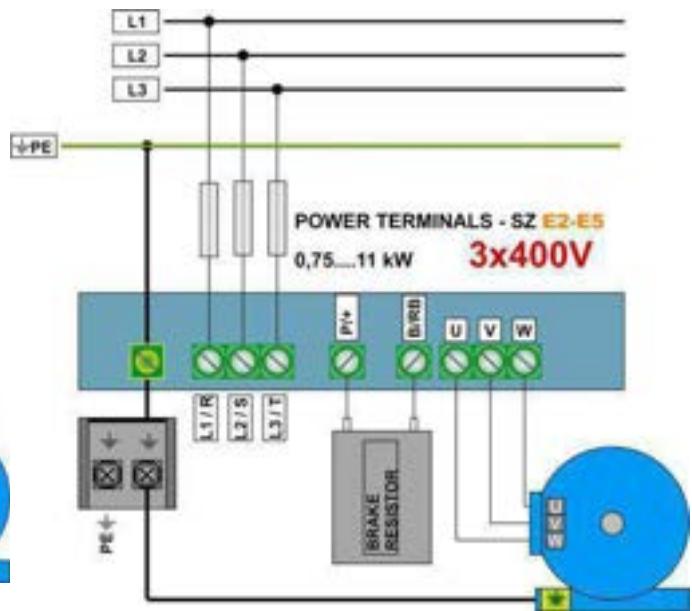
1,5 - 2,2 kW - Framesize E2

400V Threephase
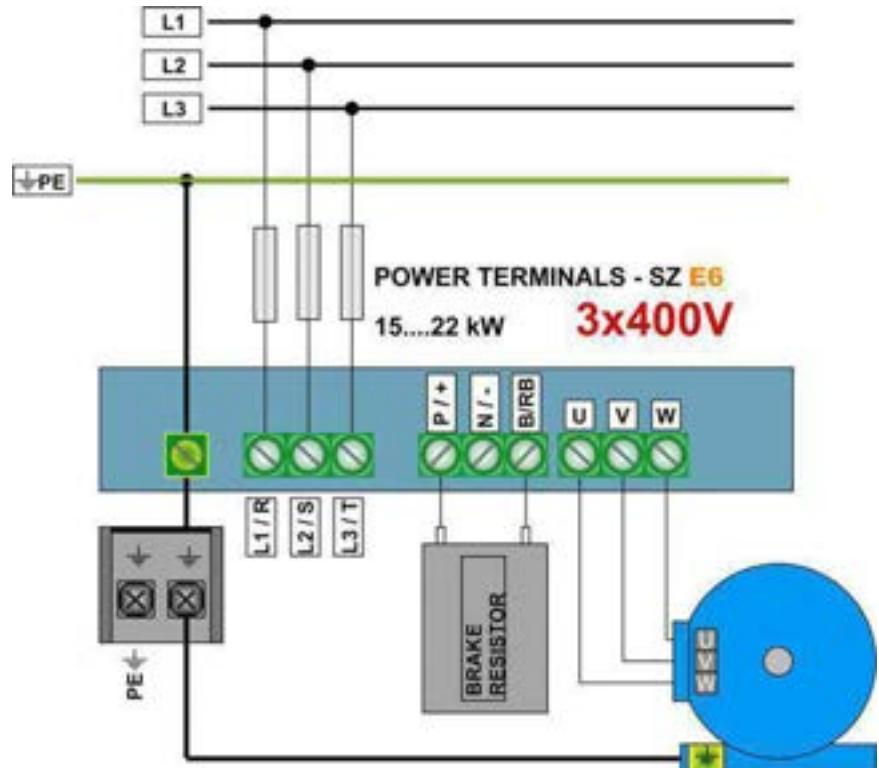
0.75 – 0,55 kW – Framesize E1

0,75 – 11 kW – Framesize E2-E5

15 – 22 kW – Framesize E6

Control terminal function and factory default configuration
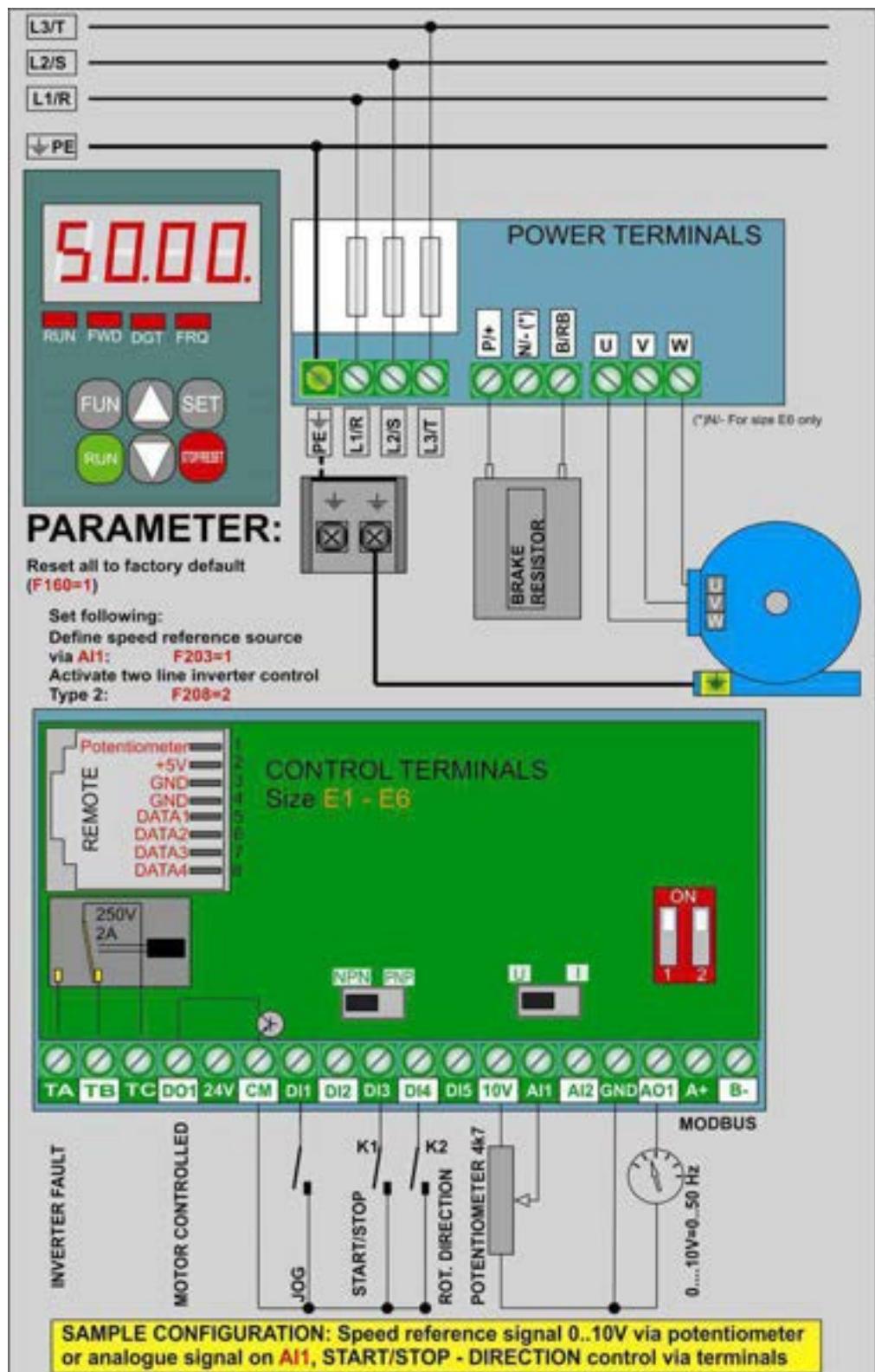
Terminal	Type	Description	Hardware data	Related parameter	Factory DEFAULT
DO1	Digital / analogue OUTPUTs	Programmable digital output 1	Open-Collector output, max. 100mA-24V (referred on CM)	(F301)	Message F=>0Hz
DO2		Programmierbarer Digitalausgang 2	Open-Coll. output max. 100 mA-24V (referred to CM (Size C3-C6 only)	(F302)	Message F>0HZ
TA TB TC		Digital Relays output - isolated switchover contact	TC=COMMON TB=NORMAL CLOSED TA=NORMAL OPEN Max. Contact load: Inverter 22kw and below: 2A/230VAC Inverter above 22 kW: 5A/230V	(F300)	Fault signal
AO1		Programmable analogue output 1	To configure for voltage/current signal (reference: analogue ground GND) For current signal: set SWITCH to „I"	(F413---F426) (F431)	Output frequency 0…10V
AO2		Programmable analogue output 2	Current signal (referred on GND) (on size C3-C6 only)	(F427----F430) (F432)	Motor current 0-20mA
10V	DC 10V	10V, ref. to processor- GND	10V supply for potentiometer or similar, max. current 20 mA		
AI1	Analogue inputs 12 BIT	Programmable analogue input 1	Set-point – current/voltage input for configuration see: (Hardware-configuration of I/O channels)	(F400-F405) (F418)	0…10V
AI2		Programmable analogue input 2		(F406-F411) (F419)	0..20 mA
GND		Analogue GROUND	Microprocessor ground, reference point for all analogue signals		
24V	DC 24V	Isolated 24V power supply	24±1.5V, to CM; limited to 50mA, for powering of digital I/Os		
DI1	Programmable digital inputs	Programmable digital input 1	All digital I/O are floating, including 24V and CM HIGH/LOW active, hardwaremäßig umschaltbar (siehe: Hardware und Hardware-Konfiguration der I/O Kanäle). (DI6-DI8 on size C3-C6 only)	(F316)	JOG mode FWD
DI2		Programmable digital input 2		(F317)	EMERGENCY STOP external
DI3		Programmable digital input 3		(F318)	Terminal (FWD)
DI4		Programmable digital input 4		(F319)	Terminal (REV)
DI5		Programmable digital input 5		(F320)	RESET
DI6		Programmable digital input 6		(F321)	Power stage enable
DI7		Programmable digital input 7		(F322)	START
DI8		Programmable digital input 8		(F323)	STOP
CM	COMM	Common potential digital I/O	Common terminal for 24V aux. supply – digital I/O signals		
A+	RS 485	Differential signal, positive	Standard: TIA/EIA-485(RS-485) Interface protokol: MODBUS Bd.Rate: 1200/2400/4800/9600/19200/ 38400/57600	(F900-F905)	9600
B-		Differential signal, negative			

Sample set-up for inverter, 400V - framesize E6

If parameter status is unknown, factory reset is recommended: Set parameter **F160 = 1**

Analogue speed reference 0....10V (potentiometer) through input channel **AI1**: Set **F203=1**
START/STOP command and inversion through terminal signals: set **F208=2** (two wire control)
Fault signalling on relays contact: **F300=1** (already default set)
„Inverter enabled" message on **DO1 F301=14** (already default set)
Frequency indication output: **AO1** 0…10V = 0-50 Hz **F423=1, F431=0** (already default set)

6) Operating panel

Inverter control, parametrization, operating-parameter display and inverter-status information are all done through the operation panel. This consists in seven segment, 4-digit display, six button keypad field and 4-LED status line.

The adjacent picture shows the standard version: 7-segment display, status LED and keypads

An optional build-in potentiometer is available

DISPLAY
Operating parameters
Inv. configuration parameters
Parameter values
Inverter fault codes

INVERTER STATUS

KEYPAD for inverter control and inverter parametrizing

7-segment display:
The content of the display can be configured, to show different operating parameters, while inverter in STOP or START mode, error messages, parameters and parameter values *(for configuration see chapter: Parameter group 100 – BASIC parameter)*

The [FUN] key is used to cycle through all programmed content, including configuration parameter level. (Configuration parameter on display have always a leading *F*).

Faults are displayed with the respective error code.

Flashing numbers in STOP mode indicate the target-frequency, which the inverter will reach after START command is given.

Status LED: To display the inverter status:

RUN	REV	DGT	FRQ
Inverter in START mode. The display shows the programmed working parameters	To indicate the rotating direction	Toggle with [STOP RESET] key ON: single step modus is selected for parameter cycling OFF: parameter group cycling	ON, if the value on the display corresponds to output frequency

Keys and functions

FUN	RUN	STOP RESET	SET	▲ ▼
Cycling through different display content	START command	STOP command Toggle switch for DGT ERROR RESET	Parameter: Selection, and save	Increment / Decrement Key

7) Parametrization

For easier prarametrization, the parameter set is divides into 11 parameter groups:

Parameter type	Parameter Nr. Range	Gruppe
BASIC parameters	F100 - F160	100
Inverter control, set-point origin setup	F200 - F230	200
Function assignation to digital I/Os - diagnosis	F300 - F330	300
Analogue I/O signal configuration	F400 - F473	400
Fixed-frequency control, cycle control	F500 - F572	500
DC-Brake, limiting functions, auxiliary functions	F600 - F623	600
Fault handling – configuration of protection function	F700 - F740	700
Motorparameter, AUTOTUNING	F800 - F830	800
Serial link parameter set	F900 - F930	900
PID controller parameter, pump control functions	FA00 - FA30	A00

Selection of parameters, modification and saving:

The FUN key toggles between all different values on the display.

F prefix indicates parameter level and the number refers to a configuring parameter. Once on parameter level, the ▼ ▲ keys are used to flip through parameters.

key toggles between single and multi parameter step. If DGT is on, single mode is selected, if off, group mode is selected, and ▼ ▲ keys moves in steps of 100.

SET key selects the parameter on the display, and the parameter value is shown. The blinking digit may be changed, using ▼ ▲ keys (eventually use key to switch through single digits). Pressing SET again memorizes the modified parameter value.