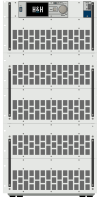


# Datasheet Series ACL

|   |                              |   |
|---|------------------------------|---|
| <b>Model</b>                                      | <b>ACLT21028</b>             |  |
| <b>Order no.</b>                                  | <b>25-009-000-01</b>         |   |
| <b>Basic operating modes</b>                      | CC, CR, CP, CV               |   |
| <b>Standard interfaces</b>                        | RS-232, USB, LAN, CAN        |   |
| <b>Number of phases</b>                           | 3                            |   |
| <b>Frequency</b>                                  | DC, 40 ... 1000 Hz per phase |   |
| <b>Maximum AC input voltage VmaxAC</b>            | 280 V AC per phase           |   |
| <b>Maximum DC input voltage VmaxDC</b>            | 400 V DC per phase           |   |
| <b>Minimum input voltage Vmin<sup>1)</sup></b>    | 6 V per phase                |   |
| <b>Maximum current Imax</b>                       | 50 A per phase               |   |
| <b>Maximum peak current Ipeak</b>                 | 200 A per phase              |   |
| <b>Power</b>                                      | 7000 W per phase             |   |
| <b>Resistance</b>                                 | 0.12 ... 79 Ω per phase      |   |
| <b>Rise/fall time<sup>2)</sup></b>                | 20 μs per phase              |   |
| <b>Load terminals<sup>3)</sup></b>                | PH7/10.16-ST76               |   |
| <b>Power consumption</b>                          | 2170 VA                      |   |
| <b>Mains voltage<br/>Mains voltage switchable</b> | 1/N/PE AC 230 V 50 ... 60 Hz |   |
| <b>Noise max. ca.<sup>4)</sup></b>                | 76 dB(A)                     |   |
| <b>Weight ca.</b>                                 | 151 kg                       |   |
| <b>Housing / 3D model<sup>5)</sup></b>            | 19" - 22 U / ACL_M6          |   |
| <b>Installation Depth<sup>6)</sup></b>            |                              |   |
| <b>Width x Height x Depth</b>                     | 482 x 995 x 523 mm           |   |

1. Minimum input voltage for maximum static load current.
2. Rise and fall times are from 10 ... 90 % and 90 ... 10 % of maximum current (CC mode, tolerance ±20 %).
3. SBUS4-32: Touch-protected sunk binding post for 4 mm banana plugs / max. 32 A.  
PH3/7.62-ST41: Phoenix plug strip 3-pole / Grid dimension 7.62 mm / max. 41 A.  
=> incl. mating connector from PHOENIX CONTACT (Phoenix order no.: 1777846)  
PH3/10.16-ST76: Phoenix plug strip 3-pole / Grid dimension 10.16 mm / max. 76 A.  
=> incl. mating connector from PHOENIX CONTACT (Phoenix order no.: 1967469)  
PH3/15-ST125: Phoenix plug strip 3-pole / Grid dimension 15 mm / max. 125 A.  
=> incl. mating connector from PHOENIX CONTACT (Phoenix order no.: 1762602)  
PH7/10.16-ST76: Phoenix plug strip 7-pole / Grid dimension 10.16 mm / max. 76 A.  
=> incl. mating connector from PHOENIX CONTACT (Phoenix order no.: 1967508)
4. Measured at the front in distance of 1 m.
5. 1 U = 44.45 mm. Detailed dimensions by means of 3D models at [www.hoecherl-hackl.com/downloads](http://www.hoecherl-hackl.com/downloads).

# Datasheet Series ACL

6. Installation depth without wiring.

|  |  |   |
|--|--|---|
| <b>Operating modes</b>   |  |   |
| Basic operating modes  | CC, CV, CR, CP   |   |
| <b>Frequency</b>   |  |   |
| Frequency range  | DC, 40 ... 1,000 Hz  |   |
| Synchronization time   | 1 ... 5 periods of input signal  |   |
| Synchronization time for rapidly changing frequencies or when connecting the input voltage | <b>Synchronization to input/extern</b>   | <b>Pre-synchronization to line voltage</b>          |
|  | max. 500 ms  | 0 ms  |
| <b>Accuracy of voltage setting<sup>1)</sup></b>  |  |   |
|  | <b>of setting</b>  | <b>of corresponding range</b>                       |
| Voltage  |  |   |
| DC   | ±0.5 %   | ±0.1 %  |
| AC   | ±1 %   | ±0.2 %  |
| <b>Accuracy of current setting<sup>1)</sup></b>  |  |   |
|  | <b>of setting</b>  | <b>of corresponding range</b>                       |
| Current  |  |   |
| DC   | ±0.2 %   | ±0.15 %   |
| 40 ... 400 Hz  | ±0.5 %   | ±0.3 %  |
| > 400 Hz   | ±0.75 %  | ±0.5 %  |
| Resolution   | 14 bits  |   |
| Total harmonic distortion <sup>2)</sup>  |  |   |
| 40 ... 400 Hz  | <2 %   |   |
| > 400 Hz   | <4 %   |   |
| <b>Accuracy of resistance setting<sup>1)</sup></b>   |  |   |
|  | <b>of setting</b>  | <b>of corresponding range</b>                       |
| Resistance <sup>3)</sup>   | ±1.5 %   | ±1 % of resistance range<br>±0.3 % of current range |
| <b>Accuracy of power setting<sup>1)</sup></b>  |  |   |
|  | <b>of setting</b>  | <b>of corresponding range</b>                       |
| Power <sup>4)</sup>  |  |   |
| DC, 40 ... 400 Hz  | ±1 %   | ±0.25 %   |
| > 400 Hz   | ±1.5 %   | ±0.3 %  |
| Power <sup>5)</sup>  |  |   |
| DC, 40 ... 400 Hz  | ±3 %   | ±0.5 %  |
| > 400 Hz   | ±5 %   | ±2.5 %  |
| Resolution   | calculated from resolutions of voltage and current measurement and current setting                           |   |
| <b>Rise and fall time</b>  |  |   |
| CC mode  | see model overview   |   |
| CP, CV mode  | DC   | ca. 10 ms   |
|  | AC   | ca. 1 s   |
| <b>Accuracy of adjustable protections</b>  |  |   |
|  | <b>of setting</b>  | <b>of current range</b>                             |
| Overcurrent protection   | ±1 %   | ±0.2 %  |
| Resolution   | 12 bits  |   |
| <b>Waveforms (Resolution: 360 points in 1° steps)</b>                                      |  |   |
| Sine   | as fundamental waveform  |   |
| Arbitrary waveforms  | based on sine, triangle or rectangle, editable pointwise   |   |
| Harmonics  | 2 <sup>nd</sup> to 25 <sup>th</sup> Harmonics in variable proportions superimposable to the fundamental wave |   |
| Crest factor   | 1.4142 ... 4.0 with automatic amplitude correction   |   |
| Phase cut  | -180 ... 180°  |   |

|  |   |                               |
|--|---|-------------------------------|
| Phase shift  | -180 ... 180° (only in combination with crest factor or phase cut, no capacitive or inductive load)   |                               |
| <b>Measurement functions</b>                               |   |                               |
| Numeric display  | rms value voltage, rms value current, resistance, active power, apparent power, reactive power, frequency, power factor, crest factor   |                               |
| Graphical display  | last period of current and voltage with 360 points, temporal progression of rms values of voltage, current and/or power of focused channel  |                               |
| <b>Accuracy of measurements/display</b>                    |   |                               |
|  | <b>of measured (real) value</b>   | <b>of corresponding range</b> |
| Voltage  |   |                               |
| DC   | ±0.2 %  | ±0.05 % ±1 digit              |
| AC   | ±0.3 %  | ±0.1 % ±1 digit               |
| Current  |   |                               |
| DC   | ±0.2 %  | ±0.1 % ±1 digit               |
| 40 ... 400 Hz  | ±0.5 %  | ±0.3 % ±1 digit               |
| > 400 Hz   | ±0.75 %   | ±0.5 % ±1 digit               |
| Resolution   | 16 bits   |                               |
| Resistance   | calculated from voltage and current   |                               |
| Power  | calculated from voltage and current   |                               |
| Sampling time  | 200 µs, triggerable   |                               |
| Frequency  | ±0.1 % ±0.1 Hz  |                               |
| <b>Dynamic function (LIST)</b>                             |   |                               |
| Number of load levels                                      | max. 300, with corresponding ramp and dwell times   |                               |
|  | <b>min.</b>   | <b>max.</b>                   |
| Dwell time   | 200 µs  | 1.000 s                       |
| Ramp time  | 0 s   | 1.000 s                       |
| Resolution   | 200 µs  |                               |
| Accuracy of setting times                                  | ±0.02 %   |                               |
| Delay at triggered start                                   | max. 300 µs   |                               |
| <b>Data acquisition</b>                                    |   |                               |
| <b>to external USB flash drive</b>                         |   |                               |
| Sampling time  | 0.5 ... 30 s, resolution 100 ms   |                               |
| Measurement data   | timestamp, voltage, current   |                               |
| Number of measurement points                               | limited by USB memory capacity  |                               |
| Dateifformat   | .csv  |                               |
| <b>to internal memory</b>                                  |   |                               |
| Sampling time  | 200 µs ... 1,000 s, resolution 200 µs, static or synchronized with LIST function  |                               |
| Measurement data   | timestamp, voltage, current   |                               |
| Number of measurement points                               | max. 40,000   |                               |
| <b>Settings memory</b>                                     |   |                               |
| Number of user settings                                    | 9, selectable (incl. programmed waveform and List)<br>1 for last settings at power-off or power fail  |                               |
| <b>I/O port (option ACL06): control inputs and outputs</b> |   |                               |
| Control inputs   | mode selection<br>load input on - off<br>selection of control source (internal, external)<br>input mode (AC, DC)<br>synchronization source (input, line, extern)<br>synchronization input<br>remote shut-down<br>trigger input (low-active) |                               |
| Dig. input level   | logical low: 0 ... 0.8 V, logical high: 3 ... 30 V  |                               |

The specified accuracies refer to an ambient temperature of 23 ±5 °C. The specified accuracies are valid when the sense lines are connected and when the unit is connected to undisturbed voltages (ripple and noise < 0.1 %). At voltages with higher disturbance values the accuracy can change for the worse.

1. The accuracy applies for the specified frequencies. At higher frequencies the accuracy decreases.
2. Measured at I<sub>max</sub>. THD increases at lower currents.
3. At 5 % V<sub>max</sub> < V < 100 % V<sub>max</sub> and 5 % I<sub>max</sub> < I < 100 % I<sub>max</sub>.
4. At V > 30 % V<sub>max</sub> and I > 30 % I<sub>max</sub>.
5. At V < 30 % V<sub>max</sub> or I < 30 % I<sub>max</sub>.

## Technical Data

|                   |  |
|-------------------|--|
| Control outputs   | load input activation state (low-active)<br>status overload<br>trigger output<br>programmable output |
| Dig. output level | logical low: 0 ... 0.8 V, logical high: 5 V/24 V selectable, max. 10 mA (push-pull)                  |

### I/O port (option ACL06): accuracy analog control 0 ... 10 V for current

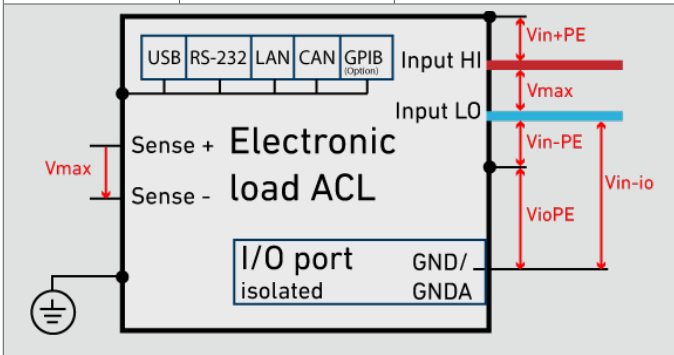
|  | of setting    | of corresponding range |
|--|---------------|------------------------|
| Current                                  | DC            | ±0.2 %                 |
|  | 40 ... 400 Hz | ±0.5 %                 |
|  | > 400 Hz      | ±0.75 %                |
| Input resistance of analog inputs >10 kΩ |               |                        |

### I/O port (option ACL06): accuracy analog monitor signals 0 ... 7 V / 0 ... 10 V for voltage and current

|   | of analog signal of real value | offset voltage |
|---|--------------------------------|----------------|
| Voltage   | DC, 40 ... 400 Hz              | ±0.3 %         |
|   | >400 Hz                        | ±0.5 %         |
| Current   | DC, 40 ... 400 Hz              | ±0.5 %         |
|   | >400 Hz                        | ±0.75 %        |
| Maximum load capacity 2 kΩ.<br>Analog monitor outputs as proportional AC curve or RMS value, selectable |                                |                |

### I/O port (option ACL06): permissible voltages

|                         | AC mode<br>The external circuit is mains voltage up to 500 V AC with overvoltage category II. | DC mode<br>The external circuit is a DC voltage derived from mains voltage with overvoltage category II. |
|-------------------------|---|--|
| Vin-io (GND - Input LO) | max. 600 V AC   | max. 800 V DC  |
| VioPE (GND - PE)        | max. 100 V AC   | max. 100 V DC  |



### Input

|   |   |
|---|---|
| Input resistance                              | > 50 kΩ at deactivated load input         |
| Input capacity                                | see model overview                        |
| Parallel operation                            | up to 3 devices in Master-Slave operation |
| Max. input voltage $V_{max}$                  | see model overview                        |
| Min. input voltage $V_{min}$ for max. current | see model overview                        |

### Input: permissible voltages

|                        |                          |
|------------------------|--------------------------|
| Vin-PE (Input LO - PE) | max. 500 V <sup>1)</sup> |
| Vin+PE (Input HI - PE) | max. 500 V <sup>1)</sup> |

| Power   |  |
|---|--|
| Continuous power                                  | see model overview (at TA = 21 °C)   |
| Derating  | -1.2 %/°C for TA > 21 °C   |
| Protection and Monitoring                         |  |
| Protective devices                                | overcurrent<br>overpower<br>overtemperature  |
| Monitoring  | overvoltage<br>undervoltage (if the input voltage is too low for the set current)  |
| Terminals   |  |
| Load input  | see model overview   |
| Sense   | Phoenix PH2/7.62-BU16  |
| Operating conditions                              |  |
| Operating temperature                             | 5 ... 40 °C  |
| Stock temperature                                 | -25 ... 65 °C  |
| Max. operation height                             | 2,000 m over sea level   |
| Pollution degree                                  | 2  |
| Max. humidity                                     | 80 % at 31 °C, linear decreasing to 50 % at 40 °C  |
| Min. distance rear panel to wall or other objects | 70 cm  |
| Cooling   | temperature-controlled air cooling   |
| Noise   | see model overview   |
| Mains voltage                                     | see model overview   |
| Mains cable                                       | length max. 3 m<br>cross-section of mains leads:<br>10 A cold device plug: (IEC C13): min. 1 mm <sup>2</sup><br>16 A cold device plug: (IEC C19): min. 1.5 mm <sup>2</sup> |
| Power consumption                                 | see model overview   |

### Housing

|                    |   |
|--------------------|---|
| Dimensions, weight | see model overview  |
| Color              | front panel RAL7035 (light grey)<br>rear panel stainless steel<br>side panels, top RAL7037 (dusty grey) |

### Safety and EMV

|                    |  |
|--------------------|--|
| Protection class   | 1  |
| Measuring category | CAT II   |
| Electrical safety  | DIN EN 61010-1<br>DIN EN 61010-2-030                                   |
| EMC                | DIN EN 61326-1<br>DIN EN 55011<br>DIN EN 61000-3-2<br>DIN EN 61000-3-3 |

### Standard interfaces

|                 |                       |
|-----------------|-----------------------|
| Data interfaces | RS-232, USB, LAN, CAN |
| I/O port        | -                     |

### Available options

|                     |   |
|---------------------|---|
| Data interface      |   |
| ACL02               | GPIB interface                            |
| Hardware extensions |   |
| ACL06<br>ACL14      | galvanically isolated I/O port<br>castors |

### Calibration, warranty

|           |   |
|-----------|---|
| FCC-ACLxx | Factory Calibration Certificate, twice for free |
| Warranty  | 2 years   |

1. positive/negative DC voltage or RMS value of a sinusoidal AC voltage