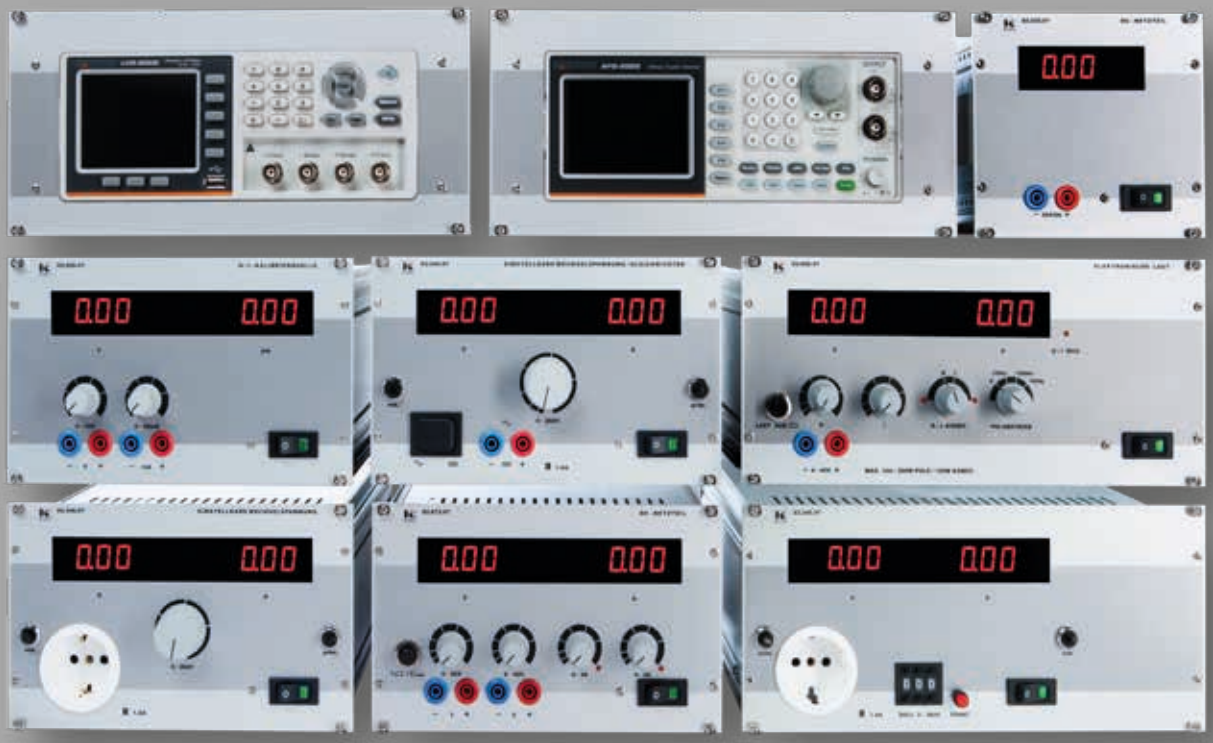
RESEARCH
LABORATORY
EDUCATION

Precise.
Clear.
Compact.



Measuring and testing technology.

KARL original.

KARL

Solutions
made to measure.

With integrated measuring and testing technology, KARL offers a comprehensive range that convinces with best functionality and high flexibility.
By consistently adhering to the 19“system according to IEC 297, the modules and fixtures can be individually configured and positioned.

In combination with the product lines QUADRO, QUADRO twin or BASIC, the measuring and testing technology can be optimally integrated at the workplace and offers the users the right overview at all times.

Safety and comfort are the main priorities in the design of the front panel and the uniform arrangement of the operating elements in the first place. An extensive product range and the modular design stand for optimal functionality and flexibility.

Stable mechanics, solid materials and high-quality details such as the abrasion-resistant lettering on the front panels guarantees long life and high value retention.

Uniform placement of the functional elements to avoid incorrect operation.

Subrack for inserting slide-in cassettes and insert plates. Fully wired, ready-to-connect system including safety modules for personal and equipment protection.

For **modern** workstation design.

Research and development, repair, service, test field or laboratory - for modern workplace design with integrated measurement and testing technology, KARL offers competent and professional solutions that impress with their quality and ensure the efficiency and safety of your electrical applications.

An extensive product range and the modular design stand for best functionality and flexibility.

In laboratory and test field environments, consistency and clarity are important - while at the same time being flexible in order to be able to react to individual circumstances on site.

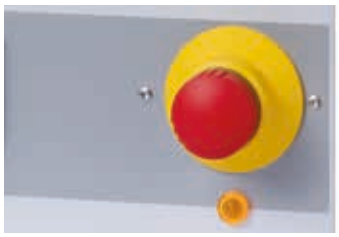
The modules are easily interchangeable and can be reconfigured with new changing requirements.

Stable mechanics, solid materials and **high quality details.**

Safety

EMERGENCY STOP circuits

- according to DIN VDE 0100-530
- prevention of unintentional restart after a power failure
- switches the entire workplace
- MASTER-SLAVE circuits for table combinations
- coupling of MASTER switch modules
- connection for room EMERGENCY STOP loops



Residual Current operated Circuit-Breaker

- for personal protection
- either standard type A or optional type B, sensitive to universal current
- 2 or 4 poles depending on requirements
- tripping current 30mA, optionally 10mA

Protective separation

- according to DIN VDE 0100-410
- floating operating voltage
- the output voltage is from the mains voltage and the earth potential is galvanically isolated
- avoiding touch voltages
- for mains-operated devices or test arrangements

Overcurrent protection

- Automatic circuit breakers or circuit breakers, coordinated with the building installation
- Different trigger characteristics can be selected optionally

Comfort

Additional level for 19 “laboratory technology

- more space on the work surface
- ergonomic arrangement in the optimal viewing and gripping area
- infinitely variable mounting
- clear and uniform arrangement of the controls
- diverse options for concealed cable routing
- optional workplace lighting

Modular System

- standard-compliant design in accordance with IEC 60279-3-101
- quick exchange or supplement for individual adjustments
- plug-in modules
- contacting the cassettes when inserting them into the rack

Built-in instruments

- voltage and current displays either analog or digital
- analog: easy detection of changes in measured values
- digital: higher resolution

Front panel

- high-quality materials
- absolutely abrasion-resistant lettering thanks to sub-anodized printing
- high value retention
- long durability

Workstations full of energy: bundled and tidy

The possibilities for hidding cables and wire routings are diverse. Connections are there where they are needed.

The laboratory tables are completely wired, ready-to-connect systems supplied with security modules for personal and equipment protection, power and data cables are laid in cable ducts.

Main supply of the measuring and testing devices through standardized connectors according to ICE 60603-2.

Measuring and testing technology

KARL original.

Power supply units

Security modules

Automatic circuit breaker: 16 A with tripping characteristic B
Circuit breaker with undervoltage release: adjustable from 10 to 16 A
Residual current circuit breaker: 25 A, fault current 30 mA

1-phase:		
RCCB	14 HP	**82.105.97**
Circuit breaker, RCCB	28 HP	**82.129.97**
Circuit breaker, EMERGENCY STOP, RCCB, indicator light	42 HP	**82.126.97**

3-phase		
RCCB	28 U	**82.107.97**
Circuit breaker, RCCB	28 HP	**82.121.97**
Circuit breaker, EMERGENCY STOP, RCCB, 3 indicator lights	56 HP	**82.160.97**
Circuit breaker, key switch, RCCB, 3 indicator lights	42 HP	**82.125.97**

Switching modules

- 19"superstructures of the QUADRO series with switching module as standard
- structures of the BASIC series can be used with a switching module insert plate

1-phase:		
Circuit breaker, EMERGENCY STOP, 1 indicator light	42 HP	**82.127.97**
3-phase		
Circuit breaker, EMERGENCY STOP, 3 indicator lights	42 HP	**82.128.97**
EMERGENCY STOP routed to connector	14 HP	**82.155.97**

Energy, data and media supply

Mains voltage

4 Schuko sockets	28 HP	**82.212.97**
6 Schuko sockets	42 HP	**82.206.97**
8 Schuko sockets	56 HP	**82.208.97**
10 Schuko sockets	19“	**82.209.97**
2 Schuko sockets, 3 Laboratory sockets L1, N, PE	28 HP	**82.211.97**
1 CEE 5-pin socket 16 A, 5 Laboratory sockets L1, L2, L3, N, PE	42 HP	**82.215.97**
1 CEE socket 5-pin 16 A	28 HP	**82.217.97**
1 CEE socket, 3-pin 16 A	28 HP	**82.219.97**
5 Laboratory sockets L1, L2, L3, N, PE	14 HP	**82.218.97**
1 Circuit breaker 10 - 16 A 2 x 5 Laboratory sockets L1, L2, L3, N, PE 2 x 3 Laboratory sockets L1, N, PE	42 HP	**82.114.97**

Energy, data and media supply

IT interfaces

2 Through connector USB A/B	7 HP	**82.257.97**
2 Through connector RJ45, CAT 6	7 HP	**82.260.97**
2 RJ45, CAT 6 sockets, rear fixed connection	7 HP	**82.261.97**
4 through connectors RJ45, CAT 6 2 through connectors USB A / B	14 HP	**82.258.97**
2 through connectors SUB-D 9-pin plug / socket	7 HP	**82.255.97**
2 through connectors BNC	7 HP	**82.262.97**

Compressed air

2 x Compressed air quick coupling 1/8"	14 HP	**82.955.97**
2 x Compressed air quick coupling 1/4“	14 HP	**82.957.97**
2 x Compressed air quick coupling 1/8“, pressure regulator 0.5 bar to 12 bar, pressure gauge	28 HP	**82.959.97**

Adjustable DC voltages

- Linear controlled laboratory power supplies with one or two outputs
- With either standard or 10-turn potentiometers

Output voltage:	floating, stabilized, can be connected in series and in parallel
Ripple:	1,5 mV_{ss} +/– 0,5 mV_{ss}
Load control U:	0 - full load: 0.01% + 1 mV
Grid control U:	Mains voltage +/– 10 %: 0,01 % + 1 mV
Temperature coefficient U:	0,01 % / °C
Load control I:	0 - full load: 0.1% + 1.5 mA
Grid control I:	Mains voltage +/– 10 %: 0,1 % + 1,5 mA
Temperature coefficient I:	0,05 % / °C
Settling time:	50 µs
DC output:	Safety laboratory sockets
Validation:	Permanent short-circuit proof due to voltage and current regulation
DC display:	Voltmeter and ammeter digital, 3.5 digits, Meter switch for two output voltages

Output 1	Output 2		Standard potentiometer	10-speed potentiometer
0 - 30V / 0 - 1A		42 HP × 230 mm × 3 U	**82.606.97**	**82.608.97**
0 - 30V / 0 - 2A		42 HP × 230 mm × 3 U	**82.612.97**	**82.614.97**
0 - 30V / 0 - 4A		56 HP × 230 mm × 3 U	**82.618.97**	**82.620.97**
0 - 30V / 0 - 10A		19“ × 285 mm × 3 U	**82.630.97**	**82.632.97**
0 - 60V / 0 - 2A		42 HP × 230 mm × 3 U	**82.654.97**	**82.656.97**
0 - 60V / 0 - 5A		19“ × 285 mm × 3 U	**82.660.97**	**82.662.97**
0 - 30V / 0 - 1A	0 - 30V / 0 - 1A	42 HP × 230 mm × 3 U	**82.666.97**	**82.668.97**
0 - 30V / 0 - 2A	0 - 30V / 0 - 2A	42 HP × 230 mm × 3 U	**82.672.97**	**82.674.97**
0 - 60V / 0 - 1A	0 - 60V / 0 - 1A	56 HP × 230 mm × 3 U	**82.678.97**	**82.680.97**

Fixed DC voltages

Linear controlled constant

Dimensions:	D = 230 mm, H = 3 U
Output voltage DC:	ungrounded, stabilized, permanent short-circuit proof, can be connected in series and in parallel
Load control U:	0 - full load: 0,1 % + 2 mV
Grid control U:	Mains voltage +/– 10 %: 0,02 % + 2 mV
Temperature coefficient U:	0,1 % pro °C
Ripple:	2 mV_{ss}
DC output:	Safety laboratory sockets
Validation:	permanent short-circuit proof with automatic starting current limitation
DC display (optional):	digital ammeter

2 x 12 V / 2 A	without display	28 HP	**82.511.97**
2 x 12 V / 2 A	digital display	28 HP	**82.513.97**
2 x 15 V / 1,6 A	without display	28 HP	**82.517.97**
2 x 15 V / 1,6 A	digital display	28 HP	**82.519.97**
24 V / 2 A	without display	28 HP	**82.523.97**
24 V / 2 A	digital display	28 HP	**82.525.97**
2 x 12 V / 0,4 A; 5 V / 3 A	without display	28 HP	**82.529.97**
2 x 12 V / 0,4 A; 5 V / 3 A	digital display	42 HP	**82.531.97**
2 x 15 V / 0,4 A; 5 V / 3 A	without display	28 HP	**82.535.97**
2 x 15 V / 0,4 A; 5 V / 3 A	digital display	42 HP	**82.537.97**

Fixed DC voltages

Primary clocked constants

Dimensions:	D = 230 mm, H = 3 U
Output voltage DC:	floating, stabilized, permanent short-circuit proof, can be connected in series and in parallel
Load control U:	10 % - Full load: +/- 1 %
Temperature coefficient U:	+/– 0,05% pro °C
Ripple:	1%
Validation:	permanently short-circuit proof

5 V / 8 A	without display	14 HP	**82.555.97**
12 V / 5 A	without display	14 HP	**82.561.97**
+ / - 12 V / 5 A	without display	14 HP	**82.563.97**
15 V / 4 A	without display	14 HP	**82.567.97**
+ / - 15 V / 4 A	without display	14 HP	**82.569.97**
24 V / 2,5 A	without display	14 HP	**82.573.97**

Single-phase AC voltages

Adjustable AC voltage

Output voltage:	ungrounded by integrated isolating transformer
Output 0 - 260 V:	floating, 2-pin socket
Output 0 - 50 V:	safety laboratory sockets
Primary protection:	thermal circuit breaker
Secondary protection:	thermal-magnetic circuit breaker
Display:	Ammeter, voltmeter
Analog display:	Moving iron instruments
Digital display:	3.5-digit LED
Readjustment:	Setpoint input via digital switch

0 - 260 V

1,6 A	Analog display	42 HP x 230 mm x 3 U	**82.305.97**
1,6 A	Digital display	42 HP x 230 mm x 3 U	**82.306.97**
3,2 A	Analog display	19“ x 285 mm x 3 U	**82.311.97**
3,2 A	Digital display	19“ x 285 mm x 3 U	**82.312.97**
5,0 A	Analog display	19“ x 285 mm x 3 U	**82.315.97**
5,0 A	Digital display	19“ x 285 mm x 3 U	**82.316.97**

0 - 50 V

5,0 A	Analog display	42 HP x 230 mm x 3 U	**82.323.97**
5,0 A	Digital display	42 HP x 230 mm x 3 U	**82.324.97**

0 - 260 V with readjustment

1,6 A	Digital display	56 HP x 230 mm x 3 U	**82.340.97**
3,2 A	Digital display	19“ x 285 mm x 3 U	**82.344.97**
5,0 A	Digital display	19“ x 285 mm x 3 U	**82.348.97**

Single-phase AC voltages

Adjustable AC voltage, switchable to DC voltage

Dimensions:	W = 42 HP, D = 230 mm, H = 3 U
Output voltage AC:	ungrounded by integrated isolating transformer
Output voltage DC:	ungrounded, 48% ripple via bridge rectifier
Output AC/DC:	Safety laboratory sockets
Primary protection:	thermal circuit breaker
Secondary protection:	thermal-magnetic circuit breaker
Display AC/DC:	Ammeter, voltmeter
Analog display:	Moving iron instruments, True RMS
Digital display:	3.5-digit LED with True RMS rectifier

0 - 260 V	Analog display	**82.405.97**
0 - 260 V	Digital display	**82.406.97**
0 - 50 V	Analog display	**82.423.97**
0 - 50 V	Digital display	**82.424.97**

Single-phase AC voltages

Fixed, floating alternating voltages

Output voltage AC:	230 V / 1 A floating through integrated isolating transformer
Dimensions:	W = 28 HP, D = 230 mm, H = 3 U
Output:	floating 2-pin socket
primary protection:	thermal circuit breaker
secondary protection:	thermal-magnetic circuit breaker

82.221.97

Output voltage AC:	230 V / 1,6 A ungrounded by integrated isolating transformer
Dimensions:	W = 42 HP, D = 230 mm, H = 3 U
Output:	floating 2-pin socket
primary protection:	thermal circuit breaker
secondary protection:	thermal-magnetic circuit breaker

82.220.97

Output voltage AC:	6, 12, 18, 24, 36, 42 V / 3 A ungrounded by integrated isolating transformer
Dimensions:	W = 28 HP, D = 230 mm, H = 3 U
Output:	4 safety laboratory sockets
primary protection:	thermal circuit breaker
secondary protection:	3 thermal-magnetic circuit breaker

82.225.97

Three-phase AC voltages

Adjustable AC voltage

Dimensions:	W = 19", D = 285 mm, H = 6 U
Output voltage AC:	3 x 0 - 260 / 450 V not floating, unstabilized
Output AC:	CEE socket 16 A, 5-pin Schuko socket Safety laboratory sockets
Validation:	3 thermal-magnetic circuit breaker
Display AC:	3 ammeters for phase currents Voltmeter with switch for display of the voltages phase-phase or phase neutral
Analog display:	Moving iron instruments
Digital display:	3.5-digit LED

3,2 A	Analog display	**82.329.97**
3,2 A	Digital display	**82.330.97**
5,0 A	Analog display	**82.335.97**
5,0 A	Digital display	**82.336.97**

Dimensions:	W = 19", D = 285 mm, H = 3 U
Output AC:	Safety laboratory sockets
Display AC:	Ammeter with switch for phase currents Voltmeter with switch for Display of the voltages phase-phase or phase neutral

3,2 A	Analog display	**82.327.97**
3,2 A	Digital display	**82.328.97**

Three-phase AC voltages

Adjustable AC voltage, switchable to DC voltage

Dimensions:	W = 19“, D = 285 mm, H = 6 U
Output voltage AC:	3 x 0 - 260 / 450 V not floating, unstabilized
Output voltage DC:	not floating, 4.2% ripple above Three-phase bridge rectifier, unscreened, unstabilized
Output AC:	CEE socket 16 A, 5-pin Schuko socket Safety laboratory sockets
Validation:	3 thermal-magnetic circuit breaker
Display AC:	3 ammeters Voltmeter with switch for display of the voltages phase-phase or phase neutral
Display DC:	Ammeter, voltmeter
Analog display:	Moving Iron Instruments (True RMS)
Digital display:	3.5-digit LED with True RMS rectifier

3,2 A	Analog display	**82.429.97**
3,2 A	Digital display	**82.430.97**

Three-phase AC voltages

Adjustable floating AC voltage

Dimensions:	W = 19“, D = 285 mm, H = 6 U
Output voltage AC:	3 x 0 - 230 / 400 V floating, unstabilized
Output AC:	CEE socket 16 A, 5-pin floating socket Safety laboratory sockets Output switch
Validation:	3 thermal-magnetic circuit breaker
Display AC:	3 ammeters for phase currents, Voltmeter with switch for Display of the voltages phase-phase or phase neutral
Analog display:	Moving iron instruments
Digital display:	3.5-digit LED

3,2 A	Analog display	**82.331.97**
3,2 A	Digital display	**82.332.97**

Measuring device

Multimeter

- 4.5 digits, 50,000 counts
- two-color dual display for simultaneous display of 2 measured values
- adjustable measuring rates of up to 40 measured values for V DC
- 0.02% basic accuracy V DC
- automatic / manual measuring range setting
- True RMS measurement (TRMS) (AC, AC+DC)
- Max./min. Measurement
- Relative value measurement
- Diode test function
- Continuity test
- USB interface
- USB storage function
- USB cable, test leads

DC voltage measurement:	0 - 1000 V DC
AC voltage measurement:	0 - 750 V AC
Resistance measurement:	0 - 50 MOhm
Temperature measurement function:	-200 to +300 °C
Capacity measurement:	5 nF - 50 µF
Dimensions:	W = 56 HP, D = 286 mm, H = 3 U

Multimeter	**82.807.97**

Measuring device

Function generator / counter

- Arbitrary generator with 2 channels
- 3.5" color LCD (8.9 cm diagonal) with user-friendly interface
- real two-channel output
- USB host / device interface for remote control and waveform processing

Frequency range:	Sine / square 1 µHz - 25 MHz
Frequency range:	Triangle 1 µHz - 1 MHz
Release:	1 µHz
Rise time:	Rectangle 25 ns
Duty cycle:	1% - 99% adjustable with square wave signal
Arbitary function:	Sampling rate 120 MS / s, Bandwidth 10 bits, 4k points for custom arbitrary waveforms
Modulartion types:	Standard AM / FM / PM / FSK / SUM / Sweep and burs function
Frequency counter for external signals:	5 Hz -150 MHz
Dimensions:	W = 56 HP, D = 286 mm, H = 3 U

2 Test leads

CD with operating instructions and PC software

Function generator	**82.826.97**

Measuring device

LCR meter

- 3.5“ color LCD (8.9 cm diagonal) with user-friendly interface
- simultaneous display of 2 setting criteria and 2 measurement results
- automatic level control (ALC) function
- PASS / FAIL assessment

Frequency range:	10 Hz - 2 kHz
Basic accuracy:	0,05%
Measuring speed:	max. 25 ms
Integrated bias voltage source:	± 2,5 V
Impedance (R, X, Z):	0,00001 Ohm - 99,9999 MOhm
Conductivity (G, B, Y):	0,01 nS - 999,999 S
Inductance (L):	0,00001 µH - 9999,99 H
Capacity (C):	0,00001 pF - 9999,99 mF
Interfaces:	RS232, USB, Handler Interface
Dimensions:	W = 56 HP, D = 286 mm, H = 3 U

Kelvin test clamps

CD with operating instructions and PC software

LCR meter	**82.816.97**

Test equipment

Electronic load for DC voltage sources

Dimensions:	W = 56 HP, D = 230 mm, H = 3 U
Operating mode:	Pulse mode for the simulation of dynamic loads either constant current or constant resistance operation
Power:	max. 100 W in constant current mode max. 200 W in pulse mode
Load current:	max. 10 A
Resistance:	0,4 Ω to 800 Ω
Voltage range:	4 V to 40 V DC
Impulse operation:	10 / 100 / 1000 Hz
Attitude:	2 high-resolution 10-turn potentiometers for setting the current limit and the load resistance
Displays:	digital ammeter, digital voltmeter

Electronic load for DC voltage sources	**82.890.97**

Test equipment

Load resistors

- Execution as insert plate
- adjustable load resistors for the low and low voltage range
- Overload protection through miniature fuses in the control connections

Dimensions:	W = 42 HP, H = 3 U
Resistance ranges:	0 Ω to 100 Ω 0 kΩ to 1 kΩ 0 kΩ to 10 kΩ
Tolerance:	10 %
Resilience:	max. 50 W
Validation:	one microfuse per resistor

Load resistors	**82.867.97**

Test equipment

Resistance decade

- Resistance value digitally adjustable and directly readable
- Execution as insert plate

Dimensions:	W = 28 HP, H = 3 U
Resistance range:	1 Ω to 999,999 kΩ
Release:	1 Ω
Tolerance:	1 Ω to 9 Ω: 2 % 10 Ω to 1 MΩ: 1 %
Operating voltage:	max. 50 V AC, 75 V DC
Resilience:	max. 1 W

Resistance decade	**82.861.97**

Capacity decade

- Capacity value digitally adjustable and directly readable
- Execution as insert plate

Dimensions:	W = 28 HP, H = 3 U
Capacity range:	100 pF to 9,9999 µF
Release:	100 pF
Tolerance:	+/– 5 %
Operating voltage:	max. 100 V DC

Capacity decade	**82.866.97**

Test equipment

U / I calibration device

- for simulating and calibrating analog control loops

Dimensions:	W = 42 HP, D = 230 mm, H = 3 U
Power source:	Range 0.00 mA to 25.00 mA, resolution 10 µA Accuracy +/- 0.1% +/- 1 digit
Voltage source:	Range 0.00 V to 10.00 V, resolution 10 mV Accuracy +/- 0.1% +/- 1 digit
Attitude:	2 high-resolution 10-turn potentiometers for current and voltage
Output:	Safety laboratory sockets 2 separate outputs for Current and voltage operation, usable simultaneously and independently
Displays:	2 digital displays for current and voltage

U / I calibration device	**82.856.97**

Soldering station

- Digital soldering station with ergonomic, powerful 150 W soldering iron
- Motion sensor in the soldering iron for energy-saving and tip-protecting standby function
- Easy handling thanks to intuitive one-touch operation and the large multifunction display
- Visual information when the optimal process window is reached
- ESD-safe version

rated capacity:	80 W
Maximum short-term heating output:	150 W
Standby power consumption:	15 W
Secondary voltage:	24 V
Heating time:	9 s
Temperature range:	150-450 °C
Dimensions:	W = 35 HP, H = 3 U, D = 230 mm

Soldering station including soldering iron	**82.715.97**

Soldering / desoldering station

- 2 independent channels with automatic tool recognition for the simultaneous operation of 2 soldering tools
- Soldering iron, solder baths up to 200 W
- Desoldering iron up to 80 W or hot air iron up to 100 W can be connected
- Rotary vane pump for vacuum and air flow generation

Max. Vacuum:	0,7 bar
Max. Delivery rate:	18 l / min
Amount of hot air:	max. 10 l / min
Power consumption:	300 W
Dimensions:	W = 56 HP, H = 3 U, D = 230 mm

Soldering / desoldering station	**82.733.97**

Mounting accessories for 19 “superstructures

Subrack 19“

- for inserting cassettes, insert plates or plug-in modules
- according to IEC 60297-3-101
  (1 U = 1,75“ = 44,45 mm, 1 HP = 0,2“ = 5,08 mm)
- Slide rails for guiding the slide-in cassettes
- 230 mm usable depth for plug-in cassettes and plug-in modules

3 U	1 x 84 HP Usable width	**82.080.97**
2 x 3 U	2 x 84 HP Usable width	**82.090.97**

Empty plates 19“

- made of silver anodized aluminum

1 U / 19“	**82.025.97**
2 U / 19“	**82.026.97**
3 U / 19“	**82.028.97**
6 U / 19“	**82.048.97**

Empty plates for subracks

- made of silver anodize aluminium
- to cover empty fields in the subrack

3 U / 7 HP (35,2 mm)	**82.003.97**
3 U / 14 HP (70,8 mm)	**82.005.97**
3 U / 28 HP (141,9 mm)	**82.010.97**
3 U / 42 HP (213,0 mm)	**82.015.97**
3 U / 56 HP (284,1 mm)	**82.020.97**

The **KARL-product range.**

Optimal solutions require a precise analysis of the work processes.
KARL defines itself as a system supplier for modern, ergonomic workplace design.

The intensive cooperation and the qualified dialogue with our customers is the basis for a tailor-made solution for your task.

We also take production-specific requirements and spatial conditions like the individual needs of each employee into account.

We visualize functionality, ergonomics, handling and implementation of the spatial specifications in a three-dimensional layout.

QUADRO.
The workplace system for the highest demands.

QUADRO twin.
The classic table system with all options.

SINTRO.
The variable assembly workstation.

SINTRO pack.
The solution for packing stations.

BASIC. The economic workplace system.

Transfer systems.

FIFO shelves. The flexible material feed.

Deployment shelves.

Cupboard and shelf systems.

Measuring and testing technology.

Ergonomics.
Functionality.
Custom design.

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