

# MSP-KONSTANTER

## Bus-Programmable Lab Power Supplies

3-349-084-03  
1/1.03

**24 W, 49 W, 120 W**  
**max. 8 Outputs**

- IEC-625/IEEE-488-and V.24/RS-232C interface
- Integrated meter function
- Up to 8 electrically isolated outputs
- All outputs can be used as electronic loads as well
- Low ripple and short setting time
- Outputs can be activated and deactivated separately or in groups
- Device configuration can be easily changed at any time
- Driver software available for LabWindows and LabView (can be downloaded from the Internet)



### Description

The MSP KONSTANTER (multi-output system power supply) is a DC power supply for manual and bus programming with up to eight separate, electrically isolated outputs and an integrated meter function.

The system includes the 64 D 42 P base frame - designed as a 19", 4 high benchtop / plug-in unit - capable of accommodating up to four single or dual channel power supply modules ES 31 / ES 32 and a control module. Modules are inserted into the basic instrument in accordance with specific individual needs.

Six types of power supply module are available providing 120 W, 49 W or 2 x 24 W output power.

The power supply modules provide linear control and feature a 2 quadrant output operating range, thus permitting operation both as a constant voltage or current source, and as a sink. Outputs can also be connected in parallel or series to boost output current or voltage, and bridge connection is also possible for the generation of bipolar voltages.

The integrated meter function acquires current values for output voltage, current and power at all channels, and stores max-min values to memory as well

### Operation

When used in the bus programming mode, functions are configured and measured values and other data are retrieved via the ICE 625/IEEE 488 interface, or via the V.24/RS-232C serial interface of the basic instrument. These functions are executed with the optional control module in the manual operating mode. In this case, programming is facilitated by means of logical programming codes and menu driven manual control.

### Applications

The MSP-KONSTANTER provides optimum flexibility, operating convenience and cost effectiveness in applications such as semi or fully automated test benches and balancing equipment for electronic modules and components in production, test laboratories and receiving inspection, or continuous testing systems in quality management. It is also an indispensable all-round tool for any well equipped R&D laboratory.

# MSP-KONSTANTER

## Bus-Programmable Lab Power Supplies

### Features

#### Programmable Functions

- Voltage and current setpoints
- Voltage and current limit values (soft limits)
- Activation and deactivation of outputs (singly or in groups)
- Channel grouping
- Disabling of source/sink function
- Desired control mode (U/I regulation)
- Overload response (limit with or without shutdown)
- Delay time for overload shutdown
- setting characteristics ("power-on" status)
- Reset device configuration
- Save device configuration
- Recall device configuration
- Service request conditions (SRQ masks)
- Display ON/OFF
- Display illumination ON/OFF
- Text read-out at display
- Self-initialization
- Language selection for online help menu (German or English)

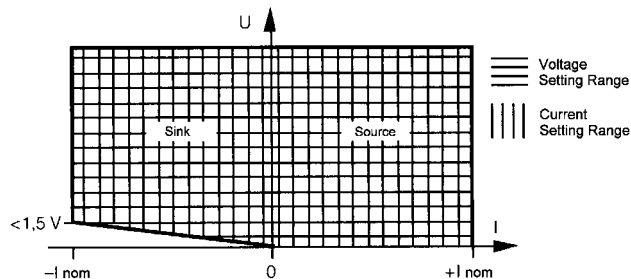
#### Retrievable Information

- Current measured values for voltage and current
- Min-max measured values for voltage and current
- Current output power
- Current device settings (individual or complete)
- Current device status (control mode, overtemperature, busy)
- Events (power failure, overtemperature, programming error)
- Device configuration
- Device identification
- Operating instructions

#### Additional Functions

- Sensor connections protected against polarity reversal with automatic switching to auto-sensing mode
- Overtemperature protection
- Output polarity reversal protection
- Battery-backed memory for device settings
- Power failure sensing
- Inrush current limiting

### Output Operating Range



### Applicable Regulations and Standards

IEC 61010-1/EN 61010-1/ VDE 0411-1:1994	Safety requirements for electrical equipment for measurement, control and laboratory use
EN 60529 VDE 0470 part 1	Test instruments and test procedures protection provided by housing (IP code)
DIN EN 61326:2002	Generic standard electromagnetic compatibility (EMC)

# MSP-KONSTANTER

## Bus-Programmable Lab Power Supplies

### Device Function Descriptions

#### Auto-Sensing

When the SENSE terminals are connected to the respective output poles, the instrument is automatically switched to the auto-sensing mode (remote sensing).

Max. compensatable voltage drop: 1 V per output lead

#### Control Panel Disabling

The controls can be disabled to prevent unauthorized operation by pressing a key, or with a command from a PC.

#### Output On/Off

The power outputs can be activated and deactivated, either individually or as a group, by pressing a key or with a command from a PC (no electrical isolation).

#### Start-Up Performance (power-on status)

Selection of one of the following device configurations is possible after power-up:

Reset = default configuration (0 V, 0 A, output deactivated etc.)

Recall = last used configuration (same as when the instrument was last switched off)

Standby = last used configuration but with deactivated output

#### Overload Response (characteristics interchange)

When the control mode is changed, the performance of each output can be defined as follows:

- FOLDBACK off = continuous limiting (standard U/I characteristics)
- FOLDBACK on = deactivation of the output if the targeted control mode defined by MODE (CV = constant voltage, CC = constant current) is exited for a duration greater than DELAY time.
- DELAY time = setting range: 0 ... 9.999 s  
setting resolution: 1 ms

#### Extreme Measured Value Memory

The MIN-MAX function causes automatic acquiring and saving of minimum and maximum voltage and current values.

#### Memory Function

The memory function allows the user to save and recall up to 9 complete device configurations using battery-backed memory.

#### Self-Test

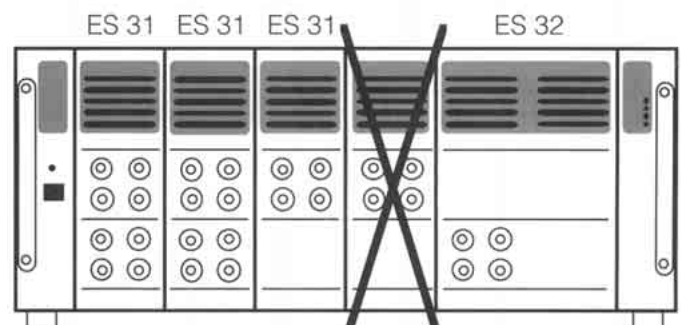
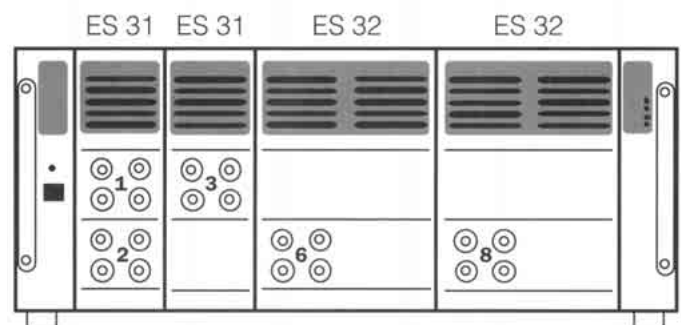
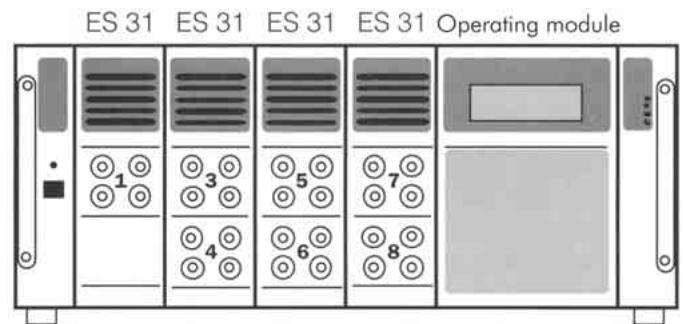
The instrument executes a self-test after power-up, or in response to a corresponding command from a PC. The following are tested: RAM, ROM, ADC timer, internal data bus, IEC bus address setting, RS 232C configuration, A-D and D-A converters. A comprehensive test report can be read out via the computer interfaces.

### Configuration Options

The basic instrument is equipped with six module slots (1 through 6 from left to right). Plug connectors for the power supply modules are located at slots 1 through 5. However, the plug connectors at slots 4 and 5 may not be used simultaneously.

If the instrument is equipped with a control module, it must be installed to slots 5 and 6. Power supply modules can then be installed to slots 1 through 4 in any desired combination.

Which channel addresses are assigned to a given module's inputs/outputs depends upon which slot it has been installed to.



# MSP-KONSTANTER

## Bus-Programmable Lab Power Supplies

### Characteristic Values – Single Channel Modules

Unless otherwise specified, all entries are maximum values and apply within an operating temperature range of 0 ... 40 °C, within the nominal power range and within a supply voltage range of 230 V ±10% after a warm-up period of 30 minutes.

Module Type		ES 31 K 7 R 7 P		ES 32 K 30 R 4 P		ES 32 K 80 R 1.5 P	
<b>Nominal Output Data</b>	Output channel	A	B	A	B	A	B
	Voltage setting range	0 ... 7 V		—		0 ... 30 V	
	Current setting range	0 ... ±7 A		—		0 ... ±4 A	
	Power	49 W		—		120 W	
<b>Control characteristics</b> (ppm and percentage values make reference to the respective setting)							
Setting resolution	Voltage	2 mV		8 mV		20 mV	
	Current	2 mA		1 mA		0.5 mA	
Overall setting accuracy at 23 ±5 °C including system deviation (load / mains)	Voltage	0.05% + 4 mV		0.05% + 16 mV		0.05% + 40 mV	
	Current	0.1% + 4 mA		0.1% + 2 mA		0.1% + 1 mA	
Temperature coefficient of the setting (Δ/K)	Voltage	90 ppm + 0.1 mV		90 ppm + 0.4 mV		90 ppm + 1 mV	
	Current	150 ppm + 0.5 mA		150 ppm + 0.2 mA		150 ppm + 0.1 mA	
Setting drift after 8 hours	Voltage	200 ppm + 0.3 mV		200 ppm + 1.2 mV		200 ppm + 3 mV	
	Current	300 ppm + 1 mA		300 ppm + 0.4 mA		300 ppm + 0.2 mA	
Static system deviation with 100% load fluctuation	Voltage <sup>1)</sup>	2 mV		2 mV		4 mV	
	Current	0.8 mA		0.8 mA		0.8 mA	
Static system deviation with 15% line voltage fluctuation	Voltage	1 mV		1 mV		2 mV	
	Current	1 mA		1 mA		0.5 mA	
Dynamic system deviation of output voltage with sudden load variation <sup>2)</sup>	10 → 90%	-200 mV		-500 mV		-500 mV	
	90 → 10%	±600 mV		±1 V		±1 V	
Settling time of output voltage with sudden load variation <sup>2)</sup>	Tolerance	20 mV		60 mV		160 mV	
	10 → 90%	200 μs		200 μs		200 μs	
	90 → 10%	1 ms		500 μs		500 μs	
Settling time of output voltage with setpoint step-change <sup>2) 3)</sup>	Tolerance	7 mV		40 mV		80 mV	
	0 V → U <sub>Nom</sub>	0.5 ms		2 ms		2 ms	
	U <sub>Nom</sub> → 1.5 V	0.5 ms		3 ms		3 ms	
Residual ripple (10 Hz ... 10 MHz)	Voltage	1 mV <sub>eff</sub> / 3 mV <sub>SS</sub>		3 mV <sub>eff</sub> / 5 mV <sub>SS</sub>		3 mV <sub>eff</sub> / 8 mV <sub>SS</sub>	
	Current	3 mA <sub>eff</sub> / 5 mA <sub>SS</sub>		3 mA <sub>eff</sub> / 5 mA <sub>SS</sub>		2 mA <sub>eff</sub> / 3 mA <sub>SS</sub>	
<b>Measuring Function</b>							
Measuring resolution	Voltage	1 mV		5 mV		10 mV	
	Current	2 mA		1 mA		0.5 mA	
	Power	10 mW		10 mW		10 mW	
Measuring accuracy at 23 ±5 °C	Voltage	0.05% + 4 mV		0.05% + 20 mV		0.05% + 40 mV	
	Current	0.1% + 8 mA		0.1% + 4 mA		0.1% + 2 mA	
	Power	0.15% + 80 mW		0.15% + 150 mW		0.15% + 200 mW	
Temperature coefficient of the measured value (Δ/K)	Voltage	80 ppm + 0.2 mV		80 ppm + 0.8 mV		80 ppm + 2 mV	
	Current	120 ppm + 0.5 mA		120 ppm + 0.3 mA		120 ppm + 0.1 mA	
	Power	200 ppm + 5 mW		200 ppm + 10 mW		200 ppm + 10 mW	
<b>Additional Functions</b>							
Auto-sensing mode							
Compensatable voltage	Per output lead at voltage over the terminals	1 V		1 V		1 V	
		8 V		31 V		81 V	
Output On/Off							
Residual standby voltage		100 mV		5 mV		5 mV	
Residual standby current		4 mA		2 mA		2 mA	
Output capacity	typical	1000 μF		220 μF		47 μF	
Sink function							
Minimum sink resistance		0.2 Ω		0.4 Ω		0.75 Ω	
<b>Protective Functions</b>							
Reverse polarity protection load capacity	Continuous	10 A		6 A		3 A	
Reverse voltage resistance	Continuous	11 V		45 V		120 V	
	Short-term (< 2 ms)	2 J		15 J		25 J	
<b>General</b>							
Power consumption	Maximum	145 VA, 115 W		300 VA, 250 W		290 VA, 230 W	
Article Number		<b>K372D</b>		<b>K373A</b>		<b>K373B</b>	

<sup>1)</sup> In auto-sensing mode

<sup>2)</sup> With enabled source and sink functions (SINK ON, SOURCE ON) and ohmic load

<sup>3)</sup> Without processing time for the preceding voltage setting command

# MSP-KONSTANTER

## Bus-Programmable Lab Power Supplies

### Characteristic Values – Dual Channel Modules

Unless otherwise specified, all entries are maximum values and apply within an operating temperature range of 0 ... 40 °C, within the nominal power range and within a supply voltage range of 230 V ±10% after a warm-up period of 30 minutes.

Module Type		ES 31 K 2x8 R 3 P		ES 31 K 2x16 R 1.5 P		ES 31 K 2x40 R 0.6 P		
Nominal Output Data		Output channel		Output channel		Output channel		
	Voltage setting range	0 ... 8 V	0 ... 8 V	0 ... 16 V	0 ... 16 V	0 ... 40 V	0 ... 40 V	
	Current setting range	0 ... ±3 A	0 ... ±3 A	0 ... ±1.5 A	0 ... ±1.5 A	0 ... ±0.6 A	0 ... ±0.6 A	
	Power	24 W	24 W	24 W	24 W	24 W	24 W	
<b>Control characteristics</b> (ppm and percentage values make reference to the respective setting)								
Setting resolution	Voltage	2 mV		4 mV		10 mV		
	Current	1 mA		0.5 mA		0.2 mA		
Overall setting accuracy at 23 ±5 °C including system deviation (load / mains)	Voltage	0.05% + 4 mV		0.05% + 8 mV		0.05% + 20 mV		
	Current	0.1% + 2 mA		0.1% + 1 mA		0.1% + 0.5 mA		
Temperature coefficient of the setting (Δ/K)	Voltage	90 ppm + 0.1 mV		90 ppm + 0.2 mV		90 ppm + 0.5 mV		
	Current	150 ppm + 0.2 mA		150 ppm + 0.1 mA		150 ppm + 0.05 mA		
Setting drift after 8 hours	Voltage	200 ppm + 0.3 mV		200 ppm + 0.6 mV		200 ppm + 1.6 mV		
	Current	300 ppm + 0.4 mA		300 ppm + 0.2 mA		300 ppm + 0.1 mA		
Static system deviation with 100% load fluctuation	Voltage <sup>1)</sup>	2 mV		1.8 mV		1 mV		
	Current	0.8 mA		0.8 mA		0.8 mA		
Static system deviation with 15% line voltage fluctuation	Voltage	1 mV		1 mV		2 mV		
	Current	1 mA		1 mA		0.5 mA		
Dynamic system deviation of output voltage with sudden load variation <sup>2)</sup>	10 → 90%	-200 mV		-400 mV		-400 mV		
	90 → 10%	±500 mV		±500 mV		+200 V		
Settling time of output voltage with sudden load variation <sup>2)</sup>	Tolerance	20 mV		40 mV		80 mV		
	10 → 90%	200 μs		200 μs		200 μs		
Settling time of output voltage with setpoint step-change <sup>2) 3)</sup>	90 → 10%	500 μs		500 μs		500 μs		
	Tolerance	8 mV		16 mV		40 mV		
Residual ripple (10 Hz ... 10 MHz)	0 V → U <sub>Nom</sub>	0.5 ms		0.5 ms		1 ms		
	U <sub>Nom</sub> → 1.5 V	0.5 ms		0.5 ms		1 ms		
Measuring Function	Voltage	1 mV <sub>eff</sub> / 3 mV <sub>SS</sub>		1 mV <sub>eff</sub> / 3 mV <sub>SS</sub>		3 mV <sub>eff</sub> / 5 mV <sub>SS</sub>		
	Current	3 mA <sub>eff</sub> / 5 mA <sub>SS</sub>		2 mA <sub>eff</sub> / 3 mA <sub>SS</sub>		2 mA <sub>eff</sub> / 3 mA <sub>SS</sub>		
Measuring resolution	Voltage	1 mV		2 mV		5 mV		
	Current	1 mA		0.5 mA		0.2 mA		
	Power	10 mW		10 mW		10 mW		
Measuring Accuracy at 23 ±5 °C	Voltage	0.05% + 4 mV		0.05% + 8 mV		0.05% + 20 mV		
	Current	0.1% + 4 mA		0.1% + 2 mA		0.1% + 0.8 mA		
	Power	0.15% + 40 mW		0.15% + 40 mW		0.15% + 40 mW		
Temperature coefficient of the measured value (Δ/K)	Voltage	80 ppm + 0.2 mV		80 ppm + 0.4 mV		80 ppm + 1 mV		
	Current	120 ppm + 0.2 mA		120 ppm + 0.1 mA		120 ppm + 0.05 mA		
	Power	200 ppm + 2 mW		200 ppm + 2 mW		200 ppm + 2 mW		
<b>Additional Functions</b>								
Auto-sensing mode	Compensatable voltage	Per output lead at voltage over the terminals	1 V		1 V		1 V	
			9 V		17 V		41 V	
Output On/Off	Residual standby voltage	Residual standby current	100 mV		100 mV		100 mV	
			2.5 mA		2.5 mA		2.5 mA	
			220 μF		47 μF		22 μF	
Sink function	Minimal sink resistance	0.4 Ω		0.7 Ω		1.5 Ω		
<b>Protective Functions</b>								
Reverse polarity protection load capacity	Continuous	5 A		3 A		1 A		
Reverse voltage resistance	Continuous	12 V		24 V		60 V		
	Short-term(< 2 ms)	2 J		3.1 J		8.4 J		
<b>General</b>								
Power consumption	Maximum	180 VA, 140 W		145 VA, 115 W		110 VA, 90 W		
Article Number		<b>K372A</b>		<b>K372B</b>		<b>K372C</b>		

<sup>1)</sup> In auto-sensing mode

<sup>2)</sup> With enabled source and sink functions (SINK ON, SOURCE ON) and ohmic load

<sup>3)</sup> Without processing time for the preceding voltage setting command

# MSP-KONSTANTER

## Bus-Programmable Lab Power Supplies

### Characteristic Values – Basic Device / Complete System

#### General

Designation	Basic MSP-KONSTANTER 64 D 42 P
Number of outputs	1 to 8, depending on number and type of modules installed
Output isolation	Floating outputs, isolated from each other and from bus as well, maximum permissible output to GND potential: 120 V
Controls	Power ON/OFF switch, line voltage selector switch, IEC bus address, baud rate (refer to control module specifications for further details)
Displays	1 LED each for power ON, addressed, remote, SQR and standby (refer to control module specifications for further details)
Connections	(on rear panel unless otherwise specified)
Line input	10 A IEC grounded inlet plug
Sensor output	4 mm shrouded jacks (front panel)
Ground	4 mm shrouded jacks (front panel)
IEC bus	24 pin socket connector (IEEE 488)
RS 232C interface	25 pin sub D socket connector (DIN 41652)
Manual control	34 pin edge connector DIN 41 651 (internal)
Ambient temperature	Operating range: 0 ... +40 °C Storage range: – 20 ... +70 °C
Cooling	Integrated 2-speed fan Air inlet: front panel Air outlet: rear panel

#### Electrical Safety

Standard	DIN EN 61010-1 IEC 61010-1 VDE 0411-1:1994
Safety class	I
Overvoltage category:	II for line input I for output and interface
Fouling factor	2

#### Electromagnetic Compatibility (EMC)

Generic standard	EN 61326-1:2002
Interference emission	EN 55022 class A
Interference immunity	EN 61000-4-2: feature C EN 61000-4-3: feature A EN 61000-4-4: feature C EN 61000-4-5: feature B EN 61000-4-6: feature C EN 61000-4-11: feature B

#### Power Supply

Line voltage	115/230 V~ +10/–15%, 47 ... 63 Hz
Power consumption	Basic device: 50 VA / 30 W Modules: see “Characteristic Values – Modules”

#### Mechanical Design

Protection	Housing: IP 20 per IEC 60529 EN 60529 VDE 0470-1
Design	Benchtop, suitable for rack mounting
Dimensions (W x H x D)	449 x 177 x 390 mm
Weight	Basic device approx. 7.0 kg Per module approx. 3.3 kg Control module approx. 0.7 kg

#### IEC-625/IEEE-488 Interface

Interface functions	SH1, AH1, T6, L4, TEO, LEO, SR1, RL1, DC1, PP1, DT1, CO, EI/2
Max. setting rate	Approx. 20 settings per second
Max. sampling rate	Approx. 10 measurements per second

#### V.24/RS-232C Interface

Transmission type	semi-duplex, asynchronous
Pin assignments	Pin 2: TXD (transmission data) Pin 3: RXD (receive data) Pin 7: GND (ground)
Transmission speed	110 ... 9600 baud, adjustable
Connection	25 pin. sub-D socket connector DIN 41 652
Controls	DIP switch for baud rate

#### Standard Equipment

- operating instructions
- mains power cable (1.5 m) with earthing contact plug
- blanking plates for unused module slots (mounted to the basic instrument)
- Assembly kit for rack mounting

#### Order Information

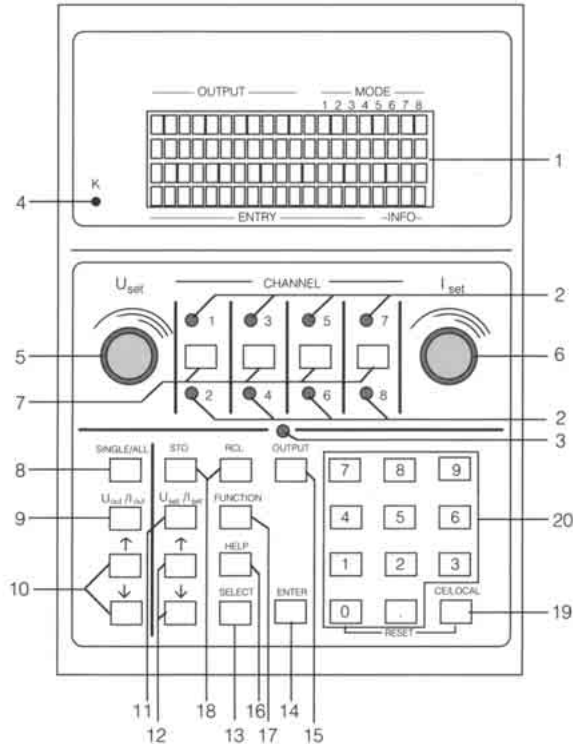
Designation	Type	Article Number
MSP KONSTANTER basic device	64 D 42 P	K370A

# MSP-KONSTANTER

## Bus-Programmable Lab Power Supplies

### Characteristic Values – Control Module

#### Controls and Display Elements

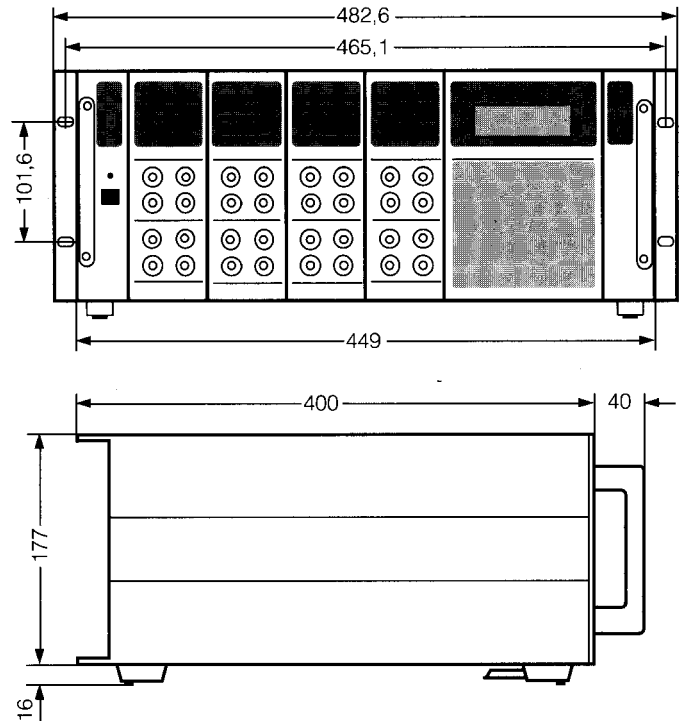


- 2 Display:  
Transflective alphanumeric LCD (4 lines of 20 characters each) with background illumination (yellow-green) ON/OFF and adjustable contrast
- 3 Channel selection displays
- 4 Output status display
- 5 Display contrast setting
- 5,6 Rotary switches for setting voltage and current:  
Rotary encoders, 24 pulses per revolution; selectable in steps, e.g. 2/10/100 mV per pulse for 8 V channel
- 7 Channel selection keys
- 8 Selector switch for individual or overall channel display
- 9 Display selector for measured value display: voltage/current
- 10 Display function selection keys
- 11 Selector switch for voltage or current setpoint entry
- 12 Entry function selector switches
- 13 Setting selector switch
- 14 Enter key for selected setting
- 15 ON/OFF for selected output channel
- 16 HELP key for displaying online help menu
- 17 Special function key (reserved for optional functions)
- 18 System settings store and recall keys
- 19 Key for correcting entries, (re-)activating the manual operating mode and resetting the device configuration
- 20 Numeric keypad for entering setpoints

#### Order Information

Designation	Type	Article Number
MSP-KONSTANTER control module	MSP control module	K371A

### Dimensional Drawings



### Accessories

#### Order Information

Designation	Type	Article Number
IEEE / IEEE bus cable, 2 m, for KONSTANTER	K931A	K931A
RS 232 bus cable, 0.4 m, for KONSTANTER	K931B	K931B
RS 232 interface cable, 2 m	Z3241	GTZ 3241 000 R0001
LabView device driver for MSP Konstanter	*	
LabWindows/CVI device driver for MSP Konstanter	*	
HPVVE/VXI PnP device driver for MSP Konstanter	*	

\* Can be downloaded from the internet at [www.gmc-instruments.com](http://www.gmc-instruments.com)

# **MSP-KONSTANTER**


## **Bus-Programmable Lab Power Supplies**

---

---

Printed in Germany • Subject to change without notice

GOSSEN METRAWATT GMBH  
Thomas-Mann-Str. 16-20  
90471 Nürnberg, Germany

 Member of  
GMC Instruments Group

Phone +49-(0)-911-8602-0  
Fax +49-(0)-911-8602-669  
e-mail [info@gmc-instruments.com](mailto:info@gmc-instruments.com)  
[www.gmc-instruments.com](http://www.gmc-instruments.com)

 **GOSSEN METRAWATT**