*Catalogue*

HARMS+WENDE HWH

# Product catalogue 2022



## Industrial Solutions

Version 2022-04

Resistance welding systems for industrial applications

**Imprint**

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**Liability exclusion**

All data refer to systems and machines with average utilisation. In case of doubt, contact our HWH Service department, tel.: +49 40 766 904-84.

Harms & Wende accepts no liability for damage caused through the installation and operation of other software applications.

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# *Introduction*

For over seven decades, Harms & Wende has been specialised in all resistance pressure and friction welding procedures, from services to products.

Our control and regulation technology solutions enjoy an outstanding reputation around the world. A number of awards and certificates demonstrate the high quality of our products. We are particularly delighted to have once again been selected as one of the winners of the "Germany's customer champions" competition. Thanks to the innovations which arise in our research and development department, we are always at the cutting edge of a constantly changing industry. Our experience enables us to offer our customers individual and solution-oriented products.

We create trust, because trust binds.

## Group

HARMS+WENDE GROUP

**The Harms+Wende Group - top together!**

The challenges of the global market are diverse, but each one is very specific. Harms & Wende has responded precisely to this by forming the Harms & Wende Group and has compiled an appropriate team of specialists for each task. We have brought unique skills together under the Group structure, particularly in the area of joining technologies. Our priority is maximum customer satisfaction, which we achieve by means of the necessary product and process quality as well as individually adapted solutions. By continuously evolving our products, always on tried-and-tested platforms, we achieve both technology and quality leadership in our area of specialisation. We therefore present ourselves to you as the perfect partner, together. Whether for complete control systems for resistance pressure welding, quality management systems or automation solutions, we offer you profound
knowledge and extensive services.

**We are the right connection.**

**Process technologies focusing on resistance and friction welding**

www.harms-wende.de

PROCON PAS

**Process automation for selected technologies**

www.procon-pas.de

COMPANY QST

**Process quality management for joining technologies**

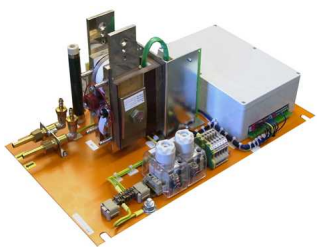
www.hwh-qst.de

## *Overview of uses*

Due to their characteristics, the different control system families are designed for specific systems or machines. Harms & Wende provides for three groups of possible uses here.

| **Modular weld timers system network – individual workstation with Windows-based visualisation** | | | |
|---|---|---|---|
| GeniusHWI | Ratia73 | | |
| MF | AC | | |
|  |  | | |

| **Modular weld system – individual workstation with integrated control system and decentralised operation on the machine** | | | |
|---|---|---|---|
| GeniusHWI/Xcomand2 | FiliusACS/FiliusMFS | Ratia43 | MPS10 |
| MF | MF / AC | AC | AC |
|  |  |  |  |

| **Complete automation solution with PLC-based visualisation systems and functions** | | | |
|---|---|---|---|
| SiniusACS/SiniusHWI | FiliusXXX analogue | LE20 | |
| MF / AC | MF / AC | AC | |
|  |  |  | |

# Overview of medium-frequency systems

Basic information on the medium-frequency systems

| Function scope | GeniusHWI | FiliusMFS + MFP | SiniusHWI |
|---|---|---|---|
| Illustrations |  |  |  |
| Uses | Suppliers, mechanical engineering, series manufacturers, special systems | | |
| Operating concepts | Control systems with net-worked operating software | Parameterisation in the control system (stand-alone) | Operation via PLC |
| Programs | 256-512 | 8-128, 2x16 | Internal 8 |
| Weld profile | VWZ, SZ, NWZ | VWZ, SZ, NWZ | Flexible |
| Regulation | KSR, IQR | KSR | KSR |
| Monitoring | Limit value monitoring, envelope, displacement monitoring, distance measurement | Limit value monitoring, distance measurement | Via PLC, externally with PQSweld |
| Analysis functions | Current, voltage, resistance curve | | Via PLC |
| Machine connection | 24 V I/O, various bus systems | 24 V I/O | 24 V I/O, various bus systems |
| Electrode management | Pre-warning, electrode wear, stepper function, milling function | Pre-warning, electrode wear, stepper function | Via PLC |
| Valves | 1 proportional valve Output 0-10V, 1 solenoid valve | 2 proportional valves Output 0-10V, 2 solenoid valves, 1 pre-stroke valve | Via PLC |
| Mains voltage | 400 - 440 V, 480 V | | |
| Max. output current | 200 A - 3500 A | 200 A - 2400 A | 200 A - 3500 A |

# *Overview of mains frequency systems*

Basic information on the mains frequency systems

| Function scope | Sinius | MPS10 | FiliusAC | Ratia43 | Ratia73 |
|---|---|---|---|---|---|
| Illustrations |  |  |  |  |  |
| Programs | 8 internal | 8 | 8, 32, 128 | 128 | 128 |
| Number of start inputs | 1 | 2 | 1, 2 | 2 | 2 |
| Number of ignition outputs | 1, 3 | 1 | 1 | 1, 3 | 1, 3 |
| Mains frequency | 50 Hz / 60 Hz automatically, with mains voltage compensation | | | | |
| Operation | With PLC | Integrated | Integrated | Integrated | XPegasus |
| Current regulation | 1-phase | No | 1-phase | 1- and 3-phase | |
| Current monitoring | With PLC | No | Yes | 1- and 3-phase | |
| Regulation range limit | No | No | Yes | Yes | Yes |
| Current profiles | 80 | 1 | 3 | 3, [10 optional] | |
| Solenoid valves | No | 2 | 1, 2 | 2 | |
| Proportional valve outputs | Yes | No | 1, 2 | 1 | |
| Pressure program | No | No | Yes | Yes | |
| Time setting | Per, half cyc. | Per, half cyc. | Per, half cyc., ms | Per, half cyc. | |
| Spot counter / counter groups | No | No | 1, 2 | 128 | |
| Stepper function | No | No | Yes | Yes | |
| Data communication | Yes | No | No | RS422 | RS422, Ethernet |
| Bus communication | Yes | No | No | 24 V I/O | PBS, IBSe, IBSo |
| Spot welding modes | Single spot, serial spot | | | | |
| Seam operating mode | Yes | No | Yes | Yes | Yes |
| Data backup | No | No | Via USB | With XPegasus | |

# *Genius product series*

Fig. 2-1 *GeniusHWI inverters*

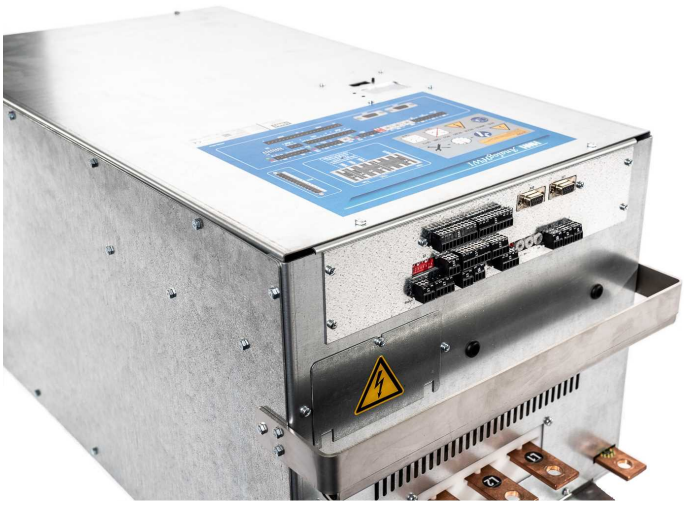


Fig. 2-2 *GeniusHWI3xyy inverters*

## Description

The *Genius* series inverters consist of a medium-frequency power unit with an integrated modular control system. Plug-in card rack is intended for several plug-in modules.

The CPU and weld cards formthe basis of the Genius inverters. Further plug-in modules such as e.g. fieldbus cards or I/O cards make this device highly adaptable. The various IQR, PQSweld and process management software packages also enable this system to be extended very flexibly. Even the system's basic equipment includes visualisation of the last ten resistance, current and voltage curves.

## Operating concepts

Central operation of up to 20 control systems with the XPegasus operating software via Ethernet. (XPegasus subject to be purchased separet).

Decentralised operation of one control system with XComand (not included in the delivery scope).

## Machine and robot connection

As standard, communication with the machine or robot control system takes place via the 24 V I/O. For an optional fieldbus connection, you can choose from eight fieldbus variants.

GeniusHWI403 - GeniusHWI408

| Power classes | HWI403L | HWI403W | HWI406L | HWI406W | HWI408L | HWI408W |
|---|---|---|---|---|---|---|
| Power input | 400 / 440 V 3 ph, 480 V 3 ph | | | | | |
| Maximum output current | 250 A | 250 A | 500 A | 500 A | 650 A | 650 A |
| Output current at 20% ED | 84 A | 112 A | 157 A | 224 A | 302 A | 302 A |
| Output current at 100% ED | 38 A | 50 A | 70 A | 100 A | 135 A | 150 A |
| Rated power at 20% ED | 42 kVA | 56 kVA | 79 kVA | 112 kVA | 151 kVA | 168 kVA |
| Cooling | Air | Water | Air | Water | Air | Water |
| Total weight | 21 kg | 21 kg | 21 kg | 27kg | 21 kg | 27 kg |
| Cooling water requirement | - | 4 l/min | - | 4 l/min | - | 4 l/min |

GeniusHWI413 - GeniusHWI36

| Power classes | HWI413L | HWI413W | HWI416L | HWI416W | HWI424W | HWI436W |
|---|---|---|---|---|---|---|
| Power input | 400 / 440 V 3 ph, 480 V 3 ph | | | | | |
| Maximum output current | 900 A | 900 A | 1200 A | 1200 A | 1600 A | 2400 A |
| Output current at 20% ED | 335 A | 369 A | 447 A | 537 A | 783 A | 1062 A |
| Output current at 100% ED | 150 A | 165 A | 200 A | 240 A | 350 A | 475 A |
| Rated power at 20% ED | 168 kVA | 185 kVA | 224 kVA | 269 kVA | 392 kVA | 531 kVA |
| Cooling | Air | Water | Air | Water | Air | Water |
| Total weight | 24 kg | 30 kg | 24 kg | 30 kg | 26 kg | 26kg |
| Cooling water requirement | - | 4 l/min | - | 4 l/min | 4 l/min | 4 l/min |

GeniusHWI440 - GeniusHWI460

| Power classes | HWI3x40 | HWI3x45 | HWI3x60 |
|---|---|---|---|
| Power input | 400 / 440 V 3 ph, 480 V 3 ph | | |
| Maximum output current | 2950 A | 3500 A | 3500 A |
| Output current at 20% ED | 1733 A | 1845 A | 2571 A |
| Output current at 100% ED | 775 A | 825 A | 1286 A |
| Rated power at 20% ED | 867 kVA | 923 kVA | 1286 kVA |
| Cooling | W = Water | | |
| Total weight | 75 kg | 75 kg | 77 kg |
| Cooling water requirement | 6 l/min | 6 l/min | 8 l/min |

# Basic (BAS) function scope

The *GeniusHWI* product range offers maximum functionality for spot and projection welding. The "Basic" version is the perfect inverter for your standard machines.

Its basic equipment encompasses 24 V I/Os and an analog output for the proportional valve. Constant current regulation, limit value monitoring and S-Inspector (distance) are part of the basic equipment.

Electrode management and proportional valve control are, of course, also included. As standard, the inverters are equipped with an Ethernet interface, enabling you to network all devices.

## Standard function scope

- 256 programs
- 3 main current times (pre-heating, main, post-heating time)
- Digital 24 V I/O
- Constant current regulation (KSR)
- Electrode management
- Current increase, current decrease
- Pulses
- Proportional valve output 0-10 V
- Current limit value monitoring
- Visualisation of measured data
- Further interfaces, see options and equipment: "Function scope" auf Seite 38 and "Machine and robot connections " auf Seite 77.

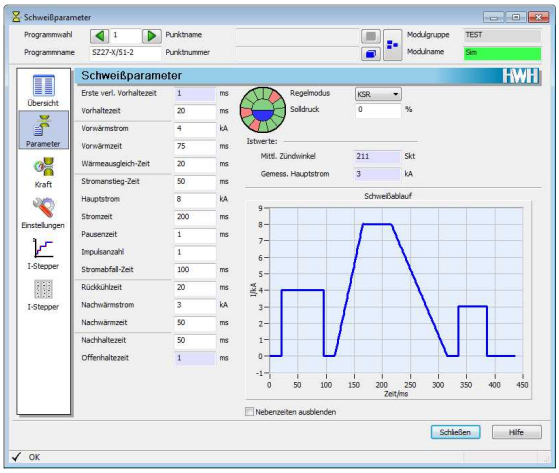



Fig. 2-3 *Current parameters on the XPegasus user interface*

S-Inspector (distance)

- Component control
- Sink-in distance
- Final dimension

Fig. 2-4 *Settings for the distance inspector via the XPegasus user interface*

Fig. 2-5 *GeniusHWI416W (with 24 V I/O)*

# *Professional (PRO) function scope*

For spot and projection welding with extended function scope.

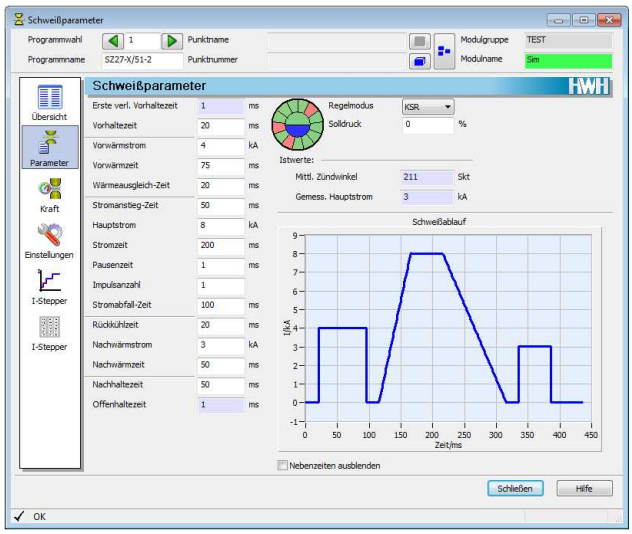
The *GeniusHWI* product range offers maximum functionality and flexibility. The "Professional" version is the professional for all mechanical engineering welding tasks. Its basic equipment encompasses 24 V I/Os and one analogue output for the proportional valve plus 512 programs.

The professional equipment also encompasses constant current regulation, a control stroke inspector and distance inspector as well as visualisation of the current, voltage and resistance curves of the last ten welding operations. We have additionally integrated the inspectors for current, voltage and resistance into the Professional equipment. At the same time, it can also be prepared for our PQS welding system.

Electrode management and proportional valve control are, of course, also included. Actuation is possible via the I/O level, Profibus, Profinet or via eight further bus interfaces. As standard, the inverters are equipped with an Ethernet interface, enabling you to network all devices.

## Standard function scope

- 512 programs
- 3 main current times (pre-heating, main, post-heating time)
- Digital 24 V I/Os
- Constant current regulation (KSR)
- Electrode management
- Current increase, current decrease
- Pulses
- Proportional valve output 0-10 V
- Current limit value monitoring
- Further interfaces, see options and equipment: "Function scope" auf Seite 38 and "Machine and robot connections " auf Seite 77.




Stromparameter in der XPegasus-Bedienoberfläche

S-Inspector (distance)

- Component control
- Sink-in distance
- Final dimension

I-Inspector (current)

- Limit value
- Mean envelope value
- Reference envelope value

U-Inspector (voltage)

H–inspector (control stroke)

- Limit value
- Mean envelope value
- Reference envelope value

R–inspector (resistance)

- Limit value
- Mean envelope value
- Reference envelope value

- Limit value
- Mean envelope value
- Reference envelope value

## *Seam (SEAM) function Scope*

The "GeniusHWI-NAHT" inverter is the specialist for roller seam applications.

The user has 16 pro files available for the seam welding process. The profiles run sequentially, and the user can decide for himself whether the specified time duration is welded to completion or whether the welded profile is terminated prematurely via an external input and the next profile is welded. For control purposes, a handshake signal is exchanged via the fieldbus. With this extensive welding profiles individual adaptations of the welding process for the respective task are possible.

### Standard function scope

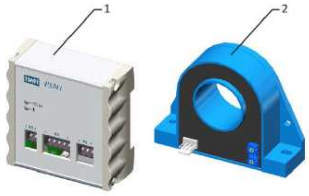
- 512 programs
- 16 profiles
- Digital 24 V I/Os
- Constant current regulation (KSR)
- Proportional valve output 0-10V
- Visualisation of measured data *
- Further interfaces, see options and equipment: "Function scope" auf Seite 38 and "Machine and robot connections " auf Seite 77.

Fig. 2-6 *GeniusHWI inverters*

Each of the 16 profiles consists of the following parameters:

- SAZ current increase time
- Current_A current in A depending on the control mode
- Current_SKT current in SKT depending on the control mode
- SZ main current time in ms
- PZ pause time in ms
- Pulses number of pulses
- Pause current in ms
- Control value preset Profile value or external
- Monitoring -off, I-mean value, SKT-mean value
- Blanking time
- Measuring time
- Tolerance+
- Tolerance-
- Deviation window
- Reference value kA or SKT

GeniusHWI Seam Accessories

| Designation | Article no. | Description | |
|---|---|---|---|
| PSM1-0600A | 47794 | Measuring box primary current measurement, measuring range 600 A (GeniusHWIx03 - GeniusHWIx08) |  1 Messbox PSM1<br>2 HTA-Stromsensor (HTA 200-S oder HTA 400-S) |
| PSM1-1000A | 47794 | Measuring box primary current measurement, measuring range 1000 A (GeniusHWIx13 - GeniusHWIx36) | |
| PSM1-2500A | 47794 | Measuring box primary current measurement, measuring range 2500 A (GeniusHWI3x40 - GeniusHWI3x60) | |

* Primary current measurement is required for welding tasks with a welding time >= 7 sec.

## *Comparison of BAS and PRO functions*

| Function scope | GeniusHWI BAS | GeniusHWI PRO |
|---|---|---|
| Operating concepts | PC with XPegasus operating software | |
| Programs | 256 | 512 |
| Welding profile | 3 main current times VWZ, SZ, NWZ | |
| Current increase | Yes | |
| Current decrease | Yes | |
| Pulses | Yes | |
| I/O | 24 V I/O | |
| Electrode management | Yes | |
| 1 proportional valve | Yes | |
| Visualisation of the last 10 measured data | Yes | |
| Constant current regulation KSR | Yes | |
| Current limit value monitoring | Yes | |
| S-Inspector (component contact, sink-in distance, final dimension monitoring) | Yes | |
| I-Inspector (current envelope) | No | Yes |
| U-Inspector (voltage envelope) | No | Yes |
| H-Inspector (control stroke envelope) | No | Yes |
| R-Inspector (resistance) | No | Yes |
| IQR - integrated quality control | Optional | |
| Q-Inspector | Optional | |
| PQS (PQS-ready) | Optional | |
| AMC / DCM - ALU Mode Classic + Dynamic Conditioning Mode | Optional | |
| BD - component documentation | Optional | |
| PDD - Process Data Documentation | Optional | |
| TT - Trace Tag | Optional | |
| HSC - High Speed Current | Optional | |
| IQflex - Integrated Quality Control incl. IQ-Inspector & IQR | optional | |
| MM1-Multi-Mess 1 | optional | |
| MM2-Multi-Mess 2 | optional | |
| MASTER | optional | |

# Inspectors

monitoring functions

of the inspectors help to ensure quality and report welding quality problems in good time.

problems in good time. Depending on the Scope of functions of the Genius inverter, certain

inspectors are already available in the device.

The inspectors are independent of each other. The following inspectors are available:

The following inspectors are available:

- Current: I-Inspector and limit value monitoring
- Voltage: U-Inspector
- Resistance: R-Inspector
- Force: F-Inspector
- Control stroke: H-Inspector
- Process stability: Q-Inspector
- Component control and distance measurement: S-Inspector
- Spatter: SP-Inspector

**Monitoring parameters:**

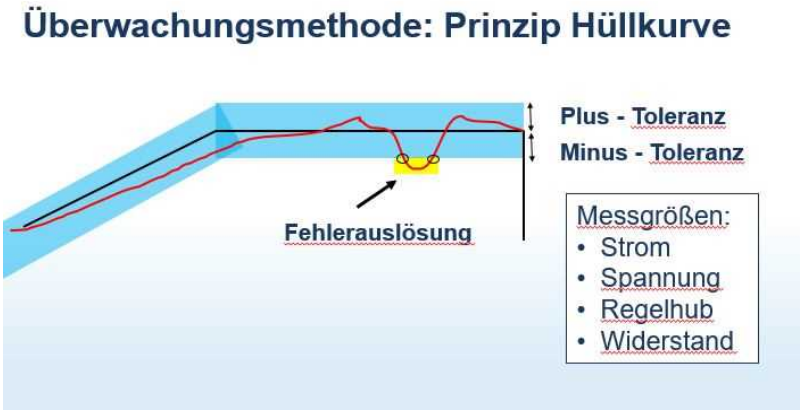
The following parameters apply to the inspectors current(I), voltage(U), control stroke(H), resistance(R) and force.

**Monitoring method:** Off, Average, Envelope, Envelope Absolute, Manual Reference Absolute.

**Comparison value source:** Setpoint, Reference value

**Measurement time setting:** Automatic, Manual


Envelope with monitoring parameters




Envelope with Principle of envelope monitoring

The inspectors for process stability, component control and displacement measurement have windows specially adapted to their function. Windows (see description S- and Q-Inspector).

## I-Inspector (current)

Monitoring the current curve of a weld provides information about the magnitude of the current intensity and the constant quality of the weld achieved as a result.

This monitoring is very useful in the case of unregulated current input, since any change in the resistance of the weld metal is immediately visible in the current curve.

The energy density available during welding and the amount of energy introduced into the weld essentially determine the weld joint. Therefore, monitoring the current profile of a weld allows a statement to be made about the constant current intensity and the quality of the weld achieved as a result. The current curve results from the parameters set on the inverter, from the properties of the welding device and the component changing during welding.

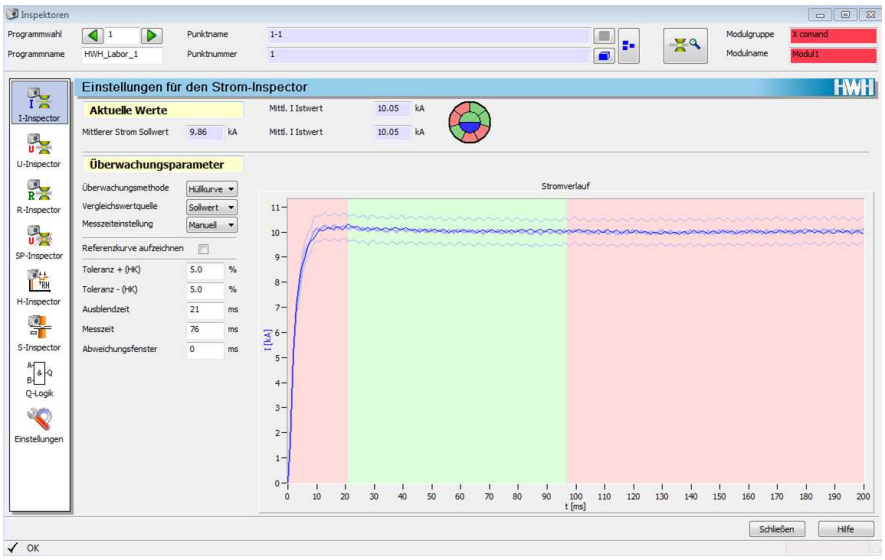



Fig. 2-7 *XPegasus representation with open I-Inspector settings*

Applications:

- Spot welding in positioned mode (unregulated)
- Projection welding in positioned mode (unregulated)

Monitoring methods:

- Mean value monitoring to setpoint or reference value source.
- Envelope monitoring to setpoint or reference value source.

# U-Inspector (voltage)

The use of voltage measurement is recommended for applications with constant current control in spot or projection welding systems. Since the control works very fast, in the millisecond range, hardly any change in the current curve can be detected. However, a greater dynamic can be seen in the voltage curve.

To monitor the voltage curve, the voltage measurement must be connected to the electrodes. If the dynamics of the voltage curve increases due to changes in the welding resistance in the weld metal, this can be an indication of a change in the weld metal or a change in the system condition, e.g. a change in the pressing force.

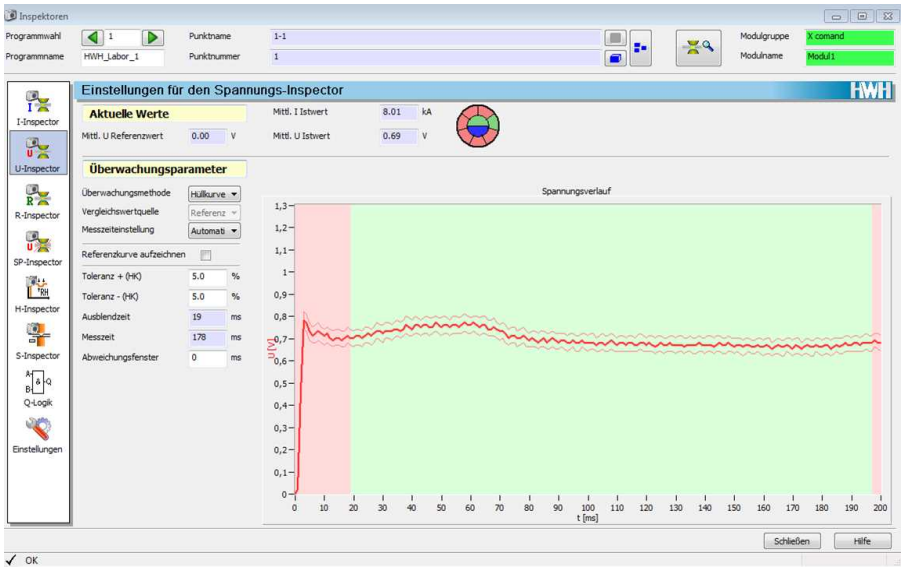



Fig. 2-8 *XPegasus representation with open U-Inspector settings*

Applications:

- Spot welding in controlled mode (KSR)
- Projection welding in controlled mode (KSR).

Monitoring methods:

- Average value monitoring to setpoint or reference value source.
- Envelope monitoring to setpoint or reference value source.

## R-Inspector

We recommend to use the R-Inspector for spot applications e.g. for the control of cap milling.

The R-Inspector compares the resistance curve during welding with a reference curve and issues a warning if a pre-selected tolerance is exceeded or classifies the weld as faulty. To monitor the resistance curve, voltage measurement must be connected to the electrodes.

The reference curve can be formed from the preset values of the controller or from the measured values of aweld classified as good.

The reference of a good weld can be specified as envelope curves. The +/-tolerance can be specified with aconstant or a proportional distance to the reference curve.

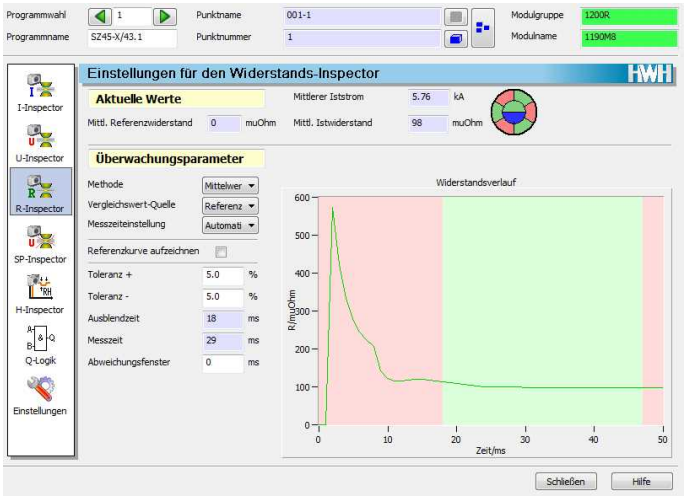



Fig. 2-9 *XPegasus representation with open R-Inspector settings*

Applications:

- Spot welding in set or controlled mode.
- Monitoring whether cap milling has occurred.

Monitoring methods:

- Mean value monitoring to setpoint or reference value source.
- Envelope monitoring on setpoint or reference value source.

## H-Inspector (control stroke)

Drepresent an alternative to voltage measurement. Here, the change of the control value (pulse width) is considered.

By using a constant current control, the control value is changed in such a way that the welding current remains constant, independent of disturbing influences.

The change in the actuating value during a weld is an indicator of how great the influence of a disturbance variable is. The H-Inspector compares the changes in the actuating value during welding with a reference curve and, if a preselected tolerance is exceeded, issues a warning or classifies the weld as faulty.

The reference of a weld can be selected as envelope curves. The +/-tolerance can be specified with a constant or a proportional distance to the reference curve.

We recommend using the H-Inspector for projection applications.

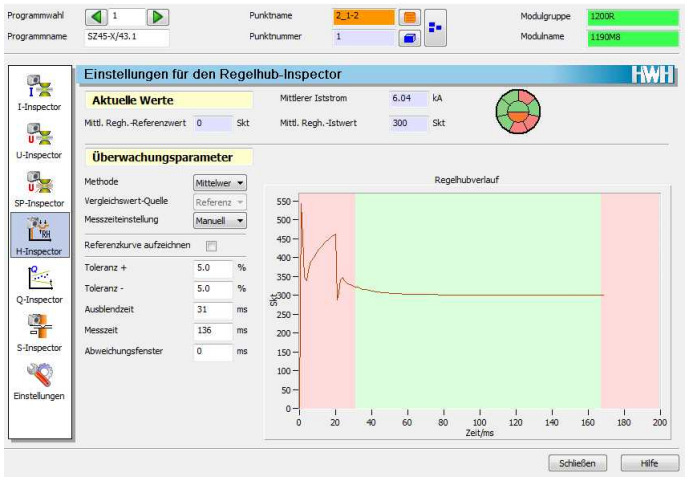



Fig. 2-10 *XPegasus representation with open H-Inspector settings*

Applications:

- Spot welding in controlled mode (KSR)
- Projection welding in controlled mode (KSR).

Monitoring methods:

- Average value monitoring to setpoint or reference value source.
- Envelope monitoring to setpoint or reference value source.

## Q-Inspector (process stability)

The The Q-Inspector compares the dynamic resistance curve of a weld with a previously formed reference and evaluates the similarity.

Particular attention is paid here to the simplicity of operation.

The reference is determined from tested welds and thus represents an optimized resistance curve. This reference is given a value of 1 (100%). Each subsequent weld is evaluated in its similarity using an internal algo- rithm. This value is called "Spot Value" and can be used as a monitoring parameter with an individually adjustable threshold. References for different welding tasks can be stored in a database and reloaded as required.

During production, the current resistance curve is displayed in relation to the reference. In addition, the user receives an overview of past evaluations in a live process drift display.

The Q-Inspector is based on statistical data and should therefore only be used with XPegasus Gold or higher, as the extended database enables optimum quality control over longer periods.

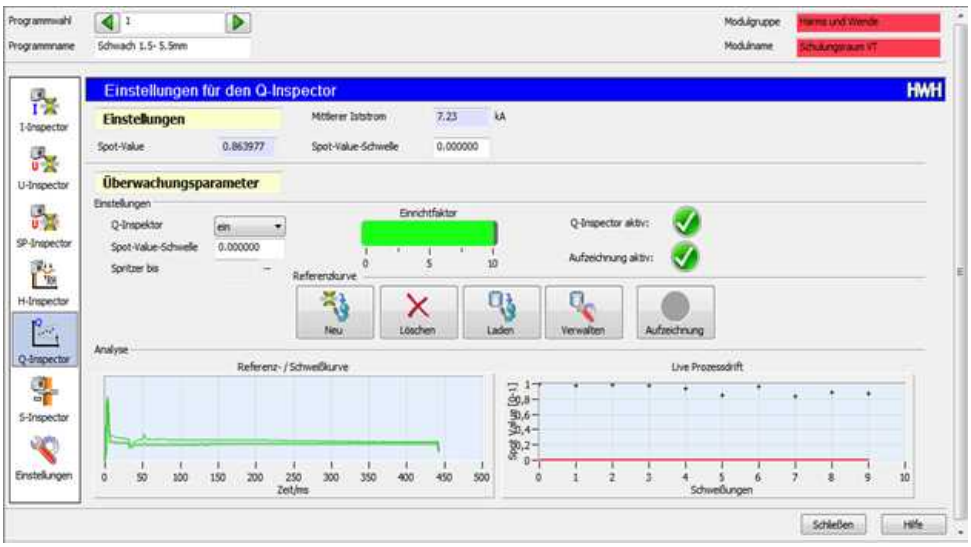



Fig. 2-11 *XPegasus Q-Inspector user interface*

Applications:

- Spot welding in controlled mode (KSR)
- Spot welding in adaptive operation (IQR).

Monitoring methods:

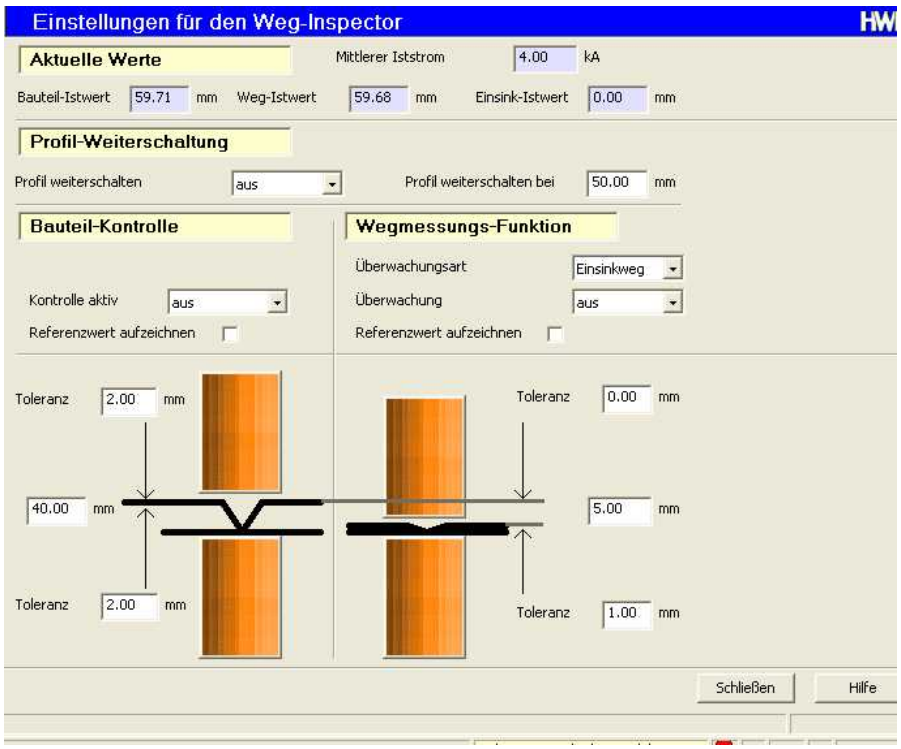
- Spot value threshold on reference value sources.

## S-Inspector (distance measurement)

The path measurement monitors the distance covered by the electrodes. This makes it possible to determine whether the component was inserted at the correct height. During welding, the sinking of the electrodes is measured and monitored with the specified tolerances. A preset sinking distance or a required gauge block can be checked. Likewise, when a preset sinking distance is reached, a profile changeover or shutdown is possible.

Characteristics / features

- Component control
- Sink-in distance monitoring
- Final dimension monitoring
- Profile indexing




Component control, sink-in distance or Final dimension monitoring

Applications:

- projection welding in closed-loop operation (KSR)
- Projection welding in open-loop operation (SKT)

Monitoring methods:

- Component control
- Sinkage monitoring
- Gauge block monitoring
- Profile indexing (or shutdown)

## Optionen

Depending on the application and welding task, we offer different optional equipment of our Genius inverters.

If you need a good documentation of your welding quality, we have the right documentation tool for you. We offer you to carry out a component documentation in an internal database, on a PC or server, as well as the documentation of your welding data to an external database.

e.g. for the spot welding task in the sheet metal area we recommend to use our IQFlex system. In this system different tools are available for each spot welding task. Extensive monitoring is already integrated.

Diagram: Sample part of a hump application

# *IQR - integrated quality control*

The integrated quality control IQR regulates the current during welding depending on the resistance curve or power curve. The aim is the elimination of interference variables in the welding process.

Welding time adaptation is controlled depending on the time point of maximum resistance. The most striking time point in the resistance curve is the end of the warm-up phase and the start of melting. From this time point, the resistance curve begins to decline again, as the transition resistance between the materials is omitted and the electrode begins to sink in. We call this point the "maximum resistance".

This time point varies. It is dependent on the interferences which influence heating.
Influencing interferences are e.g.:

- The electrode diameter
- The shunt conditions
- Mains voltage fluctuations
- Force losses due to poor fit

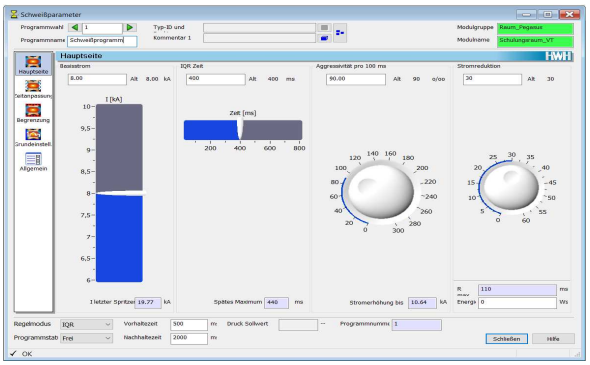


Fig. 2-12 *XPegasus representation with IQR settings*

From the point in time of maximum resistance, the thus far increasing nominal current value from previous process information is maintained at its current level with a delay. This results in a respective, new welding output, depending on the interference variables, for the further welding operation process. Heating can be changed up to the maximum resistance by programming the starting current and the steepness of the increase, called the "aggressiveness". If this is not sufficient, as may occur in rare cases, the welding time can also be adapted depending on the maximum resistance. Intervention into the cycle time must be noted in this case. Experience has shown variations in variables of no more than ±5 ms in robot applications.

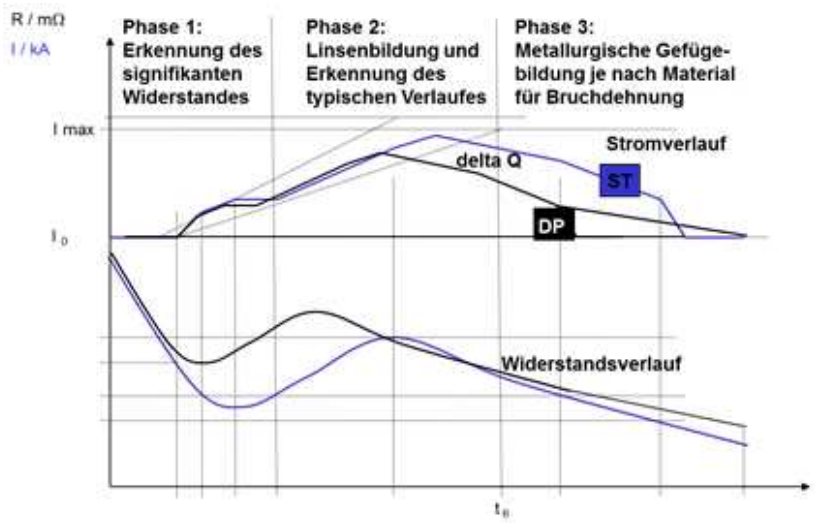



Fig. 2-13 *Resistance curves*

# IQFlex - Integrated Quality Control incl. IQ-Inspector & IQR

IQflex is for adaptive control and monitoring from the first spot weld based on the proven Genius platform.

In addition to our proven IQR, the IQflex system also includes the option of a reference-guided adaptive controller and monitoring of the weld from the first point.

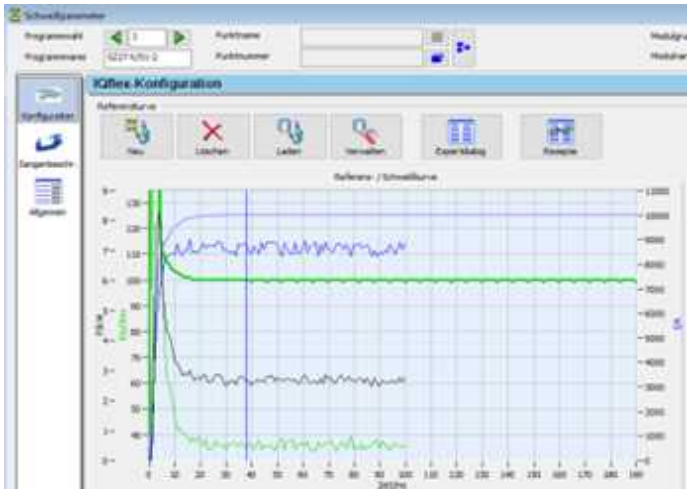
Short commissioning times and simple operation are the guarantee for efficient and cost-effective production. The IQflex adaptive package is specially optimized for these requirements and guarantees reliable spot welding of steel materials.

Our controller is based on the elementary process variables current and voltage. A voltage tap on the secondary side of the transformer provides a precise and reliable measurement signal from which all necessary process variables can be determined. The actual welding gun or machine remains free of cables to ensure easy maintenance.

By means of the process resistance, which is recalculated every millisecond, the controller individually adapts the welding current to the requirements of each welding spot. This guarantees a short process time as the required energy is applied in a concentrated manner. Minimizing cycle time is one of our customers' most important criteria for using IQflex.

**Benefits and advantages at a glance**

- Fast parameterization through simple operation
- Reliable monitoring with our new IQ Inspector from the first spot weld.
- Documentation of all welds in the XPegasus database
- Retaining the proven IQR function
- Industry 4.0 in action with safe and proven Harms & Wende products
- 100% compatibility with existing IQR parameters
- Full integration into an existing XPegasus network
- Curve display in familiar Genius performance
- Monitoring of all welds with the IQ Inspector from the first point.




The integrated preconditioning enables stable conditions to be created between the electrode cap and the workpiece surface at the start of the actual welding process. Regardless of whether the material used is coated or contaminated, IQflex makes welding a success.

The IQ-Inspektor monitors the quality of each weld and thus helps you to fully meet your customer requirements.

| Application | Monitoring methods |
|---|---|
| • Spot welding with adaptive control<br>• Automated manufacturing<br>• Use of hand-guided welding guns<br>• Different combinations of materials<br>• Different sheet thicknesses | •IQ-Inspector on reference value sources<br>•R-Inspector (see R-Inspector) |

# *PQS-ready – preparation for PQS licence*

The option PQS-ready offers you the integrated technical prerequisite for using Inline process monitoring for your spot and projection welding applications in the Genius system. The use of an additional QUADRIGO measurement module is forgone as a result.

The PQS-Res software licence required for data evaluation and analysis is not part of the PQS-ready option, and must be purchased separately. The licence is protected with a licence dongle. This is in the form of an SD card, and is inserted into the welding control system on use of the software licence.

## Characteristics of the PQS-ready option

- Software-based provision of the welding process parameters of current, voltage, resistance, power and distance in the Genius inverter for the PQS-Res software.
- Additional hardware for measured value recording is omitted.

# PDD - Process Data Documentation

**Option: PDD**

The "Process Data Documentation" option enables the user to query process data from a higher-level system PLC via the fieldbus and to store them in the system PLC.

To do this, the process data are made available after the
welding process, which is identified through the end identifier by means of an FK signal. A PC is not required for this, as the data can be requested not via the Ethernet channel but by means of acyclical data exchange via the fieldbus interface (e.g. PNS Profinet slave).

## Characteristics of Process Data Documentation

- A maximum of 10 parameters per welding process.
- The 10 parameters can be selected from a parameter pool. The parameter pool is described in a quick guide.
- The process parameters are only valid until a new start signal is set for the next welding spot.

| Parameter ID | Designation | Data type | Unit |
|---|---|---|---|
| 3528 | Current program | UInst32 | - |
| 14216 | Mean nominal current | UInst32 | A |
| 14181 | Mean actual current | SInt32 | A |
| 14287 | Actual welding time | UInst32 | ms |

## Prerequisites

- Profinet card G432-PNS (without I/Os).
- A further I/O card G201 MIO is additionally required.

Note: parameter IDs of welding curves cannot be read out via the fieldbus and are excluded from this list as they are not currently supported.

# *TT - Trace Tag*

**Option: TT**

The "Trace Tag" option is an accompanying identifier for adding external information to a welding process.
This enables the user to add a welding spot identifier to the module's archive data via the Ethernet interface (UDP).
The information can consist of max. 32 ASCII characters.

This can be an order number, a part or body identification number, for instance. The function is used for documentation and tracing to the welding spot or a batch.

Trace Tag (TT) is an optional function of the Genius inverter. It requires a fieldbus connection with network function. Profinet and EthernetIP fieldbuses are currently available with this function. The identifier is sent as a UDP packet from the higher-level control system to the Genius inverter. The identifier remains present until a new packet is sent. If the inverter has been switched off, an identifier must be sent again so that it can be entered in the archive.

## Prerequisites

- Genius firmware version: 2.70.
- XPegasus Gold: version 5.2.31 and higher.
- UDP-capable network.
- Setting port numbers.
- Archive configuration.

# ALU Mode – Classic / AMC + Dynamic Conditioning Mode / DCM

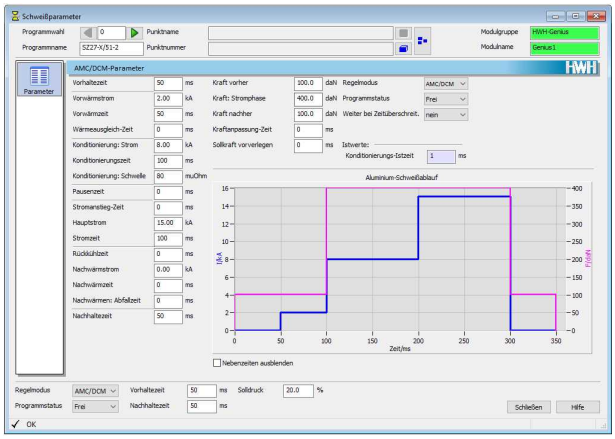


Fig. 2-14 *Visualisation of XPegasus aluminium parameters*

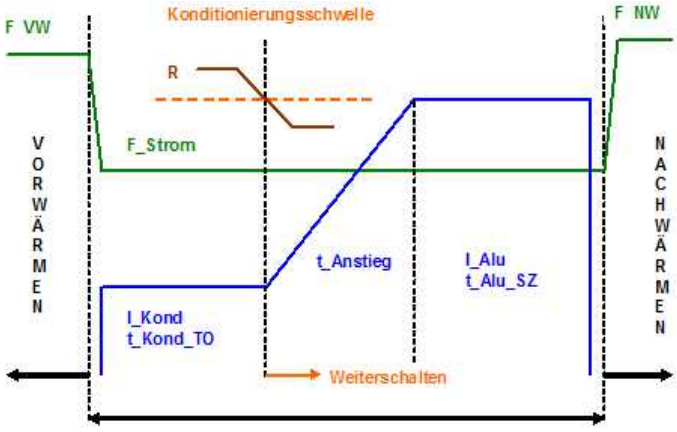



Fig. 2-15 *Visualisation of XPegasus aluminium current profile*

## Description of option: AMC / DCM

"AMC / DCM" is a control mode which enables material preconditioning. Material pairings with different oxidation tendencies and varying transfer and contact resistance pose a challenge to the welding process.

To implement the welding task with the best quality possible, it may be necessary to subject the material to preconditioning.

This offers the basis for constant spot quality in resistance welding, e.g. of aluminium alloys. The unique combination of adaptive preconditioning and a controlled force profile has been developed specifically by Harms & Wende to meet the requirements of modern aluminium materials on the spot welding process.
The AMC/DCM mode is available as an option for all GeniusHWI inverters.

During the conditioning time, a conditioning current is
output; during this time, the process resistance is measured continuously. On reaching a previously defined conditioning threshold, preconditioning is ended and the actual main current time with the set main current begins. Due to the conditioning threshold, identical starting conditions are established for each welding process to achieve a constant spot quality. Different conditioning times are achieved depending on the varying transition resistance. If the conditioning threshold is not undershot, a message is output.

It is possible to use both pneumatic proportional valves and guns driven by an electric motor.

The "AMC / DCM mode" is configured via the user interface.

# *BD component trace*

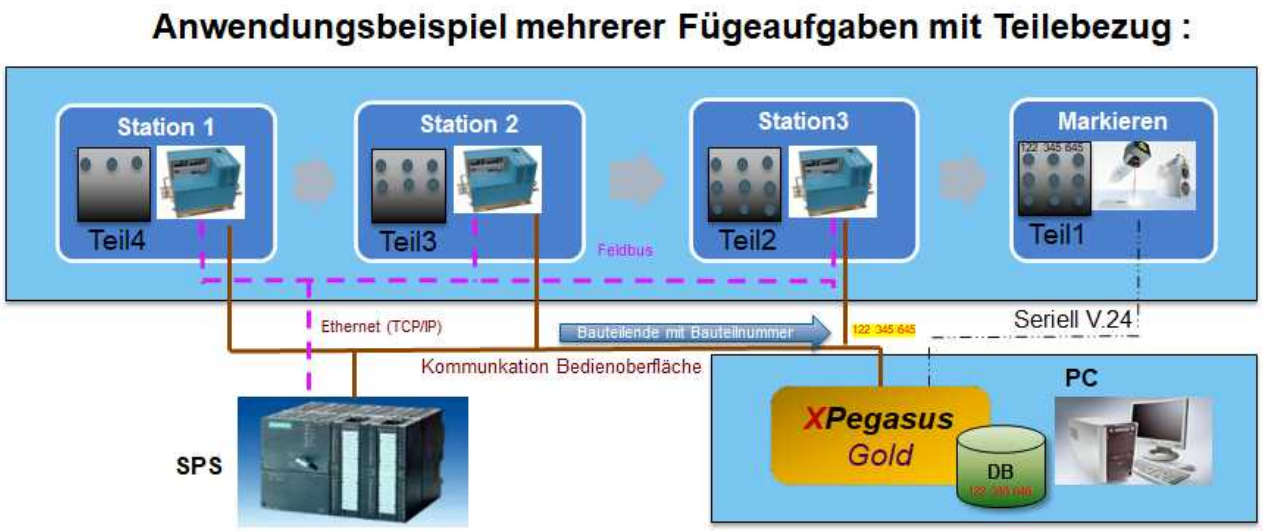



Fig. 2-16 *Application example: joining system for hybrid engines*

## Description

The component trace enables the user to depict all joining spots from all completed component production modules in an overview. To do this, the Genius inverter must be prepared for component trace. For this, the data recorded during the welding operation are transferred as an archive data record, together with the welding program and the component code, to XPegasus, where they can be displayed. The data can be transferred to the customer for further processing.

## Voraussetzungen

- at least XPegasus Gold

# HSC High Speed Current

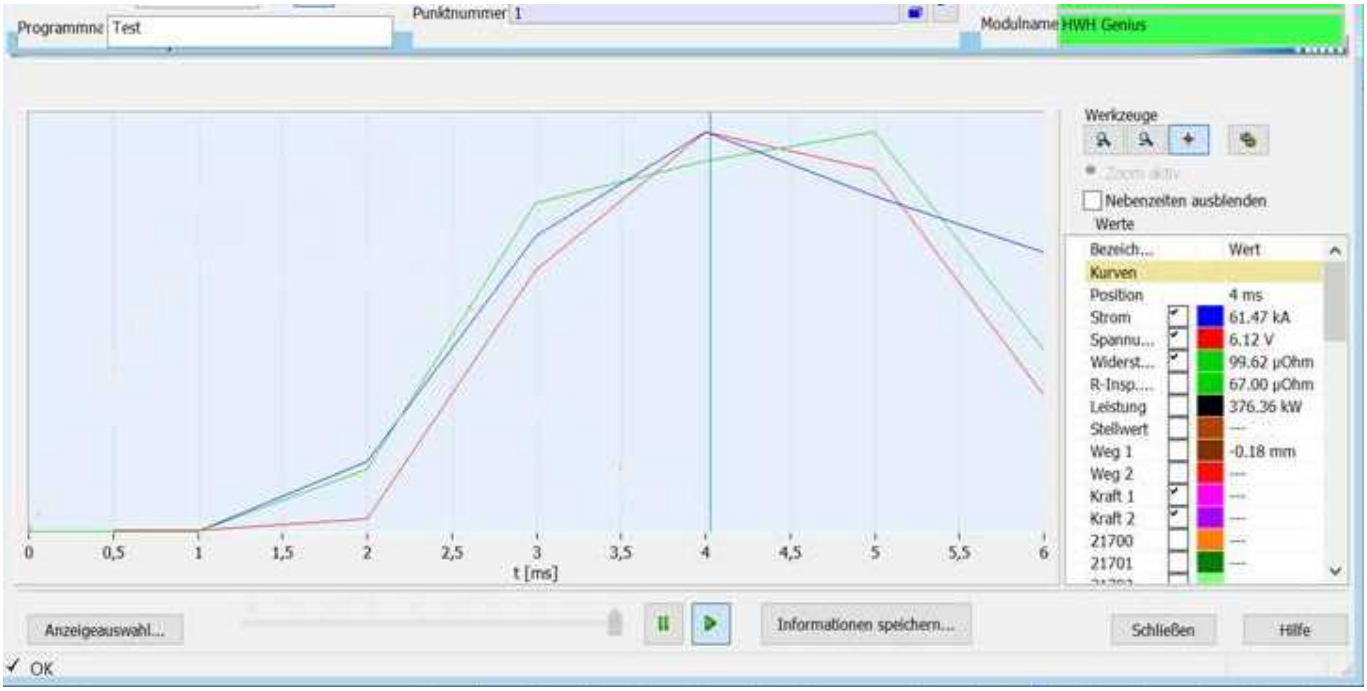



Fig. 2-17 *Application example: High Speed Current function*

## Description

The "High Speed Current" option enables the user to achieve faster current increase behaviour. Fast current increase times are often required, particularly in projection welding. Fast modulation of the secondary voltage is necessary to achieve this. The prerequisite for this is a correspondingly low-impedance welding machine secondary circuit and a secondary circuit voltage of 16 V - 21 V.

When welding nuts on high-strength material, a short welding time is advantageous to achieve a good nut connection on the metal sheet.

Using the example of a projection welding system with a low-impedance secondary circuit and an MF transformer with a secondary voltage of 21 V, currents of 60 kA with current increase times of 4 ms – 10 ms are achievable in practice. As a result of this, a medium-frequency system can replace a KE system. The advantage is that a wider range of products can be welded.

The operating range in this case is 30 kA – 150 kA.

The "High Speed Current" option is available for the GeniusHWIxx type MF power inverters. Depending on power type, inverter currents of up to 3500 A can be achieved. The options of the MF welding technology with high secondary voltage offer good advantages here, as very good scalability is achieved in the application.

# *Master*

**Option: Master**

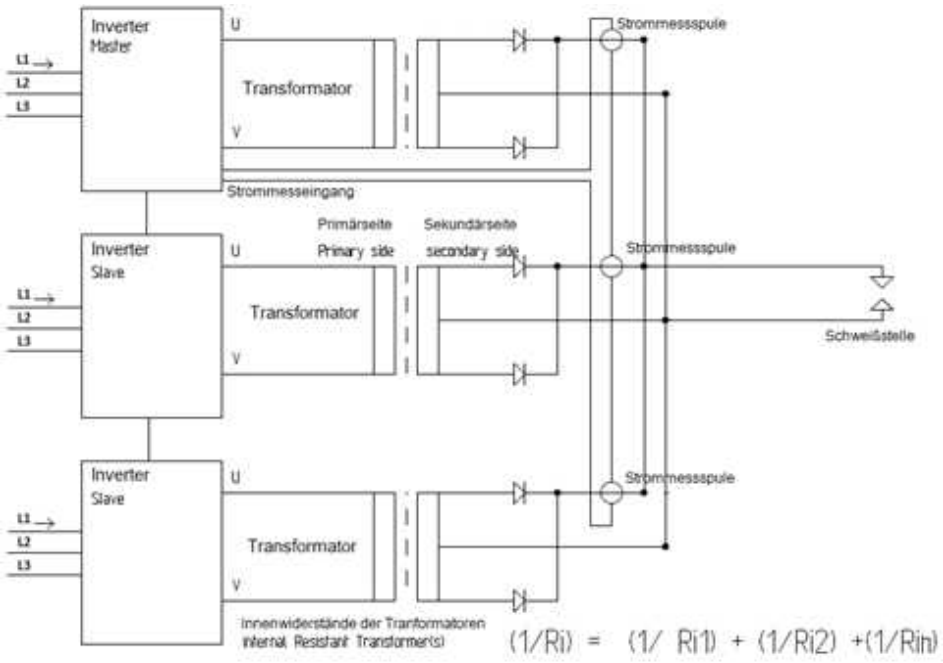
If you need more power than one inverter can supply, it is possible to increase this power by connecting further inverters. The inverter, consisting of a control section and a power section, can be operated with other power sections, so-called slaves. These do not have their own control section and are controlled by the master inverter.

This simple possibility of operating further power units of the same power allows higher currents to be achieved. For this purpose, the inverter is equipped with an additional connection to be able to connect a slave inverter. The optional "Master" equipment is required for this.

One MF transformer each must be connected to the master and slave inverter. These are operated in parallel on the secondary circuit (see sketch).

Another slave inverter can be connected to a slave inverter. Up to four power units can thus be operated on the master Inverter.

Please note that the total resistance of the secondary circuit determines the max. current level.




Circuit: Master with two slave inverters

## Requirements

- Only applicable for inverters from power class 424.
- The option must be ordered in advance, subsequent installation on site is not possible.

# Multi-Mess 1

**Option: MM1**

**Option MM1 includes an extension of the measuring inputs by an additional plug-in module G202 in the Genius system. This module is intended for use on a welding system for a displacement and/or force control.**

The following inputs are available:

• 1 x displacement measurement input - analog 0-10V, 0-20mA, 16 bit

• 1 x force measurement input - analog 0-10V, 0-20mA, 16 bit

**Displacement measurement input:**

- See S-Inspector

**Force measurement input:**

The force sensor is connected to the force measurement input. The calibration as well as the parameter input for the force build-up control in the force inspector is carried out using the XPegasus user interface, from version 6.xx. The force build-up control monitors the force just before the welding time is used at the end of the lead time. The force is measured and compared with the set tolerance value. If the value is outside the tolerance, an error message is output.

**Features**

• Strength building control

# *Multi-Mess 2*

**Option: MM2**

Option MM2 is an extension of the measuring inputs by an additional plug-in module G202 in the Genius system. This module is intended for use with, for example, a double-head welding system.

The following inputs are available:

• 2 x Displacement measurement input - analog 0-10 V, 0-20mA, 16 bit

• 2 x Force measurement input - analog 0-10V, 0-20mA, 16 bit

**Displacement measurement input:**

- See S-Inspecto

**Force measurement input:**

The force sensor is connected to the force measurement input. The parameters for the force calibration as well as the parameters of the force build-up control are entered via the XPegasus user interface, from version 6.xx, on the force inspector page. The force build-up control monitors the force just before the weld time is used at the end of the lead time. The force is measured and compared with the set tolerance value. If the value is outside the tolerance, an error message is output.

**Features**

• Strength building control

# GeniusHWI product code

| GeniusHWI | B | U | LL | ww | zzz |
|---|---|---|---|---|---|

## Family designation

## Design

- _ = inverter in design with dimensions 380 x 310 x 325 mm
- 3 = inverter in design with dimensions 778 x 389 x 345 mm

3

## Supply voltage

- 4 = 400 - 440 V, 50/60 Hz
- 5 = 480 V, 50/60 Hz

4
5

## Output classes with cooling

- 03L = 37 kVA
- 03W or WA = 50 kVA
- 06L = 70 kVA
- 06W or WA = 110 kVA
- 08L = 100 kVA
- 08W or WA = 135 kVA
- 13L = 165 kVA
- 13W or WA = 195 kVA
- 16L = 220 kVA
- 16W or WA = 270 kVA
- 24W = 385 kVA
- 36W = 525 kVA

03L
03W[A]
06L
06W[A]
08L
08W[A]
13L
13W[A]
16L
16W[A]
24W
36W

*Available in design 3*

- 40W = 900 kVA
- 45W = 950 kVA
- 60W = 1300 kVA

40W
45W
60W

## Function scope

- BAS = basic
- PRO = professional
- SEAM = seam

BAS
PRO
SEAM

## Machine and robot connections

- See machine and robot connections table

-zzz

| Machine and robot connections | -zzz |
|---|---|

**Machine and robot connections**

| | |
|---|---|
| • I/O = 24 V I/O | I/O |
| • PBS = Profibus DP electrical | PBS |
| • PNIe = Profinet electrical | PNIe |
| • PNIo = Profinet optical | PNIo |
| • PNSe = Profinet electrical | PNSe |
| • PNSo = Profinet optical | PNSo |
| • ECT = EtherCAT | ECT |
| • EIP = Ethernet IP | EIP |
| • CAN = CANOpen | CAN |
| • CCL = CCLink | CCL |
| • DEV = DeviceNet | DEV |

| Optional software functions | -vv |
|---|---|

**Genius optional software functions**

| | |
|---|---|
| • IQR = integrated quality control | IQR |
| • PQS = preparation for PQS licence | PQS |
| • QI = inspector for quality | QI |
| • AMC = Aluminium Mode Classic | AMC |
| • DCM = Dynamic Conditioning Mode | DCM |
| • AMF = Aluminium Mode Force | AMF |
| • BD = prepared for component documentation via the fieldbus | BD |
| • PDD = Process Data Documentation with the PNSe/PNSo (Profinet Slave) fieldbus card only | PDD |
| • HSC = High Speed Current | HSC |
| • TT = Trace Tag | TT |
| • Master | MASTER |

# Use of the product code

Family name example: **GeniusHWI**3545W-PRO-PNIE

Selection of the product name starts with the family designation for the GeniusHWI. The design type of the inverter with the control system technology is defined with this designation.

Design example: GeniusHWI**3**545W-PRO-PNIE

In the example, a design with the dimensions 778 x 389 x 345 mm is required due to the necessary power. This is indicated by the code B = 3. The different sizes are determined through the digits " ", "2" and "3".

Mains voltage example: GeniusHWI3**5**45W-PRO-PNIE

For connection to the supply network, the inverter must be prepared for the existing voltage. For example, the selection U= 5 means that the inverter can be operated at a 3-phase mains voltage of 480 V with 50 Hz / 60 Hz. Supply voltages of 400 - 440 V 3-phase mains voltage with 50 Hz / 60 Hz are determined by selecting U=4.

Power class example: GeniusHWI35**45W**-PRO-PNIE

The inverter's power class is specified with the selection LL=45W. A range from 20 kVA to 1300 kVA is available for the inverter power units. In the " " type designs, the power units can be provided with various cooling variants. Air cooling is only possible up to a power variant of -x16.

Power units of designs 2x and 3x can only be supplied with water cooling.

Design example: GeniusHWI3545W-**PRO**-PNIE

The functional scope of the control system, which is essentially defined through the software equipment, is selected with the code "ww". The basic and professional function scopes differ e.g. due to the number of programs and the inspector equipment.

I/O specification example: GeniusHWI3545W-PRO-**PNIE**

The communication level for the machines and the robot connection is defined through the selection ZZZ=PNIE. A selection is eight bus variants is available at this point.

Note

If none of the specified profiles meets your requirements, however, we are able to customise the device characteristics for you. Contact us.

# *Genius product codes, determination of the basic variant*

Determination of the basic variant

The basic cabinets listed below are appropriate for GeniusHWI and MFI inverters. Compile the cabinet in steps in the sequence from A -> E and 1 -> 13. The result is e.g.:

| Use | Product designation |
|---|---|
| Inverter | GeniusHWI408L-M48V1.04 |

| Family | A | B | C | D | E |
|---|---|---|---|---|---|
| Inverter design | | | | | |
| • Genius - | HWI | | | | |
| **Control cabinet supply voltage** | | | | | |
| • 400 V - 440 V | | 4 | | | |
| • 480 V | | 5 | | | |
| **Output classes** | | | | | |
| • 03 = 37 kVA (L) - 50 kVA (W) | | | 03 | | |
| • 06 = 70 kVA (L) - 110 kVA (W) | | | 06 | | |
| • 08 = 100 kVA (L) - 135 kVA (W) | | | 08 | | |
| • 13 = 165 kVA (L) - 195 kVA (W) | | | 13 | | |
| • 16 = 220 kVA (L) - 270 kVA (W) | | | 16 | | |
| • 24 = 385 kVA | | | 24 | | |
| • 36 = 525 kVA | | | 36 | | |
| • 40 = 900 kVA | | | 40 | | |
| • 45 = 950 kVA | | | 45 | | |
| • 60 = 1300 kVA | | | 60 | | |
| **Cooling** | | | | | |
| • W = water cooling | | | | W | |
| • WA = external water | | | | WA | |
| • L = air cooling | | | | L | |
| **I/O profile with the version number of the 24 V unit** | | | | | |
| • M48V1.04 | | | | | M48V1.04 |
| • M49V1.02 | | | | | M49V1.02 |
| • M61V1.01 | | | | | M61V1.01 |
| • M88V1.00 | | | | | M88V1.00 |
| • M35V1.00 | | | | | M35V1.00 |
| • M63V1.00 | | | | | M63V1.00 |
| • M76V1.00 | | | | | M76V1.00 |

The composition of the relevant control cabinet characteristics arises from the following characteristics:

Cabinet designation

- SR = cabinet for mounting on robot cabinet
- SM = cabinet for mounting on machine frame
- SG = floor-standing housing for erecting
- SH = cabinets for suspended mounting

| Use | Product designation |
|---|---|
| Inverter in the cabinet | SR-GeniusHWI408L-M48V1.04 - 100-111-10005-000 |

| Family | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| **Weld enclosure size** | | | | | | |
| • 0 = 600 x 1200 x 400 mm | 0 | | | | | |
| • 1 = 740 x 600 x 350 mm | 1 | | | | | |
| • 2 = 600 x 1200 x 400 mm | 2 | | | | | |
| • 3 = 800 x 1600 x 500 mm | 3 | | | | | |
| **Base** | | | | | | |
| • 0 = without | | 0 | | | | |
| • 1 = 100 mm | | 1 | | | | |
| • 2 = 200 mm | | 2 | | | | |
| • 3 = closed bottom | | 3 | | | | |
| **Door hinges** | | | | | | |
| • 0 = right | | | 0 | | | |
| • 1 = left | | | 1 | | | |
| • 2 = both sides | | | 2 | | | |
| **Type Main switch** | | | | | | |
| • 0 = Eaton load-interrupter switch | | | | 0 | | |
| • 1 = Eaton power switch | | | | 1 | | |
| • 2 = ABB load-interrupter switch | | | | 2 | | |
| • 3 = ABB power switch | | | | 3 | | |
| **Main switch type** | | | | | | |
| • 0 = 63 A | | | | | 0 | |
| • 1 = 100 A | | | | | 1 | |
| • 2 = 125 A | | | | | 2 | |
| • 3 = 160 A | | | | | 3 | |
| • 4 = 200 A | | | | | 4 | |
| • 5 = 250 A | | | | | 5 | |
| • 6 = 400 A | | | | | 6 | |
| • 7 = 630 A | | | | | 7 | |
| **Personal protection** | | | | | | |
| • 0 = without | | | | | | 0 |
| • 1 = differential current monitoring W35AB | | | | | | 1 |
| • 2 = differential current monitoring, higher currents W60AB | | | | | | 2 |
| • 3 = main switch with fault current tripping integrated | | | | | | 3 |
| • 4 = fault voltage monitoring PFU6 (SI10) | | | | | | 4 |

| Family | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|
| **Arrangement of electrical connections** | | | | | | | |
| • 0 = without | 0 | | | | | | |
| • 1 = rear | 1 | | | | | | |
| • 2 = bottom | 2 | | | | | | |
| • 3 = top | 3 | | | | | | |
| • 4 = left | 4 | | | | | | |
| • 5 = right | 5 | | | | | | |
| **Electrical connections** | | | | | | | |
| • 0 = without | | 0 | | | | | |
| • 1 = passage | | 1 | | | | | |
| • 2 = pluggable | | 2 | | | | | |
| **Location of media supplies** | | | | | | | |
| • 0 = without | | | 0 | | | | |
| • 1 = rear | | | 1 | | | | |
| • 2 = bottom | | | 2 | | | | |
| • 3 = top | | | 3 | | | | |
| • 4 = left | | | 4 | | | | |
| • 5 = right | | | 5 | | | | |
| **Type of media** | | | | | | | |
| • 0 = without | | | | 0 | | | |
| • 1 = 3/8* external thread | | | | 1 | | | |
| • 2 = M22x1.5 external thread | | | | 2 | | | |
| • 3 = external quick coupling hose | | | | 3 | | | |
| • 4 = (WA) 1/4 external thread, inner | | | | 4 | | | |
| • 5 = HIP water 1/2*, air 3/8 external thread | | | | 5 | | | |
| • 6 = HIP water 1/2 M22x1.5, air M16x | | | | 6 | | | |
| • 7 = both sides | | | | 7 | | | |
| **Signals on terminal** | | | | | | | |
| • 0 = without | | | | | 0 | | |
| • 1 = all 24 V I/O signals without measurement lead | | | | | 1 | | |
| • 2 = measurement lead U + I + S | | | | | 2 | | |
| • 3 = all 24 V I/O signals and all measurement leads | | | | | 3 | | |
| **24 V-Power supply** | | | | | | | |
| • 0 = without | | | | | | 0 | |
| • 1 = internally via power supply 3 A with XLP and XL8 | | | | | | 1 | |
| • 2 = externally via 2x AIDA (US1+US2) | | | | | | 2 | |
| • 3 = externally via 1x AIDA (US1+US2) | | | | | | 3 | |
| • 4 = externally via XLP (US1+US2) | | | | | | 4 | |
| • 5 = externally via XLP (US1) | | | | | | 5 | |
| **Lamps & Push buttons as control elements** | | | | | | | |
| • 0 = without operating element | | | | | | | 0 |
| • 1 = with operating element | | | | | | | 1 |

Due to the control cabinet size, the following characteristics can be compiled:

*Variant table*

| Control cabinet dimensions | Operation | Main switch [A] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 63 | 100 | 125 | 160 | 200 | 250 | 400 | 630 |
| 600 x 760 x 350 mm | X | X | X | X | | | | | |
| 740 x 600 x 350 mm | X | X | X | X | X | | | | |
| 600 x 1200 x 400 mm | X | X | X | X | X | X | | | |
| 800 x 1600 x 500 mm | X | X | X | X | X | X | X | X | X |

**Usage example of the inverter version:**

| Location in the code | Inverter version |
|---|---|
| Cabinet designation | SR |
| A | HWI |
| B | 480 V |
| C | 406 |
| D | W |
| E | M48V1.04 |

**Usage example of the control cabinet version**

| Location in the code | Inverter version |
|---|---|
| 1 | 1 - WxHxD: 740x600x350 mm |
| 2 | 0 - without base |
| 3 | 0 - door hinge on right, double-bit lock 3 mm |
| 4 | 1 - Eaton power switch |
| 5 | 1 - 100 A |
| 6 | 1 - personal protection: Residual current monitoring (max 3x 50mm²) |
| 7 | 1 - location of the electrical connections: rear side of control cabinet |
| 8 | 1 - type of electrical connections: passage |
| 9 | 0 - without media connections (location) |
| 10 | 0 - without media connections (type) |
| 11 | 0 - without signals on terminal strip / accessories |
| 12 | 5 - 24 V supply: externally via XLP (US1) |
| 13 | 0 - without operating elements |
| 14 | 0 - reserve |
| 15 | 0 - reserve |

| Use | Product designation |
|---|---|
| Inverter in the cabinet | SR-GeniusHWI408L-M48V1.04 - 100-111-10005-000 |

# PC operating software

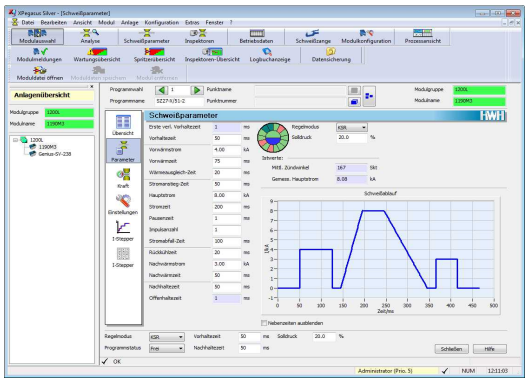
## XPegasus Silver

### Controlling and operating

The XPegasus Silver operating software offers options for controlling and operating your machines and systems. XPegasus Silver is the all-rounder with which you can quickly and efficiently set up your machine/system and monitor its operation.

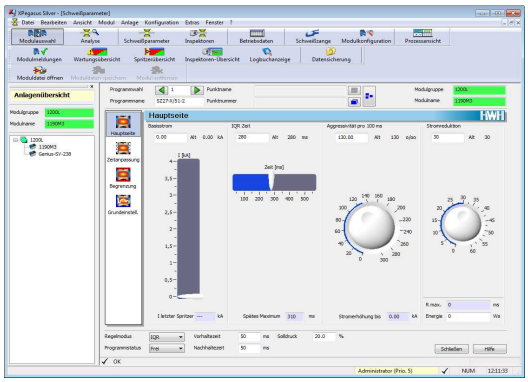
### Control effectively

XPegasus offers you functions for easy programming, data back-up and much more besides. Program wizards guide you through complex tasks and guarantee fast and error-free operation.



### Maintain an overview

Depending on application, XPegasus enables operation of your modules, which you can group individually as required. This provides you with a quick overview of your production, or individual machines, cells or entire systems if desired.



### Analyse your process

Your welding curves are shown graphically. You therefore have a tool for analysing, diagnosing and monitoring your welding processes.

Create your own reports by exporting data such as program parameters, e.g. to Excel, with just one click.

A log book documents all changes for you. Back-up your data with the integrated data back-up system.

### The universal user interface

XPegasus slots perfectly into the Harms & Wende control systems. Use XPegasus to operate your

- GeniusMFI, GeniusHWI
- HWI EVA and EVA-IQR
- Ratia73

Also in mixed operation, of course.

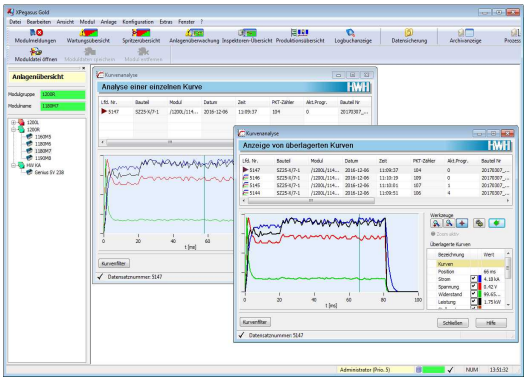
# XPegasus Gold

## Controlling, operating and archiving

The XPegasus Gold operating software offers options for controlling, operating and documenting your machines and systems. The XPegasus Gold programming software extends the functions of the XPegasus Silver with process monitoring, data evaluation and archiving.

### Monitor your welding processes

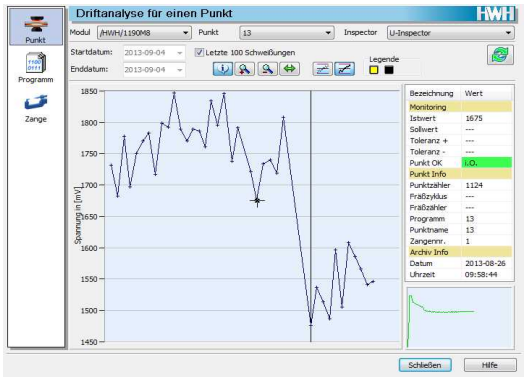
XPegasus Gold offers continuous monitoring of your welding process based on the inspectors available in your Genius inverter, i.e. the voltage, current, distance, resistance or control stroke inspector.




### Increase your machine availability

The XPegasus drift analysis supports you in solution finding.

Here, you can monitor the course of your welding processes over time and any possible deviations.




### Secure your knowledge

XPegasus Gold integrates various databases, which you can select as required, to archive your data.

XPegasus Gold highlights:

- Graphical programming incl. IQR Easy (available as a Genius option)
- Excel integration for importing and exporting data
- Program wizards for quick configuration

### The universal user interface

XPegasus Gold slots perfectly into the Harms & Wende control systems.

Use XPegasus Gold to operate your

- GeniusMFI, GeniusHWI
- HWI EVA and EVA-IQR
- Ratia43/73

Also in mixed operation, of course.

# XPegasus Platinum

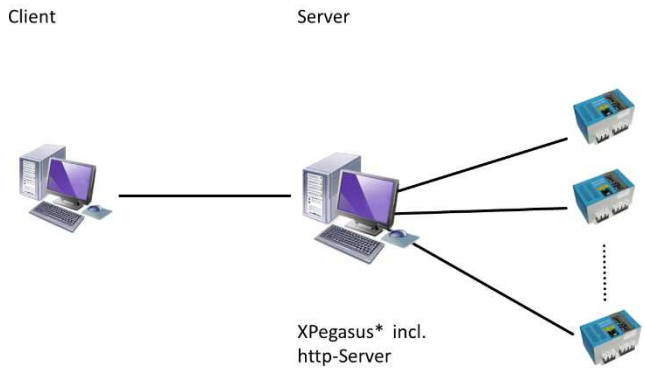
**Controlling, operating, archiving and as a server-client application**

XPegasus Platinum offers all of the functions contained in XPegasus Silver and XPegasus Gold, extending them with a server. You can therefore comfortably access a module from various workstations (client PC). The server takes care of the details, e.g. archiving your process data. The up to eight client PCs function as control computers on the machines/in the systems.

XPegasus Platinum enables up to 60 modules to be administered.

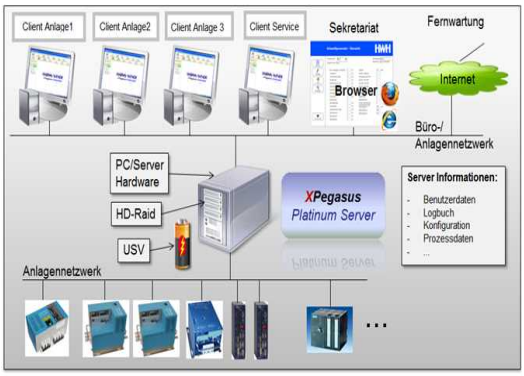
### Monitor your welding processes

XPegasus Platinum enables you to access all modules connected to the server from any client.




### Increase your machine availability

XPegasus Platinum also supports you in solution finding. A wizard guides you through typical situations. Ensuring that you quickly regain control of your process and save money!




### Information at any time

XPegasus Platinum integrates various databases, which you can select as required, to archive your data. Back up your data – security for you.

XPegasus Platinum highlights:

- Graphical programming incl. IQR Easy (available as a Genius option)
- Excel integration for importing and exporting data
- Program wizards for quick configuration
- Access to a module possible from various workstations/clients
- Server-client application

### The universal user interface

XPegasus Platinum slots perfectly into the Harms & Wende control systems.

Use XPegasus Platinum to operate your

- GeniusMFI, GeniusHWI
- HWI EVA and EVA-IQR
- Ratia43/73

Also in mixed mode, of course!

# XPegasus Platinium compact

**Server/client solution for small installations**

XPegasus Platinum compact server solution, the software variant with maximum functionality, allows centralized management of multiple installations. This means that all data (archive, backup files, log files, etc.) are always stored on the central server and are accessed from there by any type of client (line PC, service laptop, office PC, etc.). If a customer-specific part number of the welded components is assigned to each stored process data record, the production process can be traced back in the archive at any later time using this number (so-called traceability).

The XPegasus Platinum compact Variant allows you to enjoy the full Platinum functionality in a small system without any limitations. In this version, with 3 available client interfaces, you can operate, run and archive up to 10 welding modules through one data server.

ust like the full version XPegasus Platinum, the compact version can be extended by an integrated OPC UA interface, e.g. to enable a freely configurable data exchange with a higher-level database.

**Target group / users**

Small part welding, Tier 1 suppliers and users with small networked systems with one or more Genius inverters.

**Advantages**

XPegasus Platinum compact version offers you a significant economic advantage when the full strength of the full version is not required due to the small size of the installation. However, no other function is limited except reduced network capacity.

In addition, XPegasus Platinum compact can be considered as an entry-level variant into the Platinum functionality. If your plant becomes larger in the future or if you then want to integrate several plants into a cluster, the software can always be converted into the full version or subsequent license XPegasus Platinum by upgrading accordingly.

# XPegasus Platinum Follow-up license

**XPegasus Platinum Follow-up license**

In the case of integrated production lines with several plants (typical for automotive), a higher-level PLC can be used for this purpose, with which the component data of all subordinate plants must be reflected.

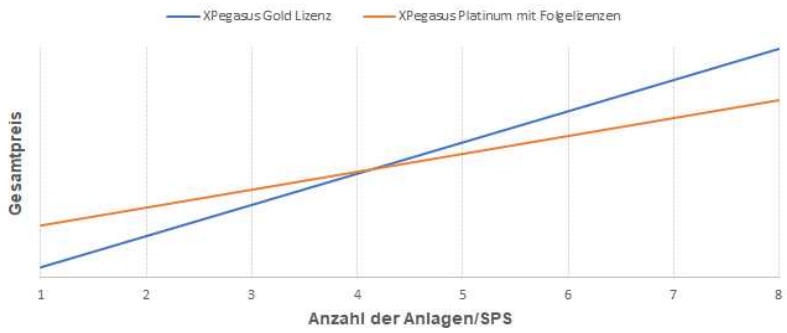
However, if the site has several autonomous plants with different hardware and software status (typical for Tier1 suppliers), the integration of the component data becomes too complex. In this case, a separate installation of the XPegasus Platinum. Server software is required for each integrated plant/PLC, even if the plant contains only a few inverters. These additional installations can, however, be purchased as a follow-up license by means of a price-advantageous variant of the software. The subsequent license XPegasus Platinum. has an unlimited range of functions and is operated in combination with an already installed full license. Within the site, such subsequent licenses can be used to integrate up to 9 additional installations with an acquired full license XPegasus Platinum.

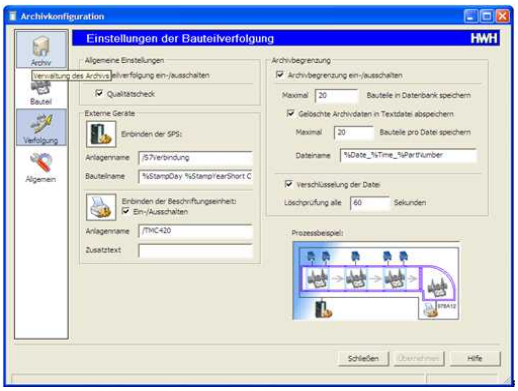
**Requirements**

Acquired XPegasus Platinum (full license) in the same location

**Target group / users**

Tier 1 suppliers and users with several welding systems in one location



### Advantages

The license model with XPegasus Platinum follow-on licenses offers a significant economic advantage for production sites with multiple production plants. The VersionXPegasus Gold software, which would be an alternative model in this case, must always be purchased with a fixed price, regardless of the number of plants in the site. Instead, the subsequent XPegasus Platinum licenses are offered at a much lower price than the first main license, i.e. the more plants (or PLCs) installed in a site, the lower the price per one license.

### An example from practice

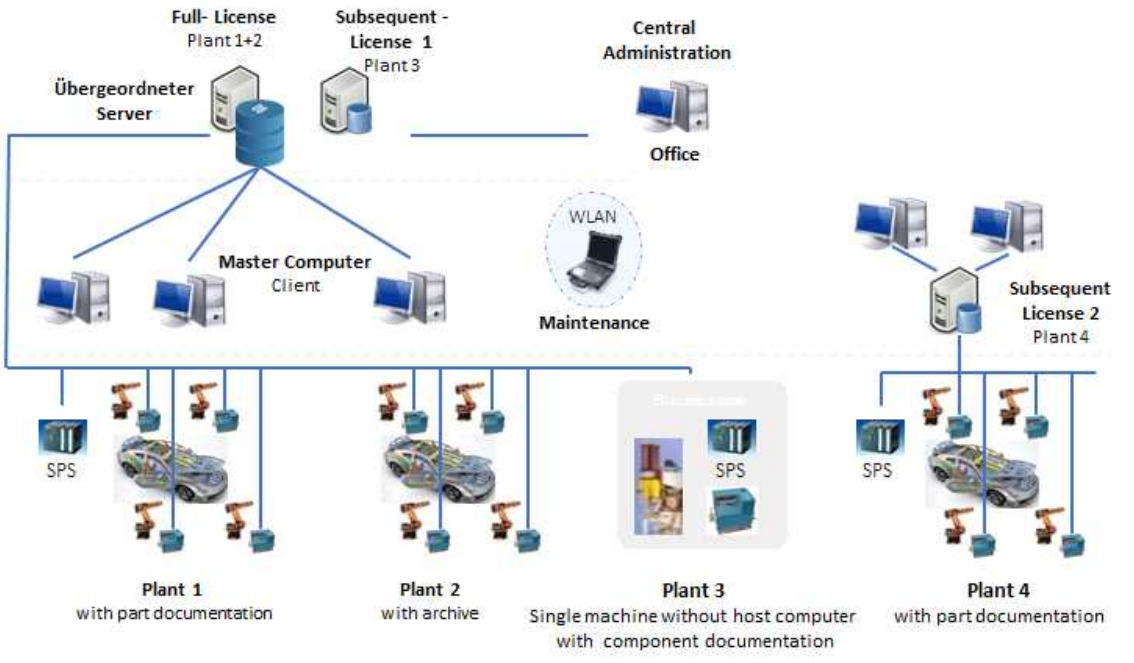
A practical example with two different scenarios is shown below. Despite much more flexibility and higher data security, the total costs are reduced in scenario B

**Scenario A: mixed licenses:**

3x XPegasus Gold
1x XPegasus Silver


**Scenario B: Subsequent licence in cluster**

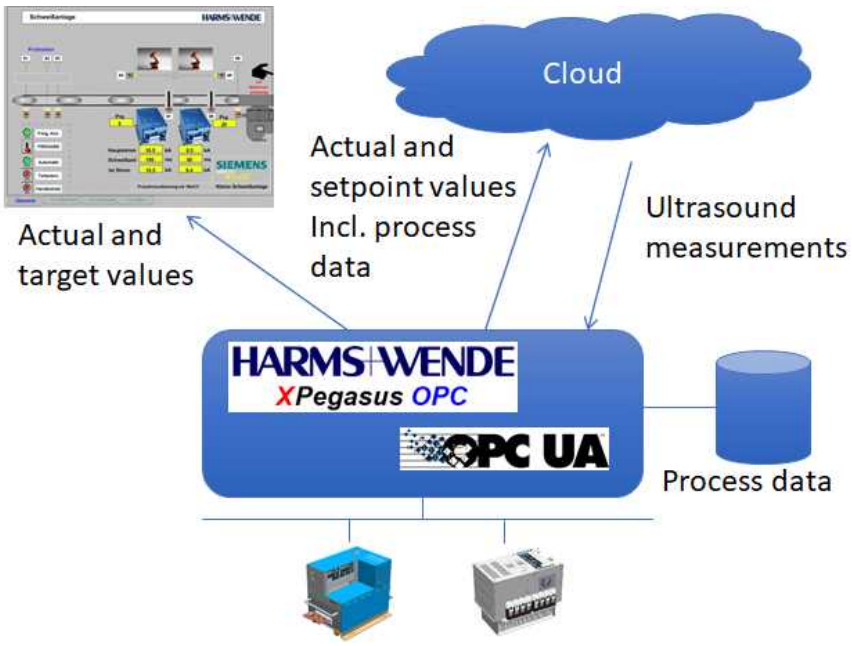
1x XPegasus Platinum
2x XPegasus Platinum subsequent licence



# XPegasus Platinum OPC-(UA)

**XPegasus Platinum OPC-UA**

XPegasus Platinum OPC version is available for flexible integration of process data in various higher-level customer systems (up to the cloud). The proven open communication standard can be regarded as the world language for industrial technology and enables machines to communicate with each other regardless of manufacturer.




The functionality of the integrated interface enables not only the pure retrieval of archive data, but also a transparent and extensive machine-to-machine communication (e.g. with PLC), which can give you many advantages when designing your plant architecture.

**Advantages**

With an OPC UA interface in the XPegasus database, you can, for example, archive the additional component-related inspection data, such as the measurement data from ultrasound, inspection cameras, etc. On the other hand, you can use it to transfer the selected archive data from XPegasus to the higher-level central database in order to manage it further according to your own IT concept.

# *Xcomand2.1* - success with "touch"!

The Xcomand2.1 has become established for operating the Genius system on the welding machine. The process view offers a very quick overview of the welding process and the last welding spots carried out.
Xcomand2.1 enhances this performance even further. An even faster processor is used here, making operation even smoother. The colour touch display is available in 15" sizes.

Xcomand2.1 with process data archiving is ready to archive your welding data. Simply connect the Xcomand2.1 to the inverter and the PC using a switch. The CD with the XPegasus process data archiving software, article No. 40967, is installed on the PC.

**> New with process data archiving on the PC**

Fig. 3-1 *Xcomand2.1 - the color touch display*

Thanks to the intuitive operating concept, you will become accustomed to XComand2.1 with ease. Whether in the control cabinet or as a stand-alone device, XComand2.1 can be seamlessly integrated into your system.

Individually adapt the Xcomand2.1 menu to your needs. This provides quick access to your most important input masks. The stable metal housing withstands even harsh ambient conditions.

The quick access page provides an overview of the most important information:

- Inspectors
- Quick parameterisation
- Welding curve analysis and history of the last welding processes including quality values
- Quick access to module messages
- Manual program selection

## *Comparison of XPegasus functions*

| XPegasus overview | XPegasus Silver | XPegasus Gold | XPegasus Platinum compact | XPegasus Platinum | Xcomand2.1 |
|---|---|---|---|---|---|
| operate | X | X | X | X | X |
| Networking | X | X | X | X | - |
| archive (Genius) | - | X | X | X | Optional |
| Server integration | - | - | X | X | - |

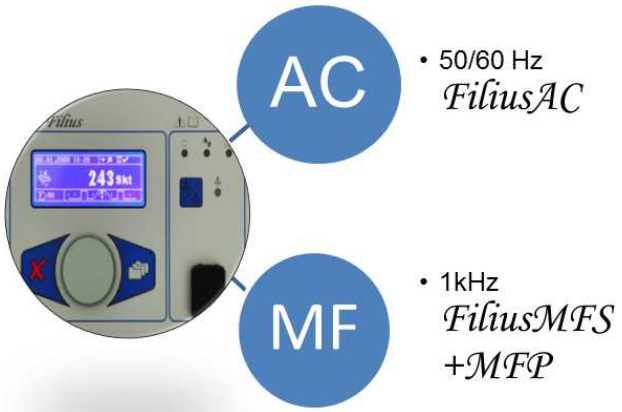
XPegasus offers you a high-performance software package which supports you in your daily work.

| Device versions supported by XPegasus | |
|---|---|
| GeniusMFI<br>GeniusHWI | All versions as of Genius firmware version 1.0 |
| HWI28xx | HWI28xx from firmware version 8.22 (ZP from 8.18) or 9.45 with Ethernet interface,<br>(not compatible with 9.x versions) archiving is not supported,<br>ZUP systems (gun switching PCB) are not supported. |
| Ratia73/43 | Ratia73 from Firmware version 5.40<br>Ratia43 from Firmware version 6.05 |

| The following PC equipment is recommended: XPegasus data sheet | | |
|---|---|---|
| PC | | With current hardware equipment |
| Processor | | Processor with multi-core technology with at least 1.8 GHz<br>Performance class (example):<br>Intel Core™ i3 or higher<br>AMD Athlon™ II or higher |
| RAM | | At least 4 GB |
| Partition size | | At least 20 GB |
| UPS (uninterruptable power supply) | | With connection to Windows Power Management<br>With activated archive function |
| Number of modules for simple database control & operation | XPegasus Silver/Gold<br>XPegasus Platinum<br>XPegasus Platinum compact | 40 modules permissible<br>60 modules permissible<br>10 Module zulässig 3 Clients |
| Number of modules for extended database documentation & analysis | XPegasus Silver/Gold<br>XPegasus Platinum<br>XPegasus Platinum compact | 20 modules permissible<br>30 modules permissible<br>10 Module zulässig 3 Clients |

# *Filius product series*

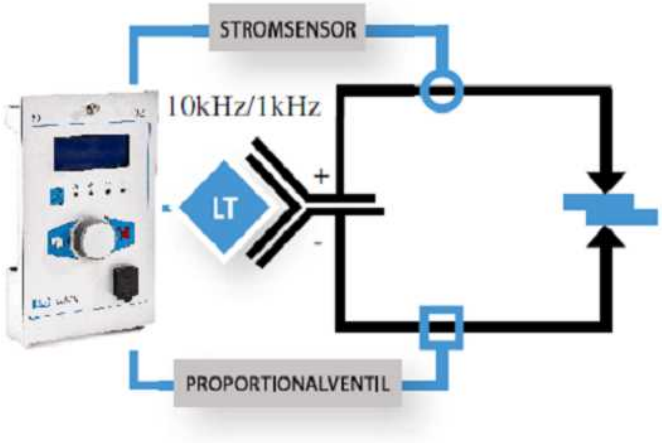

Filius Beta




## Characteristics

The Filius control systems are the perfect solutions for your future resistance welding machine projects. Thanks to self-explanatory menu guidance plus comfortable back-up of your most important program data using a pen drive, fast commissioning is guaranteed.

Filius control systems can be combined with a variety of 1 kHz MF medium-frequency power units or 50/60 Hz AC mains frequency power stages. The Filius control system is usually set up away from the power unit.


## Operating concepts:

Integrated operation via comfortable menu guidance is characteristic of the Filius control system family.

# Operation

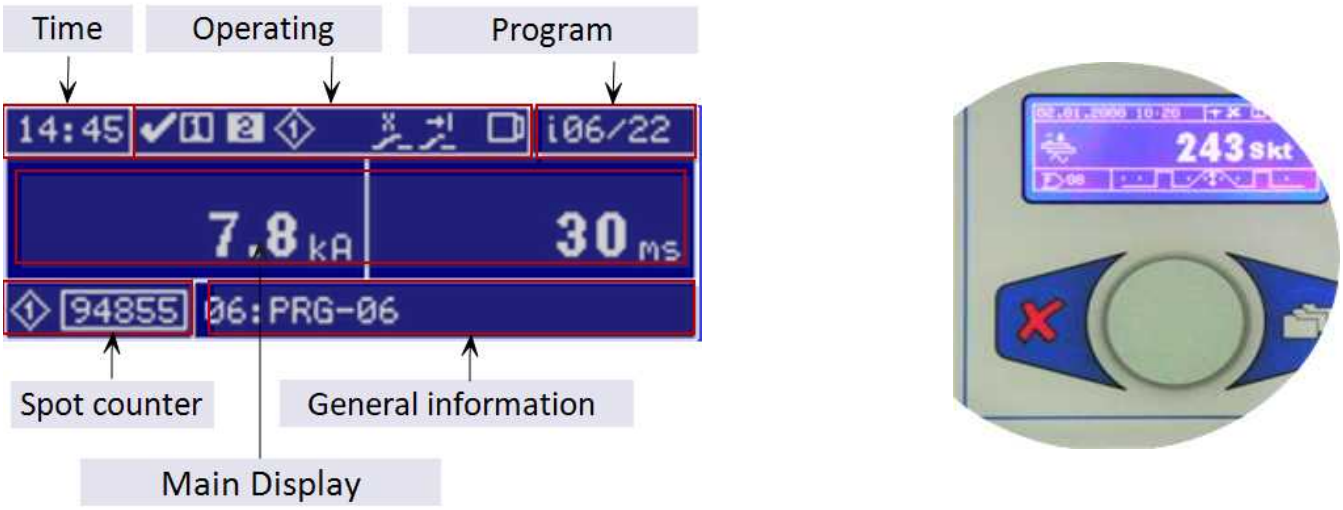



Fig. 4-1 *Filius display*

## Description

Various operating levels are available to the user. He can efficiently set basic parameters such as the welding time and welding current and, if necessary, also vary detailed welding parameters for setting individual welding processes. The welding programs can be stored in the internal memory.

Input is carried out directly via the integrated menus, which are selected by turning and pressing the jog wheel. Various rights for changing the control system configuration or welding parameters can be assigned to the user via keys on pen drives.

Firmware updates or function extensions can be loaded comfortably using a pen drive.

## *System overview*

The system designation is used to select the welding technology of the control system family. It is necessary to firstly define the power unit type and secondly to select the control system for the power unit to be connected.

| System | Description | Remarks |
|---|---|---|
| MF | Medium-frequency (1 kHz) | |
| AC | Mains frequency system (50/60 Hz), 1-phase | |

## Filius designs

The Filius system can be supplied in several variants.

- On installation of the power unit in a machine frame, separating the power unit from the control system and operating unit is recommended. The "P" variants are required for these applications. On selection of these types, specification of the power, the primary supply voltage and the type of cooling is necessary.
- It is necessary to select a control system to be able to operate a power unit. There are several function modules which are hierarchically graduated. Control system modules can be installed in machine frames to offer the operator easy access on the machine. Control systems can be ordered in various designs.

| Variant | Description |
|---|---|
| S-B | Welding control system without power unit, beta format |
| S-C | Welding control system without power unit, compact format |

# Classic function scope

Filius welding control systems are suitable for spot and projection applications and the seam function with a gun and extended function scope.

The "Classic" version is the solution for automated welding tasks in mechanical engineering.

It offers the option of controlling a pressure or force program with the second solenoid valve or the proportional valve output. 128 programs are available for the various tasks.

The "Classic" version always includes the IQ functions as well as further features:

- Constant current regulation
- Current limit value monitoring
- Program sequences
- Force/pressure program with solenoid valve/proportional valve output 0-10 V
- Current increase/stepper function

Electrode management and proportional valve control are, of course, also included. Program selection is possible internally or via actuation of the I/O level.

## Standard function scope

- 128 programs
- 3 main current times (pre-heating, main, post-heating time)
- Digital 24 V I/O
- Constant current regulation (KSR)
- Electrode management
- Stepper function
- Current increase, current decrease
- Pulses
- Proportional valve output
- Current limit value monitoring current
- Force/pressure program with MV2 and proportional valve output 0-10 V
- Program sequence


Filius Beta

### Distance monitoring

- Component control
- Sink-in distance
- Final dimension

### Stepper function

- Linearised stepper function with 10 supporting points

### Program sequences

- Up to 127 programs in succession
- Programmable program switching time at least 100 ms

### Profile indexing

- Pre-heating time (with time slot)
- Main current time (with time slot)
- Post-heating time (with time slot)

### Force/pressure program

- MV2-Verz, MV2-Ein1, MV2-Aus, MV2-Ein2

## *Multi function scope*

Application areas: for spot and projection applications plus seam function for up to two welding facilities.

The "Multi" version is optimal for all manual mechanical engineering welding tasks. This version is equipped with 24 V I/O, outputs for actuating two solenoid valves and one pre-stroke valve, two analogue outputs for force settings via proportional valves and 2x16 programs.

The "Multi" version always includes the IQ functions:

- Constant current regulation
- Current limit value monitoring
- Distance measurement

Electrode management and proportional valve control are, of course, also included. Program selection is possible internally or via actuation of the I/O level.

## Standard function scope

- 2 x 16 programs
- 3 main current times (pre-heating, main, post-heating time)
- Digital 24 V I/O
- Constant current regulation (KSR)
- Electrode management
- Current increase, current decrease
- Pulses
- 2 x proportional valve output output 0-10 V
- Current limit value monitoring current
- Further interfaces, see options and equipment, "Function scope" auf Seite 62.


Filius Beta

Distance monitoring

- Component control
- Sink-in distance
- Final dimension

Profile indexing

- Pre-heating time (with time slot)
- Main current time (with time slot)
- Post-heating time (with time slot)

# *Mono function scope*

For spot and projection applications plus seam function for an electrode holder.

The "Mono" version is the entry-level equipment for all mechanical engineering welding jobs. It is equipped with 24 V I/O, outputs for actuating a solenoid valve and a pre-stroke valve as well as eight programs.

Of course, electrode management is also available. Program selection is possible internally or via actuation of the I/O level.

## Standard function scope

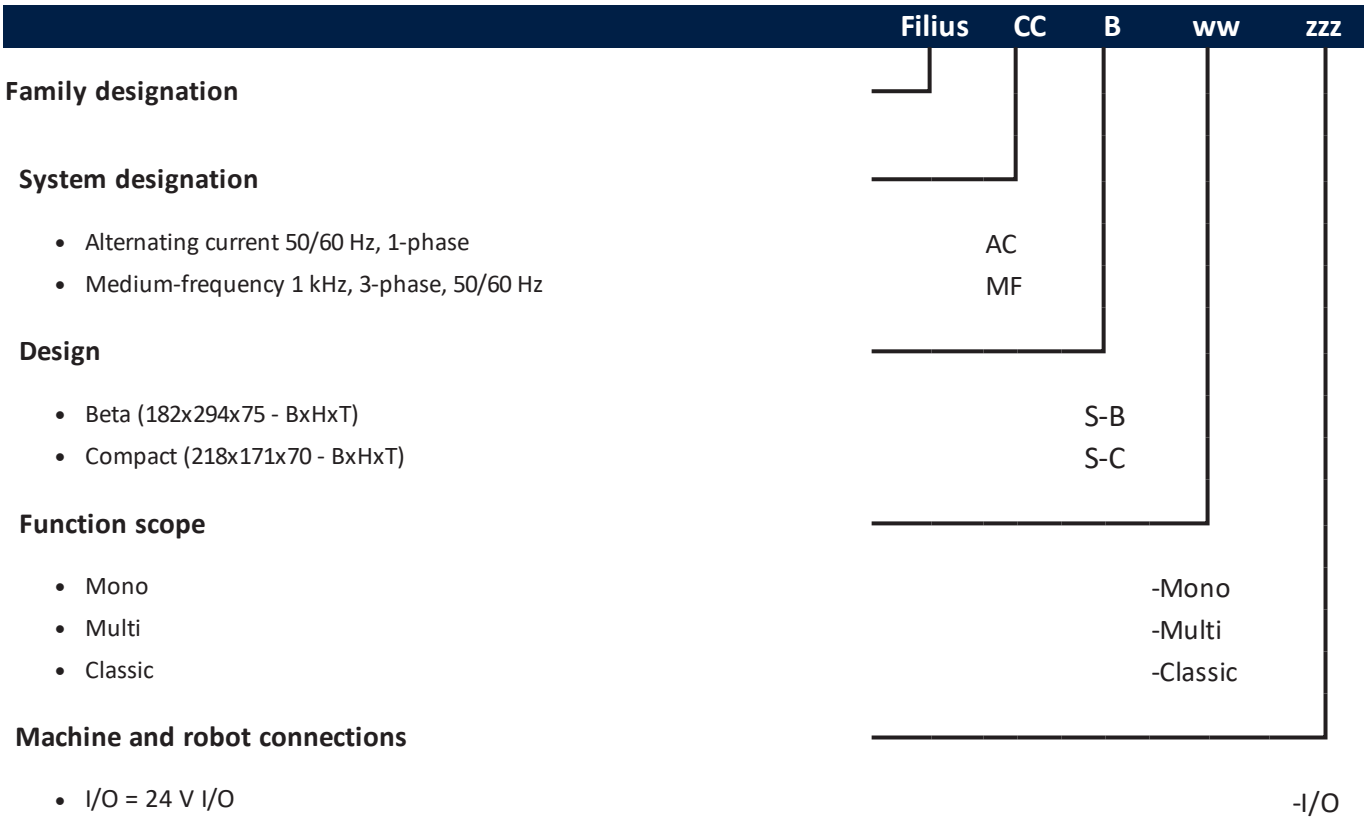
- 8 programs
- 3 main current times (pre-heating, main, post-heating time)
- Digital 24 V I/O
- Output for 1 solenoid valve, 1 pre-stroke valve
- Electrode management
- Current increase, current decrease
- Pulses


Filius Beta

## *Comparison of functions*

| Varianten (Funktionalität) | Mono | Multi | | Classic | |
|---|---|---|---|---|---|
| Functions | AC | AC | MF | AC | MF |
| Time input | Per/HW/ms | Per/HW/ms | 1 ms | Per/HWms | ms |
| Start inputs | 1 | 2 | 2 | 1 | 1 |
| Pre-stroke valve | 1 | | | | |
| Solenoid valves | 1 | 2 | | | |
| Proportional valves | 0 | 2 | 2 | 1 | 1 |
| Mains voltage compensation | Yes | Yes | No | Yes | No |
| Analogue nominal value input | No | | | Yes | |
| Current regulation | No | Yes | | | |
| Force calibration in kN | No | Yes | | | |
| Signal exchange 24 V I/O | Yes | | | | |
| Parameter back-up via USB | Yes | | | | |
| USB in the front | Yes | | | | |
| Programs | 8 | 2x16 | | 128 | |
| Program inputs | 3 | 4 | | 7 | |
| Internal program selection | Yes | | | | |
| External program selection | Yes | | | | |
| Status display | Yes | | | | |
| Spot counter menu | Yes | | | | |
| Process and editing menu | Yes | | | | |
| Configuration menu | Yes | | | | |
| Limit monitoring / current | No | Yes | | | |
| Distance monitoring | No | Yes | | | |
| Stepper function | No | | | Yes | |
| Force/pressure program | No | | | Yes | |
| Program sequence | No | | | Yes | |

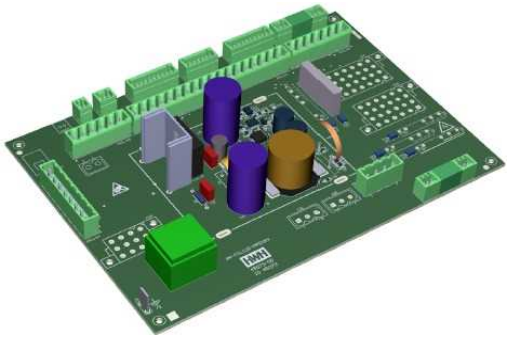
# *Filius product codes*



# *Filius Anschlussadapter*

**Connection adapter AC-Filius-MPS/-100-200-300**

The AK-Filius-MPS200 connection adapter enables the FiliusACS-x welding controller to be used as a replacement for the proven MPS100, MPS200 and MPS300 series welding controllers. The supply voltage of the FiliusACS-x welding control is provided with 24 VDC and a separate synchronous voltage. The control system can be operated and parameterized, and at the same time the power circuit can be switched off for system safety and energy saving. The proven welding controllers draw their supply voltage from the synchronous voltage of the power stage (27 VAC).



AC-Filius-MPS/-100-200-300

**Connection adapter AC-Filius-MPS80/-1-IQ**

The AK-Filius-MPS80xx connection adapter enables the use of the FiliusACS-x welding controller as a replacement for the proven welding controllers of the MPS803x and MPS8043/1 series. The supply voltage of the FiliusACS-x welding controller is provided with 24 VDC and a separate synchronous voltage. The control system can be operated and parameterized, at the same time, the power circuit can be switched off for system safety and energy saving. The proven welding controllers draw their supply voltage from the synchronous voltage of the power stage (27 VAC).

AC-Filius-MPS80xx

# MFP product series


Fig. 5-1 *MFP power unit*

## Description

The *MFP* medium-frequency power units are intended for connecting to the *FiliusMFS* and *SmartMFS* control system families.

The power units are designed without any control function as simple current sources, and are connected to the control system with a simple cable. The *MFP* power stages are available in various expension stages.
The technical data can be found in the "Appendix - technical data" auf Seite 137

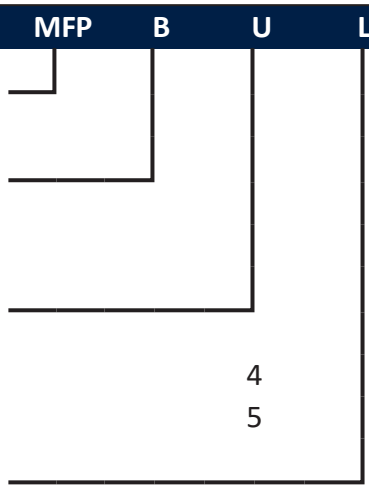
GeniusHWI403 - GeniusHWI408

| Power classes | HWI403L | HWI403W | HWI406L | HWI406W | HWI408L | HWI408W |
|---|---|---|---|---|---|---|
| Power input | 400 / 440 V 3 ph, 480 V 3 ph | | | | | |
| Maximum output current | 250 A | 250 A | 500 A | 500 A | 650 A | 650 A |
| Output current at 20% ED | 84 A | 112 A | 157 A | 224 A | 302 A | 302 A |
| Output current at 100% ED | 38 A | 50 A | 70 A | 100 A | 135 A | 150 A |
| Rated power at 20% ED | 42 kVA | 56 kVA | 79 kVA | 112 kVA | 151 kVA | 168 kVA |
| Cooling | Air | Water | Air | Water | Air | Water |
| Total weight | 21 kg | 21 kg | 21 kg | 24 kg | 21kg | 24 kg |
| Cooling water requirement | - | 4 l/min | - | 4 l/min | - | 4 l/min |

GeniusHWI413 - GeniusHWI36

| Power classes | HWI413L | HWI413W | HWI416L | HWI416W | HWI424W | HWI436W |
|---|---|---|---|---|---|---|
| Power input | 400 / 440 V 3 ph, 480 V 3 ph | | | | | |
| Maximum output current | 900 A | 900 A | 1200 A | 1200 A | 1600 A | 2400 A |
| Output current at 20% ED | 335 A | 369 A | 447 A | 537 A | 783 A | 1062 A |
| Output current at 100% ED | 150 A | 165 A | 200 A | 240 A | 350 A | 475 A |
| Rated power at 20% ED | 168 kVA | 185 kVA | 224 kVA | 269 kVA | 392 kVA | 531 kVA |
| Cooling | Air | Water | Air | Water | Air | Water |
| Total weight | 24 kg | 30 kg | 24 kg | 30 kg | 26 kg | 26kg |
| Cooling water requirement | - | 4 l/min | - | 4 l/min | 4 l/min | 4 l/min |

# *MFP product code / order designation*




**Family designation / device name**

**Design**

- _ = MF power unit, small design (dimensions = 380x310x325 mm)

**Supply voltage**

- 4 = 400 - 440 V, 50/60 Hz — 4
- 5 = 480 - 500 V, 50/60 Hz — 5

**Output classes**

- 03L = 37 kVA — 03L
- 03W or WA = 50 kVA — 03W[A]
- 06L = 70 kVA — 06L
- 06W or WA = 110 kVA — 06W[A]
- 08L = 100 kVA — 08L
- 08W or WA = 135 kVA — 08W[A]
- 13L = 165 kVA — 13L
- 13W or WA = 195 kVA — 13W[A]
- 16L = 220 kVA — 16L
- 16W or WA = 270 kVA — 16W[A]
- 24W = 385 kVA — 24W
- 36W = 525 kVA — 36W

# *Sinius product series*

Inverter technology 1 kHz

MF transformer [DC]

50/60 Hz thyristor technology

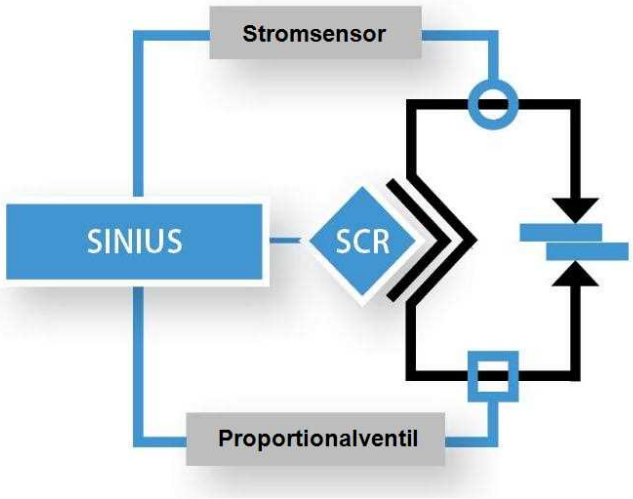
AC transformer [AC, DC]

## Description

The new Sinius welding processor product range offers you new scope in designing your machine and application. Whether in a complex system or as a single station system, visualisation is carried out with your own user interface on your PLC. As a new interface between the PLC and power units, the Sinius welding processor undertakes execution of the welding process. All Sinius welding processors can be equipped with different fieldbus variants to the PLC.

To do this, you use the familiar PLC components to visualise and control welding processes in production. As the entire functionality of your welding process is stored in your PLC, all know-how remains in your company.

Sinius welding processors undertake precise and reliable execution of the selected joining process. You are free to choose the desired welding technology, whether this be 10 kHz high frequency, 1 kHz medium frequency or 50/60 Hz mains frequency.


Stromsensor
SINIUS
SCR
Proportionalventil

## *System structure*

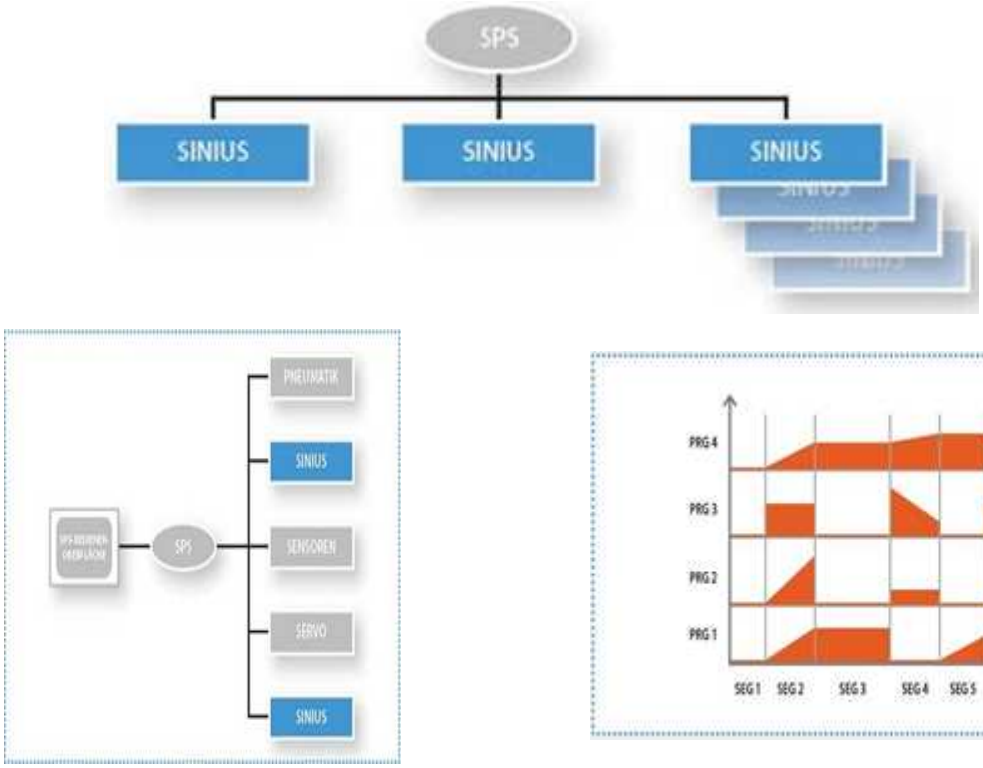



Fig. 6-1 *System structure with Sinius*

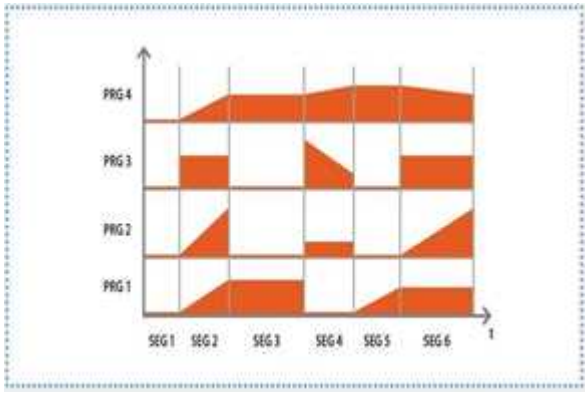



Fig. 6-2 *Individual welding process*

## Operating concept

Parameterisation of the Sinius is carried out using a direct connection to the PLC via fieldbus.

Standard function scope:

- 8 programs
- 10 time segments, freely programmable via PLC
- Current regulation
- Proportional valve output 0-10 V

Your advantages:

- Inexpensive
- Simple operation
- High flexibility
- Same PLC adaptation for different welding technologies
- Individual operation / safe handling of the machine
- individual message assistant

## *Comparison of functions*

| Function scope Sinius | HWI | AC1 | AC3 |
|---|---|---|---|
| Illustrations |  |  | |
| Power unit | Integrated | External | |
| Welding transformer | 1 kHz<br>DC technology | 50 Hz/60 Hz<br>AC technology | |
| Current type | Direct current | Alternating current | Direct current |
| Non-regulated mode | Yes | | |
| Mains voltage compensation | Yes | | |
| Current regulation | Yes | Yes | No |
| Regulation | No | | |
| 3-phase, concatenated operation | Omitted | No | Yes |
| 3-phase without concatenation | Omitted | Yes | No |
| Up to 16 modules switchable in a cascade | Omitted | Yes | Yes |
| 8 programs with 10 programmable time segments or 1 program with 80 time segments | Yes | | |
| Machine/robot connection | PBS, PNIe, ECT, CAN | | |
| Dimensions | Approx.<br>310x406x245 mm | Approx. 45x120x135 mm | |

# *SiniusHWI inverters*

The SiniusHFI welding processor offers you flexibility in designing the user interface of your planned resistance welding machine.

## Application:

Typical SiniusHWI applications include automated systems in which resistance welding processes are used. The user interface runs on the PLC user interface and can be adapted directly to the welding task. Whether in fast micro-welding in a complex system or as a high-current welding task, everything runs with your own user interface on your PLC.

No user interface familiarisation time – thanks to your own user interface – individually adaptable at any time later on. Fully integrated into the machine control system PLC or also separately – however you want it.

The SiniusHWI covers the entire range of welding inverter power classes available at Harms & Wende. The range starts at 20 kVA and extends up to approx. 7200 kVA due to the possibility of using up to four SlaveHWI inverters.

The SiniusHWI cabling has been reduced to a minimum: CANOpen, Profibus or EtherCAT with just one cable.

Your advantages: inexpensive – easy operation – high flexibility.

SiniusHWI403 - SiniusHWI408

| Power classes | HWI403L | HWI403W | HWI406L | HWI406W | HWI408L | HWI408W |
|---|---|---|---|---|---|---|
| Power input | 400 / 440 V 3 ph, 480 V 3 ph | | | | | |
| Maximum output current | 250 A | 250 A | 500 A | 500 A | 650 A | 650 A |
| Output current at 20% ED | 84 A | 112 A | 157 A | 224 A | 302 A | 302 A |
| Output current at 100% ED | 38 A | 50 A | 70 A | 100 A | 135 A | 150 A |
| Rated pSiniusower at 20% ED | 42 kVA | 56 kVA | 79 kVA | 112 kVA | 151 kVA | 168 kVA |
| Cooling | Air | Water | Air | Water | Air | Water |
| Total weight | 21 kg | 21 kg | 21 kg | 27 kg | 21 kg | 27 kg |
| Cooling water requirement | - | 4 l/min | - | 4 l/min | - | 4 l/min |

HWI413 - SiniusHWI36

| Power classes | HWI413L | HWI413W | HWI416L | HWI416W | HWI424W | HWI436W |
|---|---|---|---|---|---|---|
| Power input | 400 / 440 V 3 ph, 480 V 3 ph | | | | | |
| Maximum output current | 900 A | 900 A | 1200 A | 1200 A | 1600 A | 2400 A |
| Output current at 20% ED | 335 A | 369 A | 447 A | 537 A | 783 A | 1062 A |
| Output current at 100% ED | 150 A | 165 A | 200 A | 240 A | 350 A | 475 A |
| Rated power at 20% ED | 168 kVA | 185 kVA | 224 kVA | 269 kVA | 392 kVA | 531 kVA |
| Cooling | Air | Water | Air | Water | Air | Water |
| Total weight | 24 kg | 30 kg | 24 kg | 30 kg | 26 kg | 26kg |
| Cooling water requirement | - | 4 l/min | - | 4 l/min | 4 l/min | 4 l/min |

SiniusHWI440 - SiniusHWI460

| Power classes | HWI3x40 | HWI3x45 | HWI3x60 |
|---|---|---|---|
| Power input | 400 / 440 V 3 ph, 480 V 3 ph | | |
| Maximum output current | 2950 A | 3500 A | 3500 A |
| Output current at 20% ED | 1733 A | 1845 A | 2571 A |
| Output current at 100% ED | 775 A | 825 A | 1286 A |
| Rated power at 20% ED | 867 kVA | 923 kVA | 1286 kVA |
| Cooling | W = Water | | |
| Total weight | 75 kg | 75 kg | 77 kg |
| Cooling water requirement | 6 l/min | 6 l/min | 8 l/min |

# *SiniusAC*

Welding the elegant way

- Flexible
- Individual

SiniusAC can be used in the area of grid welding as well as for spot and projection welding tasks.

SiniusAC can be used as an individual station system or in a complex system with maximum flexibility in the structure of the user interface.

- Short familiarisation time
- Individually adaptable
- Integrated in the machine control system

SiniusAC is available with constant current regulation with one ignition output (SiniusAC1) or without regulation with up to three ignition outputs. SiniusAC3 with three ignition outputs also enables welding operations with 3-phase DC current.

The SiniusAC cabling has been reduced to a minimum: CANOpen, Profibus or EtherCAT with just one cable to your PLC.

SiniusAC also offers the option of cascading up to 16 modules with up to 48 ignition outputs. In this way, the parameterisation of all welding processors can be operated with ease via the cascade's head module.

Any power stages in the Harms & Wende range can be used for the SiniusAC. This enables the current range from 45 A to 3700 A (primary) to be covered.

Your advantages: inexpensive – easy operation – high flexibility.

Function module is supplied on the pen drive

# Sinius product code

| | SiniusHWI | B | U | LL | zzz |
|---|---|---|---|---|---|
| **Family designation** | | | | | |
| **Design** | | | | | |
| • _ = inverter in design with dimensions 380x310x325 mm | | | | | |
| • 2 = inverter in design with dimensions 720x310x325 mm | | 2 | | | |
| • 3 = inverter in design with dimensions 778x389x345 mm | | 3 | | | |
| **Supply voltage** | | | | | |
| • 4 = 400 - 440 V, 50/60 Hz | | | 4 | | |
| • 5 = 480 - 500 V, 50/60 Hz | | | 5 | | |
| **Output classes** | | | | | |
| • 03L = 37 kVA | | | | 03L | |
| • 03W or WA = 50 kVA | | | | 03W[A] | |
| • 06L = 70 kVA | | | | 06L | |
| • 06W or WA = 110 kVA | | | | 06W[A] | |
| • 08L = 100 kVA | | | | 08L | |
| • 08W or WA = 135 kVA | | | | 08W[A] | |
| • 13L = 165 kVA | | | | 13L | |
| • 13W or WA = 195 kVA | | | | 13W[A] | |
| • 16L = 220 kVA | | | | 16L | |
| • 16W or WA = 270 kVA | | | | 16W[A] | |
| • 24W = 385 kVA | | | | 24W | |
| • 36W = 525 kVA | | | | 36W | |
| *available in design 2* | | | | | |
| • 24W = 500 kVA | | | | 24W | |
| • 32W = 625 kVA | | | | 32W | |
| • 40W = 900 kVA | | | | 40W | |
| *available in design 3* | | | | | |
| • 45W = 950 kVA | | | | 45W | |
| • 60W = 1300 kVA | | | | 60W | |
| **Machine and robot connections** | | | | | |
| • See machine and robot connections table "Machine and robot connections" Auf der gegenüberliegenden Seite | | | | | -zzz |

| SiniusAC | D | zzz |
|---|---|---|

**Family designation**

**System designation**

- 1 = alternating current, 1-phase, 50/60 Hz, with regulation — 1
- P = alternating current, 1-phase, 50/60 Hz, with primary current regulation — P
- 3 = alternating current, 3-phase, 120° coupling, 50/60 Hz, without regulation — 3

**Machine and robot connections**

- See machine and robot connections table "Machine and robot connections" unten — -zzz

| SiniusHFI4 | LL | aa | zzz |
|---|---|---|---|

**Family designation**

**Output classes**

- HFI404 = high-frequency inverter 10 kHz 40 kVA — 04
- HFI407 = high-frequency inverter 10 kHz 70 kVA — 07

**Cooling**

- W = Water-cooled — W

**Machine and robot connections**

- See machine and robot connections table "Machine and robot connections" unten — -zzz

| Machine and robot connections | -zzz |
|---|---|

**Machine and robot connections**

- PBS = Profibus DP electrical — PBS
- PNIe = Profinet electrical — PNIe
- ECT = EtherCAT — ECT
- CAN = CANOpen — CAN

# *AnalogHWI product series*


Fig. 7-1 *AnalogHWI inverter*

## Description

The AnalogHWI medium-frequency inverter is a power unit for operating a medium-frequency welding transformer in corresponding welding systems. The nominal value for the welding current is specified using an analogue signal. The user is therefore provided with a simple interface with which the current level and the main current time can be set. The welding processes can therefore be designed individually.

Operating areas include spot and seam welding machines as well as heat applications.

The AnalogHWI inverters are available in various expansion stages. For high powers, the AnalogHWI inverters can be coupled with the SlaveHWI power units, as all AnalogHWI devices are already equipped with the master function.

The AnalogHWI inverters can be operated in racks or with current regulation. For main current times of more than 7 seconds, we recommend the use of Hall effect sensors for current measurement in regulated operation. Corresponding inverters are available for this.

The technical data can be found in the "Appendix - technical data" auf Seite 137

AnalogHWI403 - AnalogHWI408

| Power classes | HWI403L | HWI403W | HWI406L | HWI406W | HWI408L | HWI408W |
|---|---|---|---|---|---|---|
| Power input | 400 / 440 V 3 ph, 480 V 3 ph | | | | | |
| Maximum output current | 250 A | 250 A | 500 A | 500 A | 650 A | 650 A |
| Output current at 20% ED | 84 A | 112 A | 157 A | 224 A | 302 A | 302 A |
| Output current at 100% ED | 38 A | 50 A | 70 A | 100 A | 135 A | 150 A |
| Rated power at 20% ED | 42 kVA | 56 kVA | 79 kVA | 112 kVA | 151 kVA | 168 kVA |
| Cooling | Air | Water | Air | Water | Air | Water |
| Total weight | 21 kg | 21 kg | 21 kg | 27 kg | 21 kg | 27 kg |
| Cooling water requirement | - | 4 l/min | - | 4 l/min | - | 4 l/min |

AnalogHWI413 - AnalogHWI36

| Power classes | HWI413L | HWI413W | HWI416L | HWI416W | HWI424W | HWI436W |
|---|---|---|---|---|---|---|
| Power input | 400 / 440 V 3 ph, 480 V 3 ph | | | | | |
| Maximum output current | 900 A | 900 A | 1200 A | 1200 A | 1600 A | 2400 A |
| Output current at 20% ED | 335 A | 369 A | 447 A | 537 A | 783 A | 1062 A |
| Output current at 100% ED | 150 A | 165 A | 200 A | 240 A | 350 A | 475 A |
| Rated power at 20% ED | 168 kVA | 185 kVA | 224 kVA | 269 kVA | 392 kVA | 531 kVA |
| Cooling | Air | Water | Air | Water | Air | Water |
| Total weight | 24 kg | 30 kg | 24 kg | 30 kg | 26 kg | 26kg |
| Cooling water requirement | - | 4 l/min | - | 4 l/min | 4 l/min | 4 l/min |

AnalogHWI440 - AnalogHWI460

| Power classes | HWI3x40 | HWI3x45 | HWI3x60 |
|---|---|---|---|
| Power input | 400 / 440 V 3 ph, 480 V 3 ph | | |
| Maximum output current | 2950 A | 3500 A | 3500 A |
| Output current at 20% ED | 1733 A | 1845 A | 2571 A |
| Output current at 100% ED | 775 A | 825 A | 1286 A |
| Rated power at 20% ED | 867 kVA | 923 kVA | 1286 kVA |
| Cooling | W = Water | | |
| Total weight | 75 kg | 75 kg | 77 kg |
| Cooling water requirement | 6 l/min | 6 l/min | 8 l/min |

## *AnalogHWI product code / order designation*

| | AnalogHWI | B | U | LL |
|---|---|---|---|---|
| **Family designation / device name** | | | | |
| **Design** | | | | |
| • _ = MF power unit, small design (dimensions = 380x310x325 mm) | | | | |
| • 2 = MF power unit, design (dimensions = 720x310x325 mm) | | 2 | | |
| • 3= MF power unit, design (dimensions = 778x389x345 mm) | | 3 | | |
| **Supply voltage** | | | | |
| • 4 = 400 - 440 V, 50/60 Hz | | | 4 | |
| • 5 = 480 - 500 V, 50/60 Hz | | | 5 | |
| **Output classes** | | | | |
| • 03L = 37 kVA | | | | 03L |
| • 03W or WA = 50 kVA | | | | 03W[A] |
| • 06L = 70 kVA | | | | 06L |
| • 06W or WA = 110 kVA | | | | 06W[A] |
| • 08L = 100 kVA | | | | 08L |
| • 08W or WA = 135 kVA | | | | 08W[A] |
| • 13L = 165 kVA | | | | 13L |
| • 13W or WA = 195 kVA | | | | 13W[A] |
| • 16L = 220 kVA | | | | 16L |
| • 16W or WA = 270 kVA | | | | 16W[A] |
| • 24W = 385 kVA | | | | 24W |
| • 36W = 525 kVA | | | | 36W |
| *Available in design 2* | | | | |
| • 24W =500 kVA | | | | 24W |
| • 32W = 625 kVA | | | | 32W |
| *Available in design 3* | | | | |
| • 40W = 900 kVA | | | | 40W |
| • 45W = 950 kVA | | | | 45W |
| • 60W = 1300 kVA | | | | 60W |

## AnalogHWI inverter technical data

Please refer to the tabular lists in the Appendix for the electrical and mechanical technical data.

# SlaveHWI product series

## GeniusHWI slave operation

Slave operation is particularly suitable for applications requiring a higher welding current. Systems with an output current of 250 kA have proved suitable in practice.

The master operates e.g. as a GeniusHWI-Basic or GeniusHWI-Professional in the usual manner but additionally undertakes control of the connected slave inverters. The system messages of each connected slave inverter are monitored here, leading to overall system shut-off in the event of an error.

The slave inverter consists of a power unit and the actuation electronics of the power IGBTs. Signal amplification is also integrated into the slave inverter. It is therefore a parallel power stage. Up to 5 inverters can be switched in parallel. If more then five inverters are required, an additional power amplifier is necessary.

When constructing the machine, it must be ensured that the resistance conditions of the connections to the MF transformers are identical. I.e. the connection lines of the individual MF transformers must have the same line lengths and cross-sections. This ensures the occurrence of even current distribution to the transformers and inverters.

Accessory cable: VK33 (master-slave connection cable). The "Slave" option is not included in the product code and must be ordered separately.

Master inverter

Slave inverter

Fig. 8-1 *Control cabinet with GeniusHWI master/slave*

## SiniusHWI slave operation

Slave operation is particularly suitable for applications requiring a higher welding current.
Systems with an output current of 250 kA have proved suitable in practice.

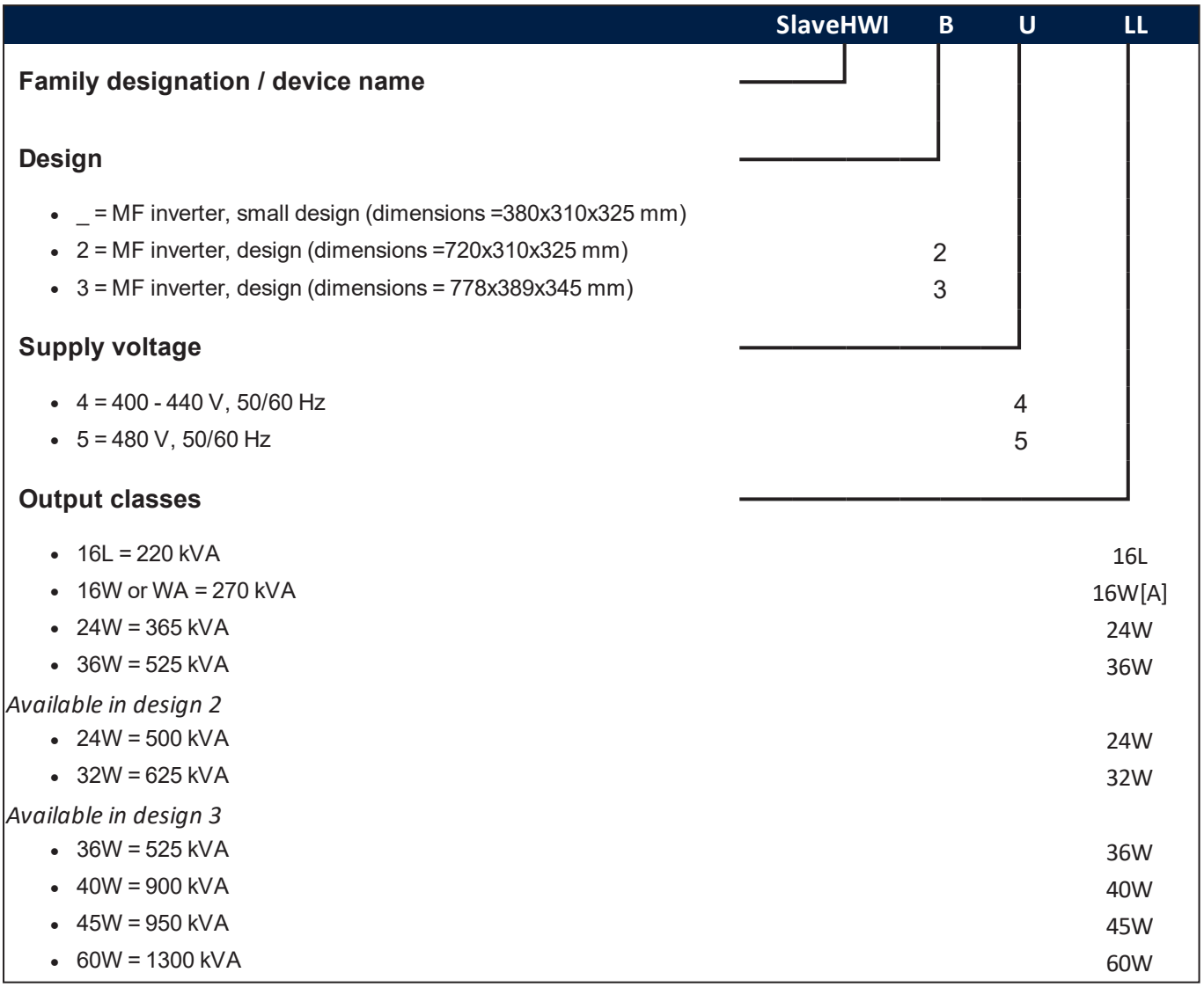
The SiniusHWI undertakes controlling of the connected slave inverters. The system messages of each connected slave inverter are monitored here, leading to overall system shut-off in the event of an error.

The slave inverter consists of a power unit and the actuation electronics of the power IGBTs. Signal amplification is also integrated into the slave inverter. It is therefore a parallel power stage. Up to six inverters can be switched in parallel. If even more power is required, an additional power amplifier is necessary.

When constructing the machine, it must be ensured that the resistance conditions of the connections to the MF transformers are identical. I.e. the connection lines of the individual MF transformers must have the same line lengths and cross-sections. This ensures the occurrence of even current distribution to the transformers and inverters.

Fig. 8-2 *Special system: maximum welding current 300 kA, SiniusHWI 3460 master system with three slave inverters*

## *SlaveHWI product code*



# *Weld transformers*

## Description

The selection of a welding transformer as a vital element for providing the high currents required for welding necessitates precise coordination with the application.

Depending on the welding inverter's output class, one or two transformers are used. The transformation ratio determines the secondary voltage in the welding current circuit.

A maximum welding current arises depending on the duty cycle determined by the joining process.

Integrated sensors for current and temperature measurement are fitted as standard.

## Recommendations

The MF welding transformers are intended for use with machines and guns according to DIN/ISO.

The inverter equipment can be found in the corresponding product series. The inverter power classes are assigned to the Genius, Filius and Sinius product series.

Standard equipment of MF welding transformers:

- Primary voltage 500 V, 1000 Hz
- Attached rectifier set
- Integrated current measurement coil
- Temperature monitoring for transformer and diodes
- Other transformers and terminal boxes on request
- Open design
- All MF transformers are available without connection housing

Optional equipment:

- Transformers also available in 600 V (for 480 V mains)
- Encapsulated version

| MF transformer suggestion for inverter power class Genius-, SiniusHWI403 and MFP403 | | | |
|---|---|---|---|
| Rated power at 20% ED | Sec. voltage – Diode type/number | Welding current at 20% ED | Welding current At 5% ED |
| Transformer – 33 kVA (at 6 V) | 3.5/4.5/6.0 - 1.5/2 V | Approx. 3 kA | Approx. 5 kA |

| MF transformer suggestion for inverter power class Genius-, SiniusHWI406 and MFP406 | | | |
|---|---|---|---|
| Rated power at 20% ED | Sec. voltage – Diode type/number | Welding current at 20% ED | Welding current At 5% ED |
| Transformer – 33 kVA (at 6 V) | 3.5/4.5/6.0 - 1.5/2 V | Approx. 3 kA | Approx. 5 kA |
| Transformer – 80 kVA | 6.3 - 6/2 V | Approx. 12 kA | Approx. 18 kA |

| MF transformer suggestion for inverter power class Genius-, SiniusHWI408 and MFP408 | | | |
|---|---|---|---|
| MF transformer suggestion for inverter power class Genius-, SiniusHWI408 and MFP408 | | | |
| Rated power at 20% ED | Sec. voltage – Diode type/number | Welding current at 20% ED | Welding current At 5% ED |
| Transformer – 80 kVA | 6.3 - 6/2 V | Approx. 12 kA | Approx. 18 kA |
| Transformer – 90 kVA | 8.3 - 6/2 V | Approx. 12 kA | Approx. 18 kA |
| Transformer – 130 kVA | 9.4 - 10/2 V | Approx. 14 kA | Approx. 21 kA |

| MF transformer suggestion for inverter power class Genius-, SiniusHWI413 and MFP413 | | | |
|---|---|---|---|
| Rated power at 20% ED | Sec. voltage – Diode type/number | Welding current at 20% ED | Welding current At 5% ED |
| Transformer – 130 kVA | 9.4 - 11/2 V | Approx. 14 kA | Approx. 26 kA |
| Transformer – 180 kVA | 9.0 - 6/4 V | Approx. 20.0 kA | Approx. 30 kA |

| MF transformer suggestion for inverter power class Genius-, SiniusHWI416 and MFP416 | | | |
|---|---|---|---|
| Rated power at 20% ED | Sec. voltage – Diode type/number | Welding current at 20% ED | Welding current At 5% ED |
| Transformer – 130 kVA | 9.4 - 11/2 V | Approx. 14 kA | Approx. 26 kA |
| Transformer – 180 kVA | 9.0 - 6/4 V | Approx. 20.0 kA | Approx. 30 kA |
| Transformer – 250 kVA | 11.8 - 6/4 V | Approx. 21.2 kA | Approx. 28 kA |

| MF transformer suggestion for inverter power class Genius-, SiniusHWI424 and MFP424 | | | |
|---|---|---|---|
| Rated power at 20% ED | Sec. voltage – Diode type/number | Welding current at 20% ED | Welding current At 5% ED |
| Transformer – 250 kVA | 11.8 - 6/4 V | Approx. 21.2 kA | Approx. 28 kA |
| Transformer – 250 kVA | 13.2 - 6/4 V | Approx. 19 kA | Approx. 28 kA |
| Transformer – 300 kVA | 16.0 - 6/4 V | Approx. 18 kA | Approx. 28 kA |

| MF transformer suggestion for inverter power class Genius-, SiniusHWI436 and MFP436 | | | |
|---|---|---|---|
| Rated power at 20% ED | Sec. voltage – Diode type/number | Welding current at 20% ED | Welding current At 5% ED |
| Transformer – 300 kVA | 8.9 - 13/2 V | Approx. 21.2 kA | Approx. 51 kA |
| Transformer – 500 kVA | 13.2 - 13/2 V | Approx. 29 kA | Approx. 51 kA |

| MF transformer suggestion for inverter power class Genius-, SiniusHWI3440 | | | |
|---|---|---|---|
| Rated power at 20% ED | Sec. voltage – Diode type/number | Welding current at 20% ED | Welding current At 5% ED |
| Transformer – 300 kVA | 8.9 - 13/4 V | Approx. 21.2 kA | Approx. 51 kA |
| Transformer – 500 kVA | 13.2 - 13/4 V | Approx. 29 kA | Approx. 51 kA |
| Transformer – 600 kVA | 17.0 - 13/4 | Approx. 29 kA | Approx. 51 kA |

| MF transformer suggestion for inverter power class Genius-, SiniusHWI3445 | | | |
|---|---|---|---|
| Rated power at 20% ED | Sec. voltage – Diode type/number | Welding current at 20% ED | Welding current At 5% ED |
| Transformer – 700 kVA | 17.2 - 13/6 V | Approx. 42 kA | Approx. 75 kA |
| Transformer – 900 kVA | 13.2 - 10/8 V | Approx. 56 kA | Approx. 78 kA |

| MF transformer suggestion for inverter power class Genius-, SiniusHWI3460 | | | |
|---|---|---|---|
| Rated power at 20% ED | Sec. voltage – Diode type/number | Welding current at 20% ED | Welding current At 5% ED |
| Transformer – 900 kVA | 17.0 - 10/8 V | Approx. 56 kA | Approx. 78 kA |
| Transformer – 1200 kVA | 17.0 - 13/8 V | Approx. 58 kA | Approx. 100 kA |

## Cable for feeding the welding case

| Article number | Cable | Length | Cross section |
|---|---|---|---|
| 38697 | Primary cable to the weld enclosure | 3m | 4mm² |
| 49904 | Primary cable to the weld enclosure | 3m | 16mm² |
| 51110 | Primary cable to the weld enclosure | 3m | 25mm² |

## Primary cable for connecting the inverter to the MF transformer

| Article number | Cable | Length | Cross section |
|---|---|---|---|
| 44403 | Primary cable to the weld transformer | 1,5m | 4mm² |
| 41965 | Primary cable to the weld transformer | 2,5m | 16mm² |
| 4xxxx | Primary cable to the weld transformer | 1,5m | 25mm² |
| 49906 | Primary cable to the weld transformer | 2,5m | 25mm² |
| 51112 | Primary cable to the weld transformer | 2,5m | 25mm² |

## Welding transformer accessories

| Article | Designation | Description |
|---|---|---|
| 16265 | Connection housing | Rear transformer housing complete with large cover for installation of 180 A MCC plug in the cover or installation of 135 A MCC socket at the side in the housing |
| 16266 | Connection housing | Rear transformer housing complete with two-part cover for installation of 135 A MCC plug in the cover |
| 12112 | Thermal con-tact | Replacement thermal contact for the diode package |
| 12111 | Measurement coil* | Replacement measurement coil for MF transformer 80/90 kVA |
| | Measurement coil* | Replacement measurement coil for MF transformer 180/250 kVA |
| 25024 | Protective resistor | Fault current protective resistor 1 kOhm |

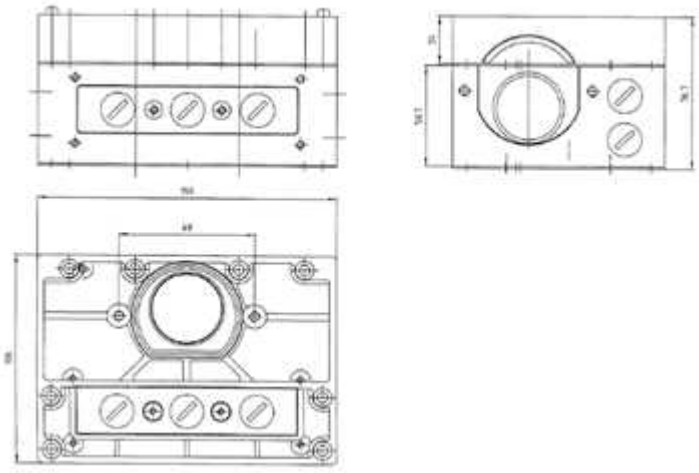


Fig. 9-1 *Connection housing 16265*

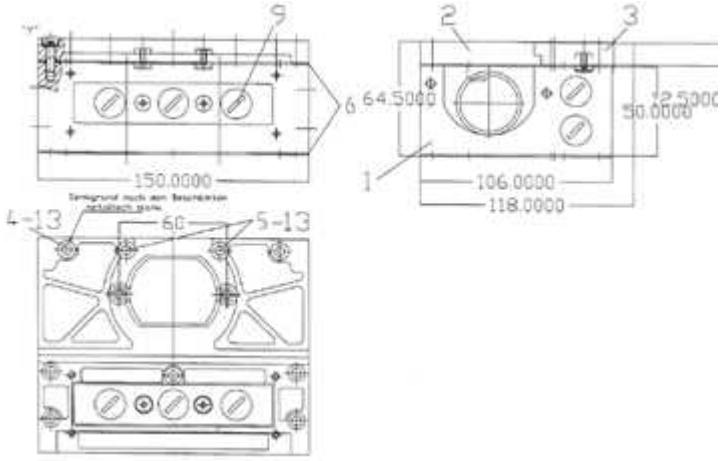



Fig. 9-2 *Connection housing 16266*

# *Mains frequency systems*

| Sinius | MPS10 | FiliusAC | Ratia43 | Ratia73 |
|---|---|---|---|---|
|  |  |  |  |  |

## Description

Harms & Wende offers a broad range of individual solutions for each mains frequency welding application. From the proven MPS10 welding control system for simple operation and actuation of 1-phase welding machines to the Ratia73 with fieldbus connection and parameterisation using the high-performance XPegasus software, we can offer you a product which meets your requirements. Individual options and extension packages offer flexibility with needs-friendly costs. The Harms & Wende mains frequency systems are equally suitable for installing in systems and welding cases. Operation is carried out externally or via an integrated operating concept.

# Ratia43/73 and MPK43/73 product series

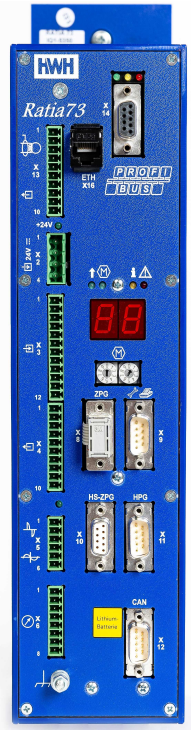



Fig. 10-1 *Ratia73*

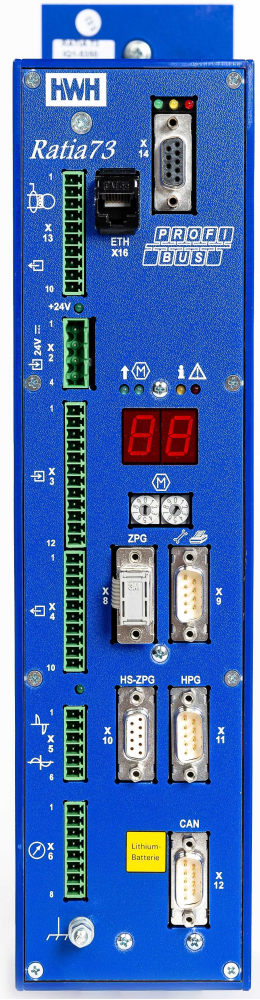

Fig. 10-2 *Ratia43*

Fig. 10-3 *MPK43 control cabinet*

# *Ratia73 product series*

Multi-function welding control system in module form for installation in central control systems or welding cases.

Ratia73 equipment:




- 128 programs
- 128 counter groups
- Current and pressure program
- Electrode wear compensation
- With "linear stepper"
- Electrode management
- Log book function and diagnosis
- Proportional valve actuation
- Automatic 50/60 Hz recognition
- Bus and operating unit connection
- 2 starting functions
- 2 solenoid valve and pre-stroke outputs
- Secondary constant current regulation
- Alternating current
- Current monitoring with adjustable tolerance
- Current monitoring with adjustable spot repetition

### I/O level bus connections

- I/O connection via Profibus DP
- I/O connection via Interbus-S electrical or optical

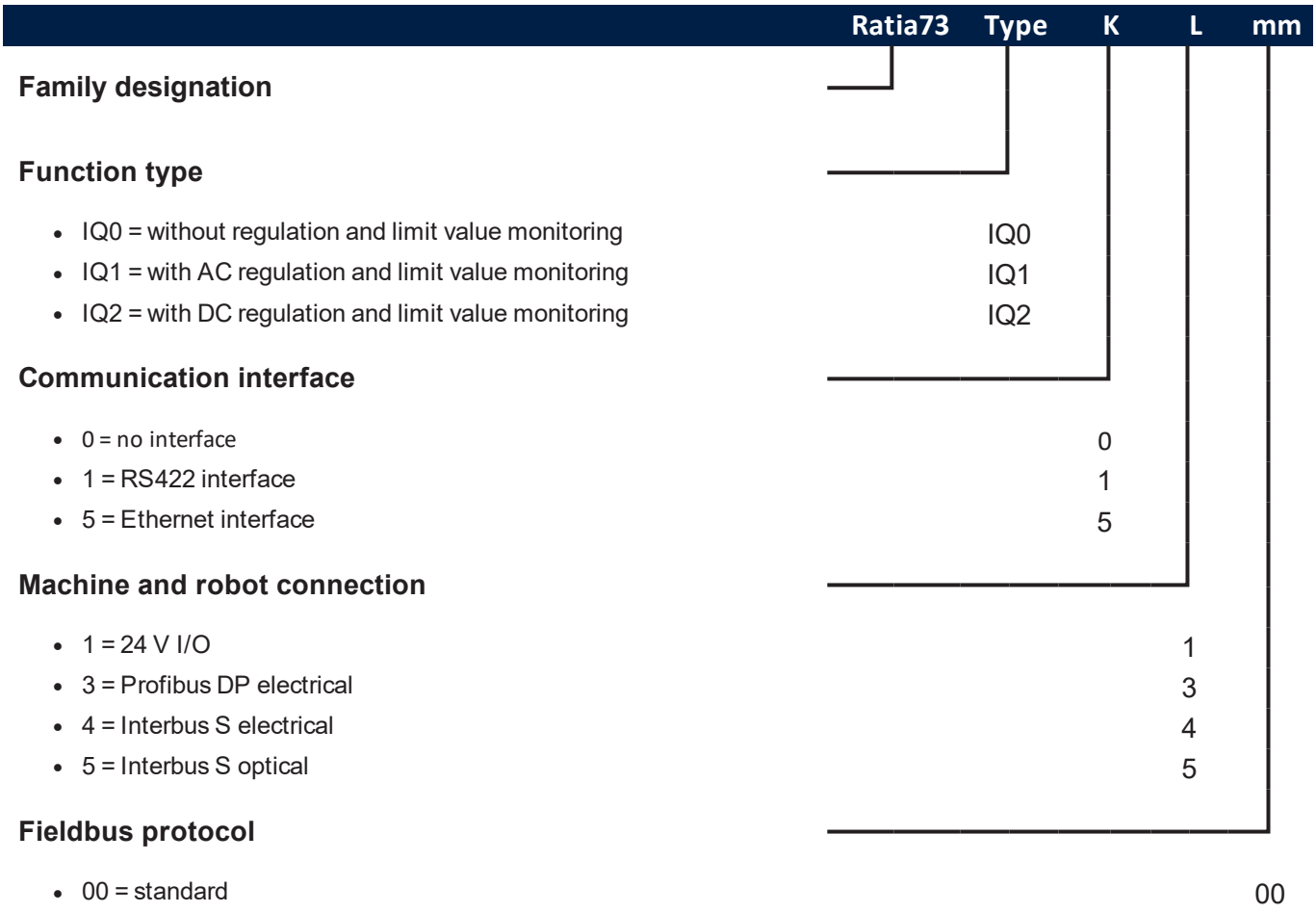
### Communication interface

- Ethernet
- RS422
- RS232

### Ratia73 special functions

- 10 free current profiles
- Manual programming device HPG-E connectable
- Operation via Mundus operating unit
- Networking and operation via the XPegasus software
- Distance measurement via XPegasus OPC

# Ratia73 product codes



# *Ratia43α product series*

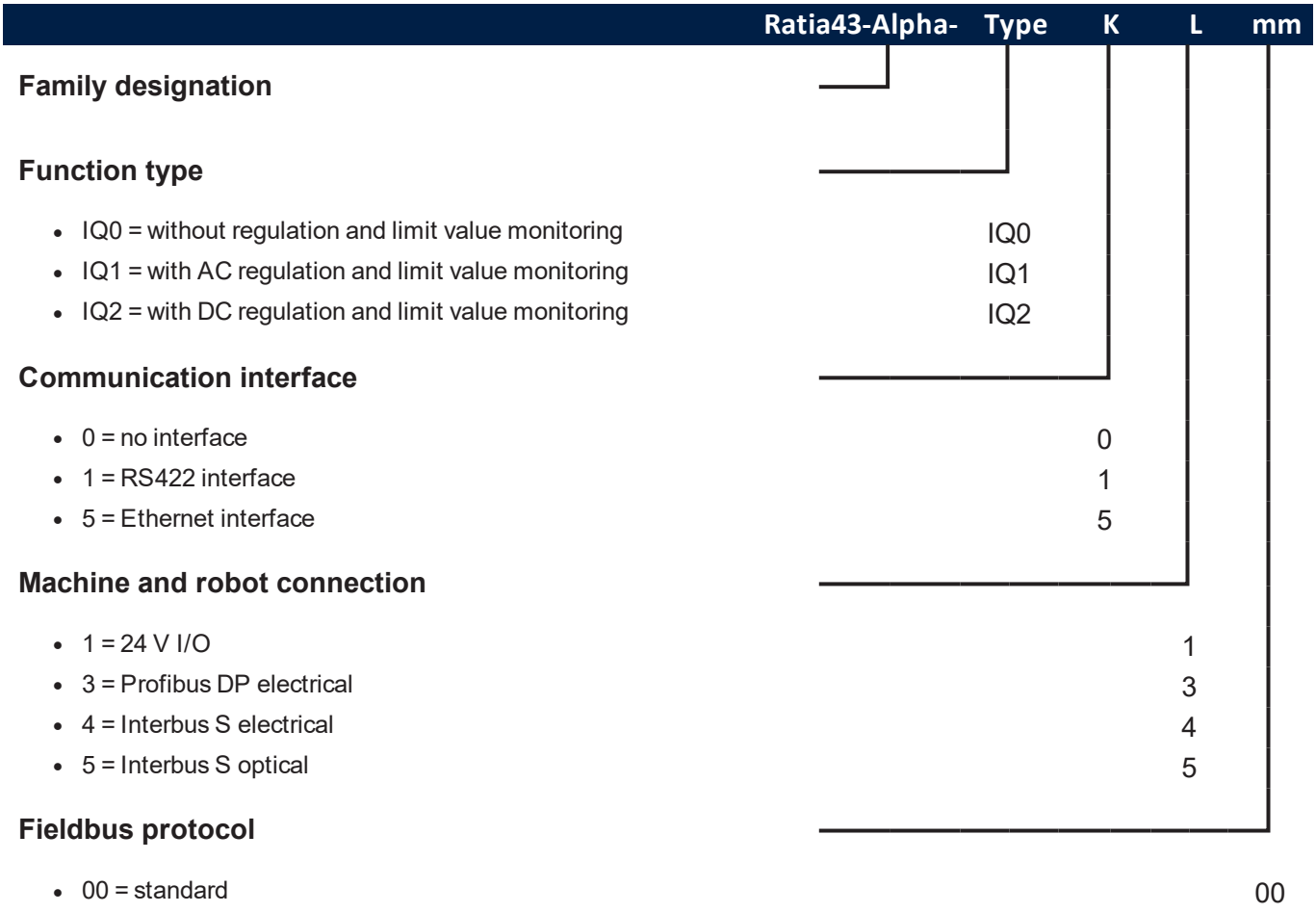

Fig. 10-4 *Ratia43α*

| **Ratia43α standard equipment: multi-function welding control system with integrated operating unit** | |
|---|---|
| • Two-line display with plain text display<br>• Menu guidance<br>• Function keys<br>• Password protection<br>• Direct process and error information<br>• Regulation range limit<br>• 128 programs<br>• 128 counter groups<br>• Current and pressure program<br>• Proportional valve actuation<br>• Electrode management (stepper)<br>• Menu in 3 languages - de, en and fr | • Automatic 50/60 Hz recognition<br>• 2 starting functions<br>• 2 x solenoid valve and pre-stroke outputs<br>• Rework or milling program<br>• Interface for parameter printout<br>• Mains voltage compensation<br>• Half cycle operation<br>• I/O connection via 24 V<br>• Supply voltage 24 VDC |

| **Ratia43α IQ1 additional equipment** | **Ratia43α special functions** |
|---|---|
| • Secondary constant current regulation for alternating current<br>• Current monitoring with adjustable spot repetition<br>• Regulation range monitoring | • 10 free current profiles<br>• Supply voltage 27 VAC |

| **Ratia43α IQ2 additional equipment** | **Options:** |
|---|---|
| • Secondary constant current regulation for alternating current<br>• Current monitoring with adjustable spot repetition<br>• Regulation range monitoring | • Seam mode with profile indexing, time or event controlled<br>• Distance measurement |

# *Ratia43 product codes*




**Family designation**

**Function type**

- IQ0 = without regulation and limit value monitoring — IQ0
- IQ1 = with AC regulation and limit value monitoring — IQ1
- IQ2 = with DC regulation and limit value monitoring — IQ2

**Communication interface**

- 0 = no interface — 0
- 1 = RS422 interface — 1
- 5 = Ethernet interface — 5

**Machine and robot connection**

- 1 = 24 V I/O — 1
- 3 = Profibus DP electrical — 3
- 4 = Interbus S electrical — 4
- 5 = Interbus S optical — 5

**Fieldbus protocol**

- 00 = standard — 00

# *MPS10 product series*

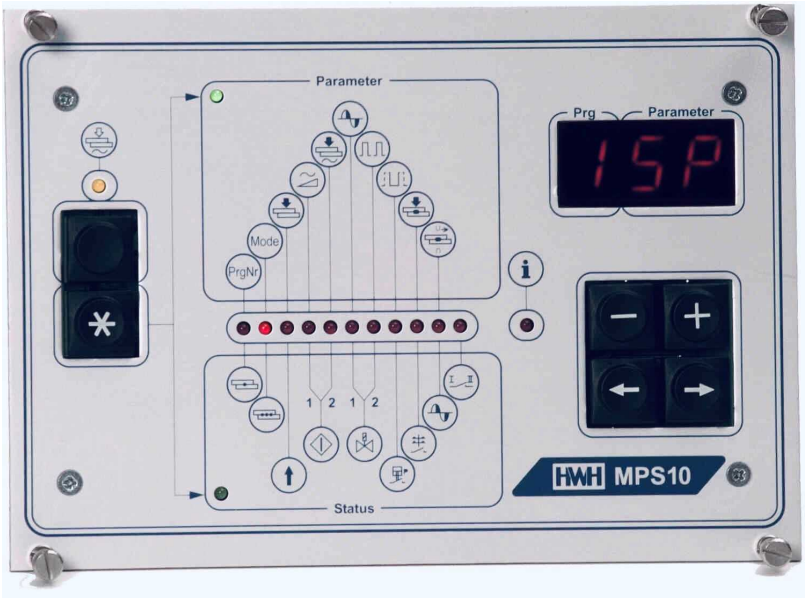



Fig. 10-5 *MSP10*

## Description

The MPS10 welding control system is a programmable 5-time control system for actuating 1-phase welding machines with up to eight welding programs.

All MPS10 control stage operating functions are processed via a clearly arranged control panel.

The primary use of standardised icons for resistance welding devices results in a user-friendly, language-independent interface.

All operating elements required for editing and configuration are located on the front.

The electrical connections required for operation are located at the rear.

The control system offers the following basic features and functions:

| Designation | Characteristics |
|---|---|
| MPS10<br>MPS10 beta<br>MPS10 alpha | • Five-time control system (VHZ, SZ, NHZ, OHZ, PZ) and additional SAZ as well as pulses<br>• Selectable single spot and serial spot operating modes<br>• Eight programs<br>• Two start inputs<br>• Two solenoid valve outputs and one pre-stroke output<br>• Automatic 50/60 Hz recognition<br>• Automatic equalisation of mains voltage fluctuations<br>• Adaptation of the control system and welding processes to welding system conditions<br>• Display of status and error messages during the welding process<br>• With/without "current" switching via button |

# *50/60 Hz power stages*


## Description

Power stages are the appropriate addition to our 50/60 Hz welding control systems and an integral element of high-performance welding systems. Various designs are available in terms of input voltage, maximum current and type of cooling. The range is rounded off with 3-phase versions of proven welding thyristors to supplement the 3-phase welding control systems from Harms & Wende.

# LE11

The LE11 type is a thyristor output stage in an open chassis design.

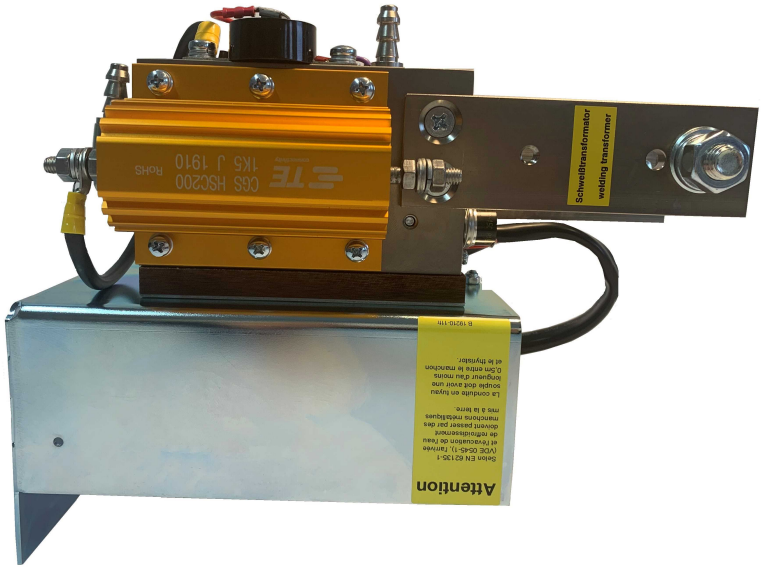
It is characterised by its encapsulated electronics, which are protected against splash water.

The E3 discharge resistor integrated on the cooling surface provides indirect water cooling.

It is designed for installation in enclosed control cabinets or machine stands. It contains two thyristors, not connected in parallel, with water cooling and temperature monitoring.

The LE11 power stage is designed for operating all Harms & Wende 50/60 Hz welding control systems. It has no separate mains voltage supply transformer for synchronising the welding control system. This has to be connected separately.

A particularly low-carbon and thus high-impedance plug-in hose should be used as the coolant connection. This hose is mounted on the heat sink fitting without cable clamps.




| Basic designation | Additional designation | Current | Voltage to | Cooling |
|---|---|---|---|---|
| LE 11 | 250 | 250 A | 500 V | Water |
| LE 11 | 700 | 700 A | 500 V | Water |
| LE 11 | 900 | 900 A | 500 V | Water |
| LE 11 | 1440 | 1440 A | 500 V | Water |
| LE 11 | 2335 | 2335 A | 500 V | Water |
| LE 11 | 2950 | 2950 A | 500 V | Water |
| LE 11 | 3700 | 3700 A | 500 V | Water |

# *LE100 / LE200*

**Closed power stages**

Range of application:

Tyristor power stage for internal cabinet mounting

The power stages for space-saving installation in cabinets with air or water cooling and insulated construction with de-energizing resistor, thyristor control and supply transformer 27 V AC including hand-safe cover.

All-round protection for power thyristors

Sturdy mechanical housings and partially insulated cooling water circuit effectively protect people and equipment from current damage. Unhandy and bulky covers and special hoses with safety length are not necessary. Finger protection, contact protection, tool protection and insulated water cooling system are just a few of the key words that apply to the thyristor power units in this series. Water stays outside!

Thanks to the practical water connection at the rear, there is no need for a hose or pipe connections in the control cabinet when mounted appropriately. The leakage of cooling water into the cabinet is prevented (LE26S1, LE200).

Fig. 11-1


Fig. 11-2 *LE26S1-Thyristor power stage*

Fig. 11-3 *LE100-Thyristor power stage*

Fig. 11-4 *LE200-Thyristor power stage with cover*

LE 100

| Basic designation | Additional designation | Current | Voltage to | Cooling |
|---|---|---|---|---|
| LE100 and LE200 | L045 | 45 A | 500 V | Air |
| LE100 and LE200 | L200 | 200 A | 500 V | Air |
| LE100 and LE200 | 125 | 125 A | 500 V | Water |
| LE100 and LE200 | 580 | 580 A | 500 V | Water |
| LE100 and LE200 | 1135 | 1135 A | 500 V | Water |
| LE26 and LE26S1 | 280 | 280 A | 500 V | Water |
| LE26 and LE26S1 | 580 | 580 A | 500 V | Water |

Performance parts in comparison

| | LE26 S1 | LE100 | LE200 |
|---|---|---|---|
| Isolated cooling water circuit | Yes | | |
| De-excitation resistor | Yes | | |
| Finger protection / cover | Yes | Hand back safe | |
| Water cooling outside the cabinet | Yes | No | Yes |
| Standard nominal voltage | 400 V | | |
| Possible nominal voltages | 230 / 415 / 440 / 500 V | 415 / 440 / 500 V | |
| Supply voltage for welding controller | 27 V | | |
| Suitable for welding control | Ratia73/43 FiliusACS MPS10 | | |

## *LE7/1*

Appropriate for the Ratia73/43, FiliusACS, SiniusAC1 and MPS10 series welding control systems.

For installation in a housing, e.g. on the base plate, with water cooling with type E2 discharge resistor and 27 VAC supply transformer.

Standard connection voltages: 230 V, 400 V, 415 V, 440 V, 500 V.

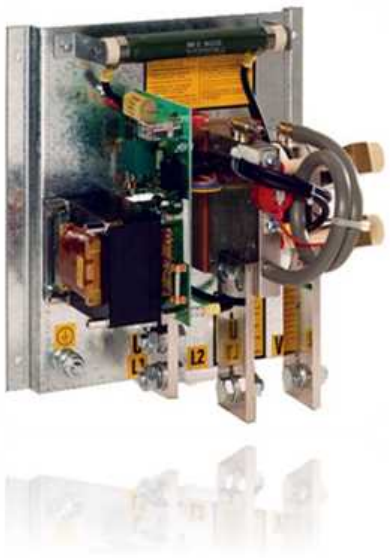


Fig. 11-5 *LE7/1*

| Basic designation | Additional designation | Current | Voltage to | Cooling |
|---|---|---|---|---|
| LE 7/1 | 250 | 250 A | 500 V | Water |
| LE 7/1 | 700 | 700 A | 500 V | Water |
| LE 7/1 | 900 | 900 A | 500 V | Water |
| LE 7/1 | 1440 | 1440 A | 500 V | Water |
| LE 7/1 | 2335 | 2335 A | 500 V | Water |
| LE 7/1 | 2950 | 2950 A | 500 V | Water |
| LE 7/1 | 3700 | 3700 A | 500 V | Water |

## *LE10/3*

Appropriate for the 3-phase welding control systems Ratia73/43 and SiniusAC3. For installation in a housing, e.g. on the base plate, with water cooling, type E2 discharge resistors and 27 VAC supply transformer.

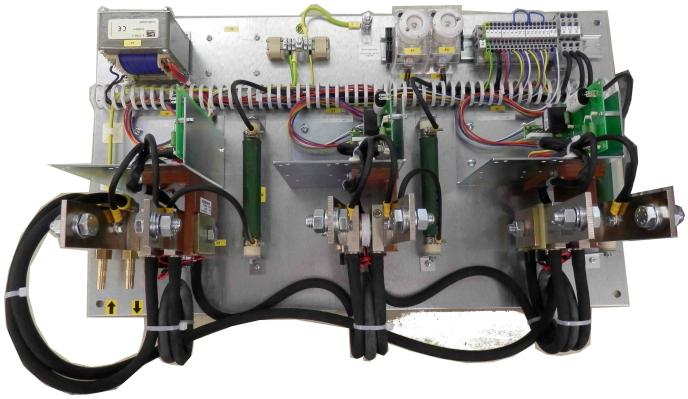


Fig. 11-6 *LE10/3*

| Basic designation | Additional designation | Current | Voltage to | Cooling | Activation |
|---|---|---|---|---|---|
| LE 10/3 | 1440 | 1440 A | 400 V | Water | Star or triangle |
| LE 10/3 | 2335 | 2335 A | 400 V | Water | Star or triangle |
| LE 10/3 | 2950 | 2950 A | 400 V | Water | Star or triangle |
| LE 10/3 | 3700 | 3700 A | 400 V | Water | Star or triangle |
| | | | | | |
| LE 10/3 | 250 | 250 A | 500 V | Water | Star or triangle |
| LE 10/3 | 700 | 700 A | 500 V | Water | Star or triangle |
| LE 10/3 | 900 | 900 A | 500 V | Water | Star or triangle |
| LE 10/3 | 1440 | 1440 A | 500 V | Water | Star or triangle |
| LE 10-3 | 2335 | 2335 A | 500 V | Water | Star or triangle |
| LE 10-3 | 2950 | 2950 A | 500 V | Water | Star or triangle |
| LE 10/3 | 3700 | 3700 A | 500 V | Water | Star or triangle |

## *LE20*

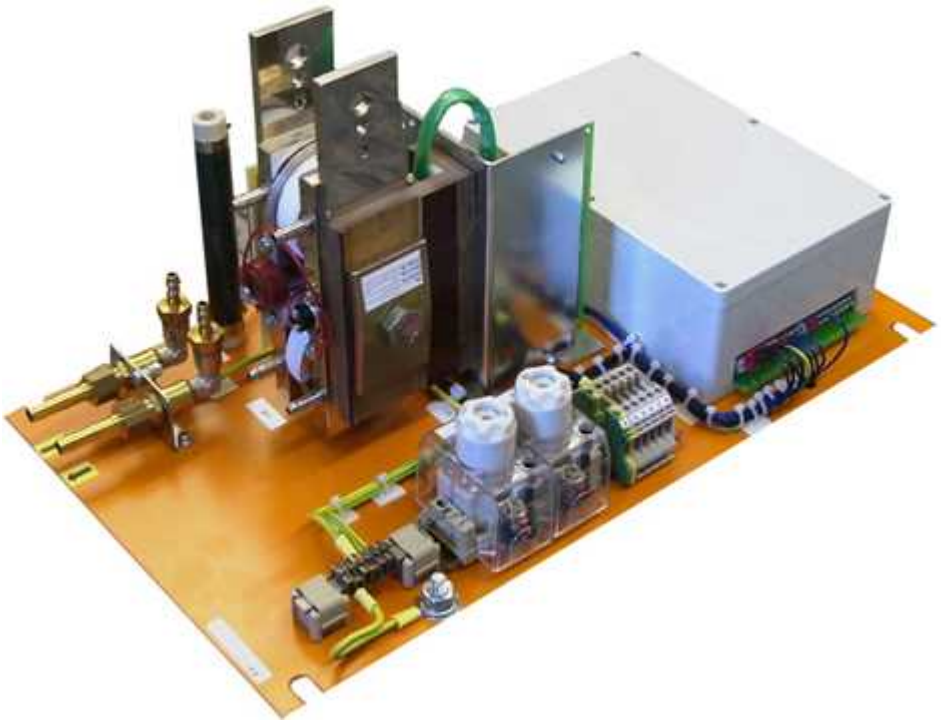


Fig. 11-7 *LE20 thyristor power stage*

| Basic designation | Additional designation | Current | Voltage to | Cooling |
|---|---|---|---|---|
| LE 20 | 250 | 250 A | 500 V | Water |
| LE 20 | 700 | 700 A | 500 V | Water |
| LE 20 | 900 | 900 A | 500 V | Water |
| LE 20 | 1440 | 1440 A | 500 V | Water |
| LE 20 | 2335 | 2335 A | 500 V | Water |
| LE 20 | 2950 | 2950 A | 500 V | Water |
| LE 20 | 3700 | 3700 A | 500 V | Water |

# *LE20/3*

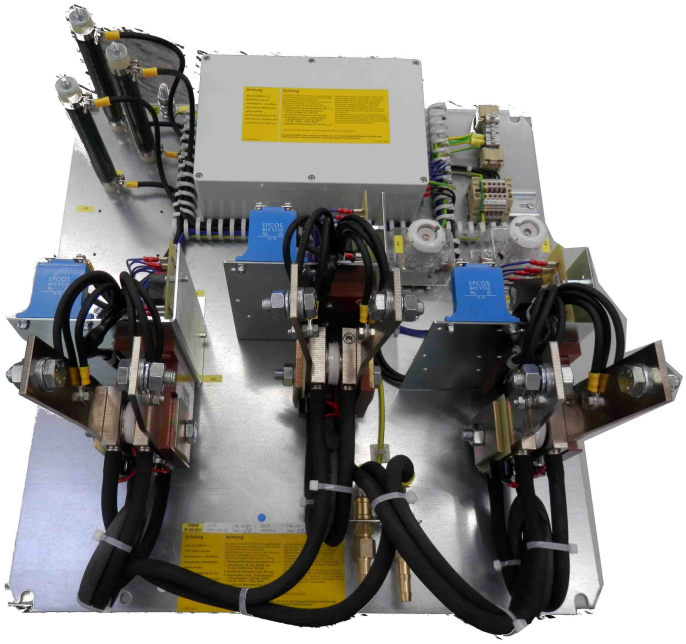


Fig. 11-8 *LE20/3 3-phase thyristor power stage*

| Basic designation | Additional designation | Current | Voltage to | Cooling |
|---|---|---|---|---|
| LE 20/3 | 250 | 250 A | 500 V | Water |
| LE 20/3 | 700 | 700 A | 500 V | Water |
| LE 20/3 | 900 | 900 A | 500 V | Water |
| LE 20/3 | 1440 | 1440 A | 500 V | Water |
| LE 20/3 | 2335 | 2335 A | 500 V | Water |
| LE 20/3 | 2950 | 2950 A | 500 V | Water |
| LE 20/3 | 3700 | 3700 A | 500 V | Water |

# *Weld panels*

## Advantages:

- Individual
- Design as per specified regulations
- Automated control cabinet production through use of an automatic drilling machine
- Designed for the components which are used
- Adaptation of additional add-on parts
- Control cabinet design adapted to your needs
- Pre-defined solution approaches for installing our control system components
- Short delivery times through use of Rittal standard cabinets
- … and much more

# Control cabinets

Fig. 12-1 *Representation of SK-SiniusHWI*

## Description

A control cabinet from Harms & Wende optimally protects the system technology from harmful environmental influences such as dust, water or electromagnetic interference.

The control cabinet also protects the operator from contact with hazardous voltages. Corresponding safety features such as main switches and emergency stop buttons extend the equipment.

Flexible production enables the integration of control and operating units for comfortable parameterisation directly on the system.

The interior can be structured according to the application using corresponding mounting rails and plates. The optional integration of cooling systems protects the valuable components from overheating and failure.

Various connector systems also enable the comfortable and quick connection of external systems. The control cabinet's dimensions depend on the installed components and the customer's requirements. Seamless integration into existing structures is therefore possible.

The standard SK-Genius HWI4yy series control cabinets are prepared with GeniusHWI4xx series Harms & Wende inverters. They are equipped with a main switch and power supply for supplying the undervoltage triggering function.

The GeniusHWI4xx inverters are available in different output variants.

Up to the GeniusHWI 416 (160 kVA), the devices are installed with standard water cooling in Rittal AE1376 type control cabinets (600x760x350 mm). A smaller Rittal AE1360 type cabinet (600x600x350 mm) may also be used for the types with external water (WA) or air cooling (L). The Rittal CM5113 type control cabinet (600x1200x400 mm) is used as of GeniusHWI424.

The cabinets' standard colour is RAL 7035. Other colour variants and options are available subject to a surcharge. A choice of air- and water-cooled variants is available for output classes up to GeniusHWI416.

On request, we will also be happy to offer designs adapted to your specific requirements and wishes.

## *Top mounted robot cabinets*

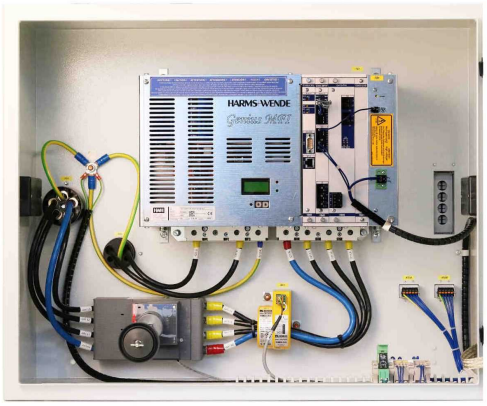



Fig. 12-2 *Top mounted robot cabinet, interior view*

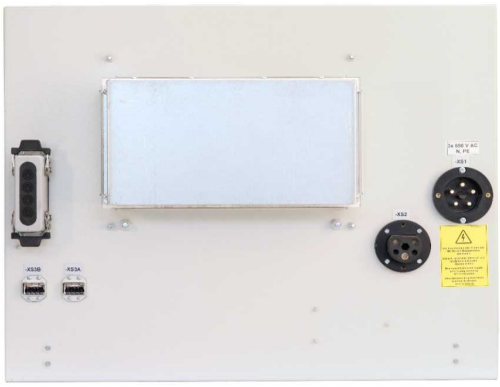


Fig. 12-3 *Top mounted robot cabinet, rear view*

## Description

Our welding cabinets are predestined for typical use in highly automated body production in modern automotive plants. Even the exterior dimensions of the control cabinet are selected to enable simple installation above or directly on a robot control cabinet. Corresponding holes enable secure installation. Various closures are available to offer optimal personal protection. An externally accessible main switch enables disconnection from the mains at any time. A radiator mounted on the rear ensures quiet and low-maintenance dissipation of heat which is generated. As well as the welding inverter and the main switch, many additional options can be integrated into the control cabinet. The choice of connection options at the rear can be implemented as desired by the customer, as can the colour of the overall housing. With our welding case concept for robot applications, we not only comply with European regulations and standards, but can also supply and certify them with components which meet worldwide requirements.

# Floor-standing cabinets

Fig. 12-4 *Control cabinet with electrode holder changeover*

Fig. 12-5 *Control cabinet with four inverters*

## Description

Besides the welding case for mounting on robot cabinets, Harms & Wende also offers customer-specific solutions as floor-standing housings. These are often used for high-power inverters, e.g. for projection welding. Outstanding accessibility of all components is guaranteed. Thanks to the generous installation space inside the control cabinet, with minimal floor space at the same time, additional components such as supply units or switching contactors can be integrated. Floor-standing housings for master-slave systems are a special feature. Several GeniusHWI series inverters are combined in these to achieve welding currents of several 100 kA in the secondary circuit.

The "floor-standing cabinet" housing form is particularly suitable for systems which combine several welding inverters in a tight space, or for projection welding applications in which very high powered inverters are required. Of course, these are also produced according to your specifications and wishes. The same options as for the compact welding cases are available.

# Control cabinet solution for projection welding applications

Fig. 12-6 *Welding hollow sections*

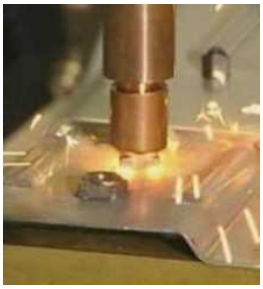


Fig. 12-7 *Welding nuts*

We recommend the following medium-frequency inverters for these applications:

- Inverter: GeniusHWI416W-EA-PRO
- Cabinet: F-100A-600x760x350 mm
- Complete: SK-GeniusHWI416W-EA-PRO-F-100A-600x760x350

Refer to the data sheets for the relevant inverter output types for the output data.

Technical data:

- 512 programs
- 3 current profiles
- Digital 24 V I/O
- Constant current regulation (KSR)
- Current increase
- Current decrease
- Pulses
- Proportional valve output
- Limit value monitoring
- Stationary operation with XComand operating unit, installed at the front
- IP54 housing
- Supply voltage 3x400 V 50/60 Hz

# Control cabinet options

| Material | Description |
|---|---|
| Comfort housing | Adapted housings can be mounted directly for various types:<br>Kuka KRC1/2, ABB, etc. |
| Terminal strip for connections | All connections routed via terminals as an alternative to direct application to the welding control system and the power unit |
| Pluggable connections (up to 180 A primary current) | Output via MC and I/Os via Harting plugs |
| Mating connectors | Mating connector set for plug connections |
| Secondary circuit monitoring facilities | Fault voltage monitoring with PFU6 |
| Secondary circuit monitoring facilities | Fault current monitoring with differential current relays |
| Mains supply output | Mains output fused for milling cutters |
| Mains supply output | Mains output fused for robots |
| Mains supply output | Service socket |
| Indicator lamps and buttons | Error, error reset |
| Machine control system package | Two-hand control system |

# Accessories

## Current and force measuring device TE1700C

The TE1700C is a portable device for measuring the resistance welding parameters. The use of various types of measurement sensors enables measurement of the welding current, the electrode force, the voltage at the electrodes, the energy, the resistance and the heat flux


Fig. 13-1 *TE700C*

Particularly during the set-up phase, this device offers all information required to configure your individual welding process correctly and optimally. Every technician should therefore have this measuring device to hand for commissioning and service.

Only a measurement reliably ensures that the welding machine or an electrode holder does what meets your requirements. The effects of corrections to the current setting or the air pressure can also be checked immediately.

The colour 5.7" LCD touch screen display ensures precise reading, even under unfavourable conditions.

## TE1700C current / force measuring device versions

| Designation | Description |
|---|---|
| TE1700 current with Rogowski belt 1635 | Portable current measuring device |
| | |

## Strom- / Kraftmessgerät TE 1700C

| Bezeichnung | Artikelnr | Beschreibung |
|---|---|---|
| TE1700C Strom | 44083 | Combinable current, time and force meter with Bluetooth port<br>Current meter version includes: - TE1635 current measuring belt, diameter approx. 160 mm,<br>150 mV/kA L= 2000mm- Calibration |
| TE1700C Karft | 44084 | Combinable current, time and force measuring device with Bluetooth portForce measuring device version includes:-<br>TE1675 Force transducer for small electrode distances min.<br>10 mm Measuring range up to 1,200 daN |
| TE1700C Strom + Kraft | 44074 | Combinable current, time and force measuring device with Bluetooth port<br>Current and force measuring device version including:- TE1635 Current measuring belt, diameter approx. 160 mm,<br>150 mV/kA L= 2000mm- TE1675 Force measuring transducer for small electrode distances min.<br>10 mm Measuring range up to 1,200 daN-<br>Calibration |

## Current and force measuring device TE1600

Mobile measurement with know-how. Do you always know how much current your welding machine used to weld the last important order, and does the electrode holder always achieve the desired pressure? With our mobile measuring device TE1600, you always have all data at your disposal.

Fig. 13-2 *TE1600 with Rogowski belt and force measuring probe*

Particularly during the set-up phase, this device offers all information required to configure your individual welding process correctly and optimally. Every technician should therefore have this measuring device to hand for commissioning and service.

Only a measurement reliably ensures that the welding machine or an electrode holder does what meets your requirements. The effects of corrections to the current setting or the air pressure can also be checked immediately.

The large, clear digital display ensures precise reading, even under unfavourable conditions. Battery operation guarantees the necessary freedom of movement and enables you to work in virtually any location.

Your advantage:

The mobile measuring device TE1600 for controller set-up or random samples ensures production quality and documents the correct function of welding systems. It not only reduces costs but also enables you to work more productively in the future.

## Current/force measuring device TE1600 versions

| Designation | Description |
|---|---|
| TE1600 current with Rogowski belt 1635 | Portable current measuring device |
| TE1600 force with force measuring probe 1675 | Portable force measuring device,<br>max. 1200 daN |
| TE1600 multi with Rogowski belt and force measuring probe | Portable current / force measuring device<br>Optional measurement of current (1635) and force (1675) |

| Extensions | Description |
|---|---|
| Current measuring belt 1635 | Rogowski belt for TE1600,<br>open with quick-action lock, diameter approx. 160 mm |
| Force measuring probe 1673 | Manual force measuring probe for TE1600, max. 200 daN, 10 mm |
| BNC cable | For connecting an oscilloscope to the TE1600, length 1 m |

With our mobile measuring device TE1600, you always have all data at your disposal.

## Current-/ force measuring device TE1600

| Designation | Article no. | Description |
|---|---|---|
| TE 1600 Strom | 19662 | Combinable current, time and force measuring device: Current measuring device version including:-<br>TE1635 Current measuring belt, diameter approx.<br>160 mm, 150 mV/kA L= 2000mm-<br>Calibration |
| TE 1600 Kraft | 19663 | Combinable current, time and force measuring instrument:Version force measuring instrument including:-<br>TE1675 force transducer for small electrode spacing<br>min. 10 mm Measuring range up to 1.200 daN-<br>Calibration |
| TE 1600 Multi | 25420 | Combinable current, time and force measuring device Current and force measuring device version including:-<br>TE1635 Current measuring belt, diameter approx. 160 mm, 150 mV/kA L= 2000mm-<br>TE1673 Force measuring transducer for small electrode spacing min. 10 mm Measuring range up to 200 daN-<br>Calibration |
| TE 1600 Multi | 19664 | Combinable current, time and force measuring device Current and force measuring device version including:-<br>TE1635 Current measuring belt, diameter approx. 160 mm, 150 mV/kA L= 2000mm-<br>TE1675 Force measuring transducer for small electrode spacing min. 10 mmMeasuring range up to 1.200 daN-<br>Calibration |

## TE 1600 extension and spare parts:

| Designation | Article no. | Description |
|---|---|---|
| TE1673 Force | 25419 | Force transducer for small electrode spacing min.<br>10 mm Measuring range up to 200 daN<br>  |
| TE1675 Force | 18741 | Force transducer for small electrode spacing min.<br>10 mm Measuring range up to 1,200 daN<br>  |
| TE1662 Force | 21675 | Force transducer for electrode spacing min.<br>22 mm Measuring range<br>up to 2.000 daN<br>  |
| TE1663 Force | 21382 | Force transducer Measuring<br>range up to 10.000 daN<br>  |
| TE1635 Current | 25420 | Current measuring belt, diameter approx. 160 mm, 150 mV/kA L= 2.000mm |

## *Distance measurement*

Fig. 13-3 *Distance sensor*

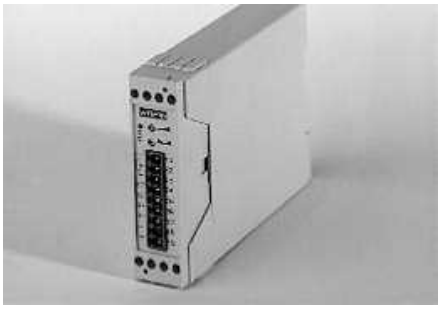


Fig. 13-4 *Measuring transducer*

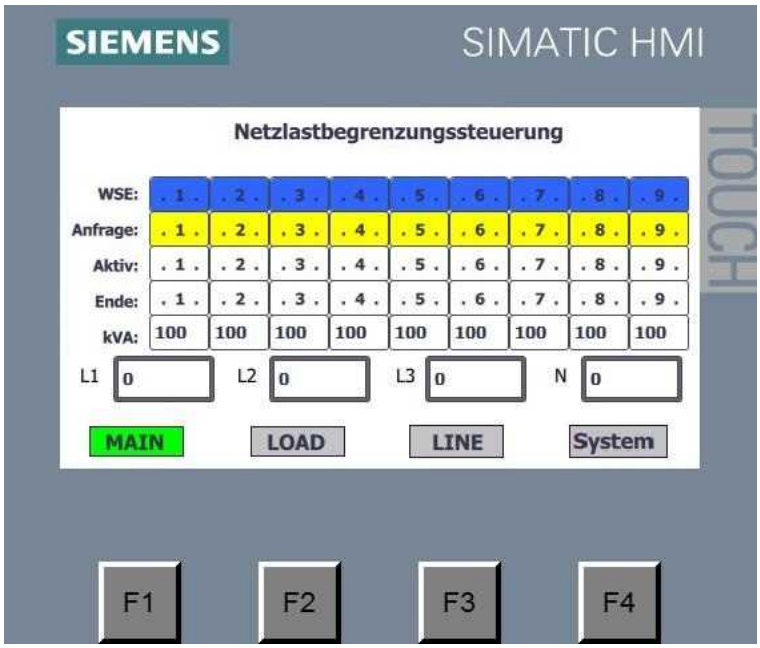
Fig. 13-5 *Distance sensor 100 mm*

| Article | Designation | Description |
|---|---|---|
| 31049 | Distance sensor 25 mm | Potentiometric distance sensor 25 mm |
| 39603 | Distance sensor 100 mm | Potentiometric distance sensor 100 mm |
| 23107 | Distance sensor 150 mm | Potentiometric distance sensor 150 mm<br>With ball joint as link |
| 29854 | Measuring transducer MPS100 | Measuring transducer for potentiometric sensors,<br>0-10 V, supply voltage 24 VDC |
| 34314 | Measuring transducer MPX101 | Measuring transducer for potentiometric sensors,<br>0-10 V, supply voltage 24 VDC, adjustable range. |

# *Netzlastbegrenzungssteuerung*

The mains load limitation control NBS-9 is available from2022 in the UL-ready version and with an English user interface. Mains load limitation controllers are the solution for sites that have a high feed-in requirement due to the number of resistance welding equipment in use. Resistance welding equipment (WSE) requires high power from the mains supply for short periods of time.

If several WSE are connected to one mains supply, the welding processes will overlap in time. The short-time peak loads on the mains supply lead to voltage dips in the supply network, flicker phenomena and higher energy costs. The mains load limitation control (NBS) controls the release of the individual devices. The individual setting options (power, priority, priority time and phase-O PROCON configuration) of each of the 9 possible resistance welding devices ensure that the available mains power is allocated as required. Procon will be pleased to provide further information.




NBS Control

- The following advantages result:
- Reproducible behavior of the network load
- Compliance with the flicker limit values (limit value of the power supply company)
- No deeper voltage dips
- Improved welding quality due to lower voltage dips (operation without regulation, possibly also with constant current regulation)
- Reduction of energy costs (price for peak load of the network - EVU dependent calculation and prices) SIEMENS SIMATICHMI FLOAD NBS control system
- Cost-optimized installation possible (optimization: cable cross-sections, medium voltage transformer, fuses, ...)
- Symmetrical loading of the medium voltage transformer

# Transformer switchover


Fig. 13-6 *HWU-2 welding transformer switchover*

## Description / application

HWU-2 welding transformer switchover enables the operation of several welding transformers on one MF power unit. For example, this enables the execution of two welding tasks in succession either through the use of two welding cylinders or two separate machines.

Switching to the respective channel is carried out via a 24 VDC voltage. Switchover can be controlled from a PLC.

## Technical data

| | | |
|---|---|---|
| Power input | U – V: | MF: 50 – 690 V -15% + 20% |
| Output voltage | U1 – V1:<br>U2 – V2: | Power input – 4 V -10% to +20%<br>Load- and temperature-dependent |
| Maximum input and output current<br>[≤ 10 ms] | | 1200 A<br>For further output currents, see the characteristic curve of the connected inverter |
| Supply voltage | | 24 VDC -10% to +20%, 200 mA |
| Cooling water requirement | | 6L |

## *HWC-ETH module*

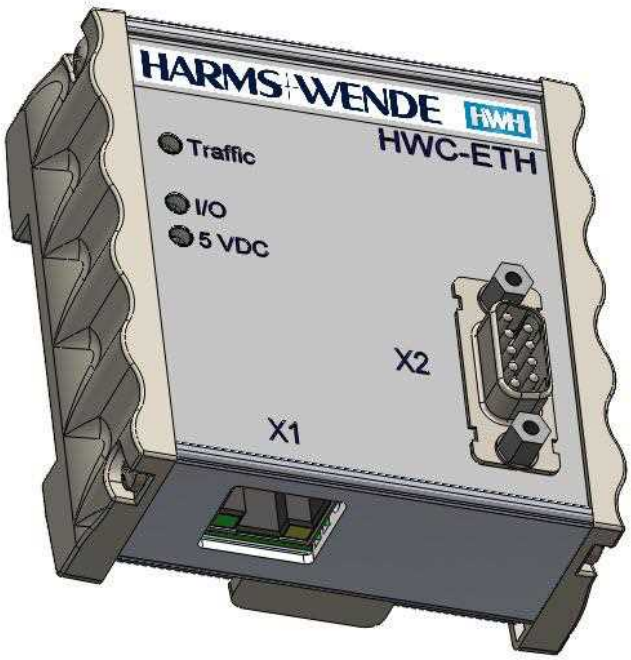



Fig. 13-7 *HWC-ETH external interface converter for rail mounting (TS35)*

The HWC-ETH module is used to connect the HWI24xx inverter series to Ethernet networks. This module is connected directly to an inverter with an EVA or IQR PCB set, and provides an Ethernet socket (RJ-45). The module's delivery scope includes a connection cable.

This cable enables the HWC-ETH module to be supplied and data exchange between the inverter and module. The inverter and HWC-ETH module should be no more than 2 m apart; the enclosed cable is 1.8 m long. This limitation is necessary, as the HWC-ETH module's supply can only be guaranteed over this distance. Using the module within the inverter's control cabinet is recommended. The module's housing requires a connection to the control cabinet's earthing point; a plug connection is available on the rear for this.

**Commissioning:**

On delivery, the HWC-ETH module is configured with the standard IP address: 192.6.10.95. This address can be changed as desired by the customer via the XPegasus user interface. After configuration, the device is connected to the network, and can be accessed within the network structure with the operating software.

### Supported inverter function variants (XPegasus user interface)

| Function | Type code | SW version | Note | Restriction |
|---|---|---|---|---|
| EVA | EVA | 9.XX | | Connection of the module is only permissible without SA34 and with the enclosed connection cable to the inverter's X3. Interface conversion on systems with Genius, Sinius, analogue and slave functionality is not possible. |
| IQR | IQR | 8.XX | | |
| EVA manual | Manual | 8.HX | | |
| IQR manual | IQR manual | 8.HX | | |
| EVA-ZP | EVA ZP | 8.XX | Pegasus only | |
| IQR-ZP | IQR ZP | 8.XX | Pegasus only | |
| EVA plus | EVA PLUS | ≥ 8.23 | | |

# *PQS licence*

The PQS-Res software licence for data evaluation and analysis is protected with a licence dongle. This is in the form of an SD card, and is inserted into the welding control system on use of the software.

## Characteristics of the PQS-Res software, which can be purchased as an option

- Visualisation and logging of the above specified process data
- Extensive signal visualisation options, including comparisons over long periods of time, enable rapid error analysis
- Online monitoring of parameters with immediate error message in the event of process deviations
- Analysis of current process stability
- Long-term data archiving and documentation
- Option of recording or importing external test results
- Operation and data recording can be separated from each other, and can be executed on different PCs

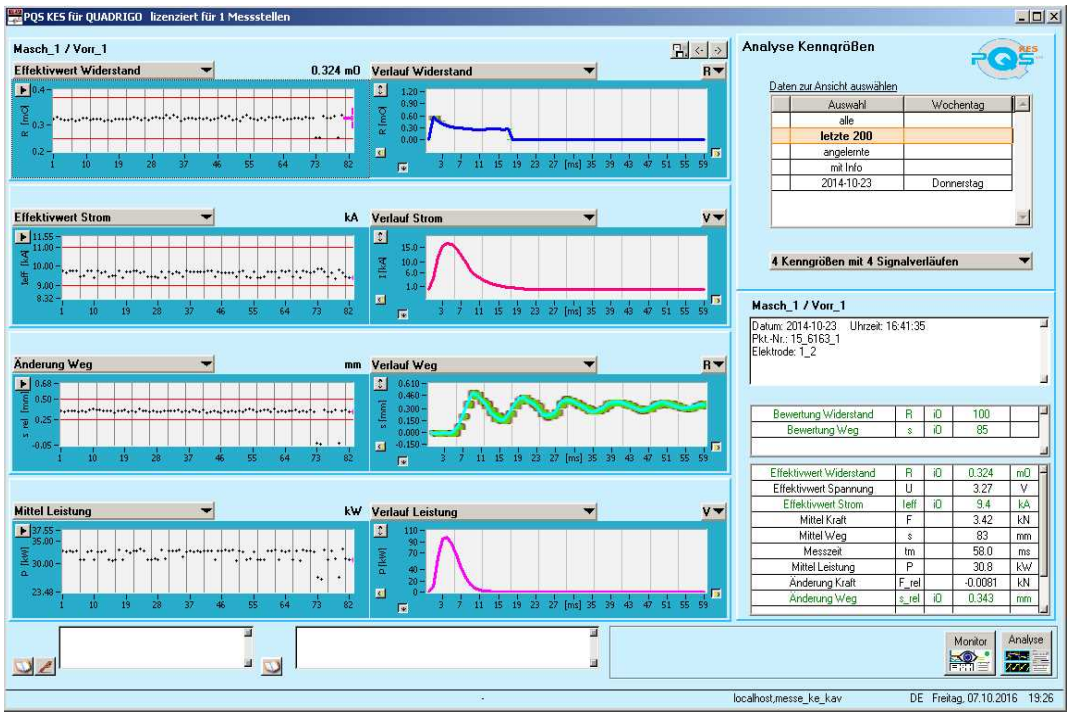



Fig. 13-8 *PQS-Res software parameter analysis window*

## QUADRIGO-Master

Fig. 13-9 *QUADRIGO-Master*

The QUADRIGO-Master is an industrial PC for space-saving control cabinet installation for industrial use.

The PQS software package for data recording, but also for operating the overall system, can be installed on the QUADRIGO-Master. Of course, QUADRIGO-Master PCs can also be used for other applications, such as e.g. operating the XPegasus software.

Harms & Wende offers various performance classes depending on requirements. The bandwidth ranges from 1 to 16 measuring points, which can be operated with one master.

If constant use in production is intended, we urgently recommend the variants with integrated UPS and external battery pack

Characteristics of the QUADRIGO-Master

- Temperature range 0 to 45°C, passive cooling
- 24 V supply, UPS integrated, external battery
- Windows 7, Intel i5, 4 GB RAM, 320 GB HDD

## QUADRIGO-VISU

Fig. 13-10 *QUADRIGO-VISU-Plus-V002*

The QUADRIGO-VISU is an industrial panel PC with Windows operating system. The PQS software package for system operation and data recording can be installed on the QUADRIGO-VISU. Of course, QUADRIGO-VISU PCs can also be used for other applications, such as e.g. operating the XPegasus software.

QUADRIGO-VISU is available for mounting on a support arm from beneath (19") and as a panel PC for installation in the front of control cabinets (15" and 19").

Depending on version, it offers comfortable touch operation and/or an unbreakable short-stroke keyboard.

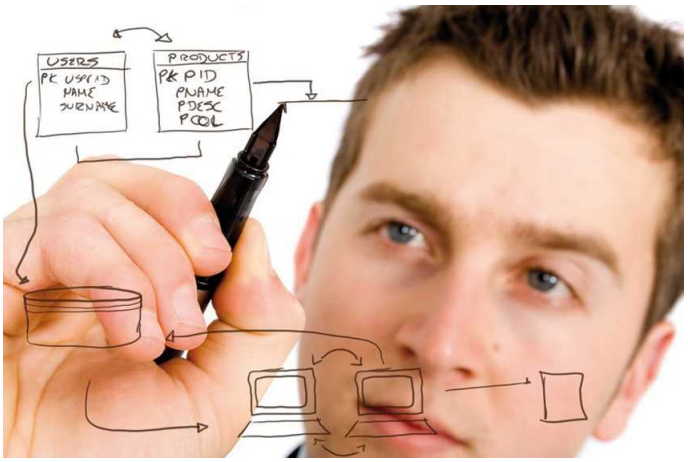
The QUADRIGO-VISU is available with an integrated UPS concept for maximum data security. The external battery pack must then be installed in a control cabinet.

Characteristics of the QUADRIGO-VISU

- Dual Ethernet adapter with 2x 100/1000 GB Ethernet
- 1 serial interface RS232 and 4 USB 2.0 ports
- Can be installed in our QUADRIGO box with a QUADRGO measurement module
- UPS preparation including external battery pack

Please refer to the separate HWH-QST product catalogue for detailed descriptions and equipment features of the QUADRIGO modules.

# *Academy*




## Description

As an international company, Harms & Wende offers training courses on site at your premises, at our partners and, of course, also here at our company in Hamburg.

The training courses can usually be conducted in the national language on site or in German and English in Hamburg.

We offer you a clearly structured training program, which can also be adapted to meet your requirements.

A selection of possible languages includes Chinese, Hungarian, Romanian, Portuguese (Brazil) and Spanish.

Contact us and we will compile a tailored program for you.

Your satisfaction is our success!

On completion of the courses, the participants receive a certificate which documents their participation and describes the contents.

# Basic training

The basic training requires no prior knowledge. This training serves as preparation for the system operating personnel. No measures for parameterising the welding task are trained.

If the training participants have a technical background, the course can be shortened by one day.

| Training contents | |
|---|---|
| Basic principles | |
| • Resistance welding<br>• General welding technology | |
| Device technology | |
| • Components of the welding technology used | |
| Operating software | |
| • System messages<br>• Behaviour in the event of a fault<br>• Who can help me? | |
| Duration | 3 days |
| Place | Harms &Wende GmbH & Co. KG<br>Großmoorkehre 9<br>D-21079 Hamburg |
| Number of participants | 3 to 8 persons |

# *Advanced training*

The advanced training requires knowledge of the basic training. This training serves as preparation for set-up staff. After a brief recap of the general welding technology, the basics of parameterising the welding task are trained. The training participants require a technical background.

| Training contents | |
|---|---|
| Basic principles | |
| • Resistance welding<br>• General welding technology<br>• General parameterisation | |
| Device technology | |
| • Components of the welding technology used<br>• Behaviour of the control system | |
| Operating software | |
| • Basic parameters<br>• Module configuration<br>• Data backup<br>• Inputs/outputs (diagnosis)<br>• System messages<br>• Behaviour in the event of a fault<br>• Who can help me? | |
| Duration | 2 days |
| Place | Harms &Wende GmbH & Co. KG<br>Großmoorkehre 9<br>D-21079 Hamburg |
| Number of participants | 3 to 8 persons |

# *Basic + advanced training*

The combined basic and advanced training requires no prior knowledge. This training serves as preparation for the system operating personnel. In addition to the basics, parameterisation of the welding task is trained. If the training participants have a technical background, the course can be shortened by one day.

| **Training contents** | |
|---|---|
| Basic principles | |
| • Resistance welding<br>• General welding technology<br>• General parameterisation | |
| Device technology | |
| • Components of the welding technology used<br>• Behaviour of the control system | |
| Operating software | |
| • Basic parameters<br>• Module configuration<br>• Data backup<br>• Inputs/outputs (diagnosis)<br>• System messages<br>• Behaviour in the event of a fault<br>• Who can help me? | |
| Duration | 4 days |
| Place | Harms &Wende GmbH & Co. KG<br>Großmoorkehre 9<br>D-21079 Hamburg |
| Number of participants | 3 to 8 persons |

# *Maintenance training*

The maintenance training is aimed at service technicians who have to ensure the operational readiness of the welding components used within the company by exchanging control system components or repairing the devices. Electrical engineering training is a desirable requirement for the participants.

| Training contents | |
|---|---|
| Basic principles | |
| • Resistance welding<br>• General welding technology<br>• General parameterisation | |
| Device technology | |
| • Components of the welding technology used<br>• Design, function, components, communication with the PC / device<br>• Communication with the machine<br>• Replacement parts, installation/removal<br>• Design and connections<br>• Software update | |
| Operating software | |
| • Basic parameters<br>• System messages<br>• Who can help me? | |
| Duration | 2 days |
| Place | Harms &Wende GmbH & Co. KG<br>Großmoorkehre 9<br>D-21079 Hamburg |
| Number of participants | 3 to 8 persons |

# *Expert training*

The expert training provides training on the entire field surrounding the welding task. The trained topics form the prerequisite for internal training within the company. Electrical engineering training is a desirable requirement for the participants.

| Training contents | |
|---|---|
| Basic principles | |
| • Resistance welding<br>• General welding technology<br>• General parameterisation | |
| Device technology | |
| • Components of the welding technology used<br>• Device overview<br>• Design, function, components, communication with the PC / device<br>• Communication with the machine<br>• Replacement parts, installation/removal<br>• Design and connections<br>• Software update | |
| Operating software | |
| • Basic parameters<br>• Module configuration<br>• Data backup<br>• Inputs/outputs (diagnosis)<br>• Error messages<br>• Behaviour in the event of a fault<br>• Who can help me? | |
| Duration | 4 days |
| Place | Harms &Wende GmbH & Co. KG<br>Großmoorkehre 9<br>D-21079 Hamburg |
| Number of participants | 3 to 8 persons |

# *Key user training*

The expert and key user training courses are based on each other. The key users take part in the expert training. After a short while, a two-day key user training course is conducted; this is more or less interactive, and deals with the daily problems faced by key users.

| Training contents | |
|---|---|
| Basic principles | |
| • Resistance welding<br>• General welding technology<br>• General parameterisation | |
| Device technology | |
| • Components of the welding technology used<br>• Device overview<br>• Design, function, components, communication with the PC / device<br>• Communication with the machine<br>• Replacement parts, installation/removal<br>• Design and connections<br>• Software update | |
| Operating software | |
| • Basic parameters<br>• Module configuration<br>• Data backup<br>• Inputs/outputs (diagnosis)<br>• System messages<br>• Behaviour in the event of a fault<br>• Who can help me? | |
| Duration | 4 days |
| Place | Harms &Wende GmbH & Co. KG<br>Großmoorkehre 9<br>D-21079 Hamburg |
| Number of participants | 3 to 8 persons |

# Services

Harms & Wende offers a variety of assistance services for resistance welding. Qualified engineers, system specialists or technicians are on hand to provide support in:

- Software creation
- Commissioning
- Customer service calls
- Repairs
- Consulting and remote maintenance

for instance. These services are generally invoiced according to effort. Contact us.

## Use of the welding facility or the welding laboratory

| Use of a Harms & Wende welding facility | Invoicing unit |
|---|---|
| Machine hour, use of Harms & Wende welding facility, without provision of a technician | Per hour |
| Service and machine hour Use of Harms & Wende welding facility, with provision of a technician for operation and parameterisation | Per hour |
| Machine day, 1 day, 8 h, use of the Harms & Wende welding facility, without provision of a technician | Per day |
| Service and machine day, 1 day, 8 h, use of the Harms & Wende welding facility with provision of a technician for operation and parameterisation | Per day |
| Consumables | |

# *Appendix - technical data*

The technical data listed here for the inverters refer to the power values of the basic devices in the device profiles

- GeniusHWI
- SiniusHWI,
- SlaveHWI
- MFP

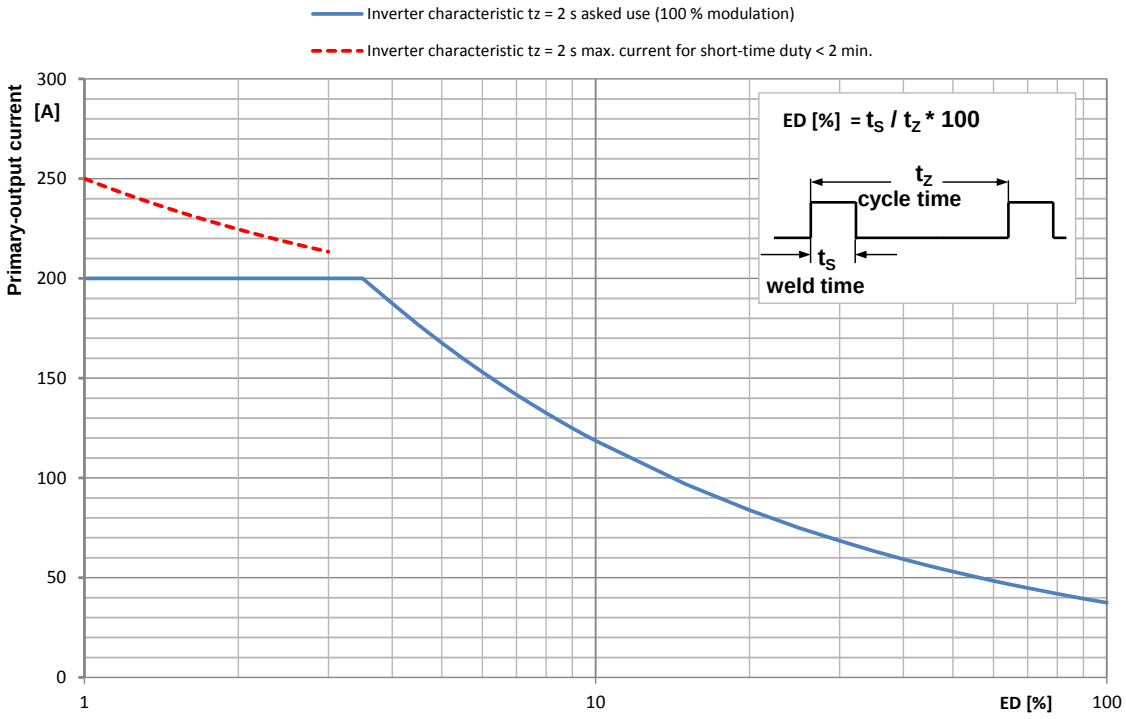
Not all output classes are available in the device profiles.

In output classes HWIx03 to HWIx16, the devices with air cooling, water cooling or external water cooling can be selected.

Only inverters with water cooling are available as of size HWIx24.

# Limit value chart x03L

## Load Limit Diagram




**Load curve represents the absolute limits. For reliable continuous operation, these limits should be exploited with a maximum of 85 %.**

### Technical data

| Designation | | HWI403L | HWI503L |
|---|---|---|---|
| Cooling medium | Air | | |
| Line voltage range | 3 ph, -15 %, +20 % | 400 / 440 V | |
| Line voltage range | 3 ph, -15 % +10 % | | 480 V |
| Output voltage | | 500 / 550 V | |
| Output voltage | | | 600 V |
| Rated output | 20 % ED[2] | 42 kVA | |
| Primary output current | 20 % ED[1] | 84 A | |
| Primary output current | 100 % ED[1] | 38 A | |
| Max. primay output current | [10 ms] | 250 A | |
| Main nominal current (max. thermal continuous current) [3] | | 27 A | |
| Cooling water requirements | | | |
| Cooling water pressure | | | |
| Cooling water connection | | | |
| Ambient temperature | +10 °C bis max. +45 °C | | |
| Relative humidity | 5 % – 85 % No condensation | | |
| Air pressure | 86 kPa – 106 kPa | | |

[1] Peak current is specified.

[2] The rated output at 500 V mains voltage is specified.

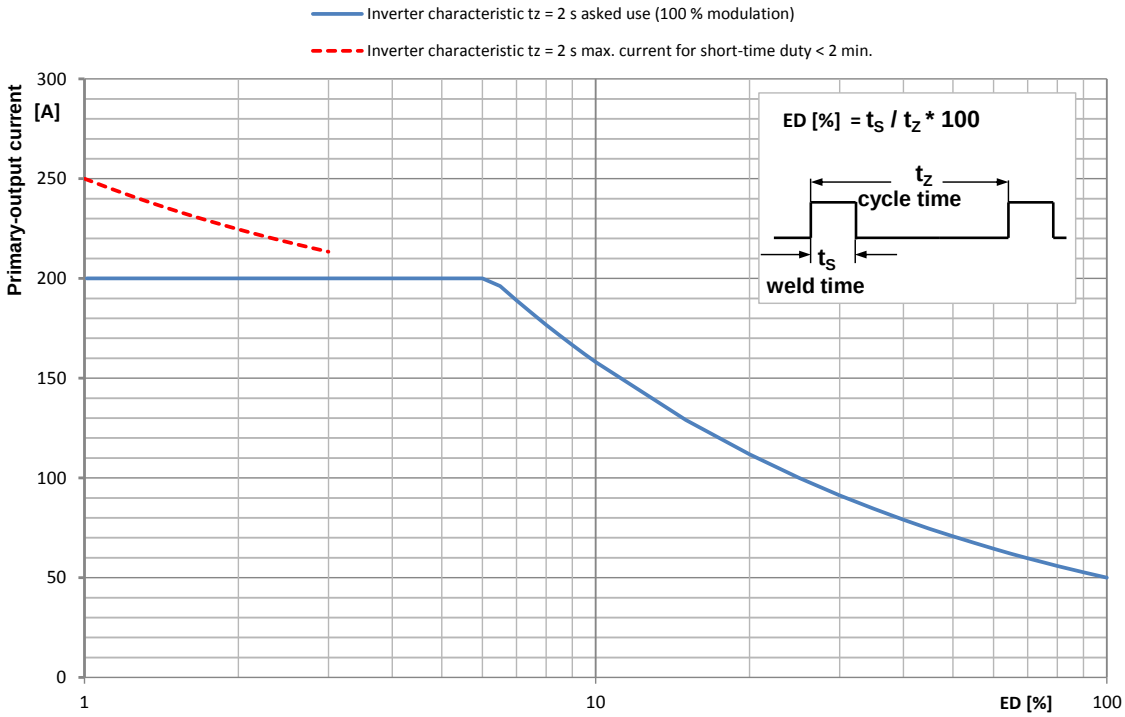
[3] Main nominal current for dimensioning the fuses is specified. The currents may also be lower / higher depending on application

| | GEZEICHNET | GEPRÜFT | | | |
|---|---|---|---|---|---|
| DATUM | 2017-07-18 | 2017-07-18 | DRAWINGNUMBER | 41174-01en | SHEET 1 |
| NAME | Reichardt | Erdmann | | | |
| STATUS: | | | TITLE | HWI2803L / Genius-, Sinius-, AnalogHWIx03L, MFPx03L | SHEETS 1 |

HARMS+WENDE

# Limit value chart x03W

## Load Limit Diagram




**Load curve represents the absolute limits. For reliable continuous operation, these limits should be exploited with a maximum of 85 %.**

### Technical data

| Designation | | HWI403W | HWI503W |
|---|---|---|---|
| Cooling medium | Water | | |
| Line voltage range | 3 ph, -15 %, +20 % | 400 / 440 V | |
| Line voltage range | 3 ph, -15 % +10 % | | 480 V |
| Output voltage | | 500 / 550 V | |
| Output voltage | | | 600 V |
| Rated output | 20 % ED[2] | 56 kVA | |
| Primary output current | 20 % ED[1] | 112 A | |
| Primary output current | 100 % ED[1] | 50 A | |
| Max. primay output current | [10 ms] | 250 A | |
| Main nominal current (max. thermal continuous current) [3] | | 35 A | |
| Cooling water requirements | 4 l/min | | |
| Cooling water pressure | max. 6 bar | | |
| Cooling water connection | G1/4" nipple with internal cone according to DIN EN 560 | | |
| Ambient temperature | +10 °C bis max. +45 °C | | |
| Relative humidity | 5 % – 85 % No condensation | | |
| Air pressure | 86 kPa – 106 kPa | | |

[1] Peak current is specified.

[2] The rated output at 500 V mains voltage is specified.

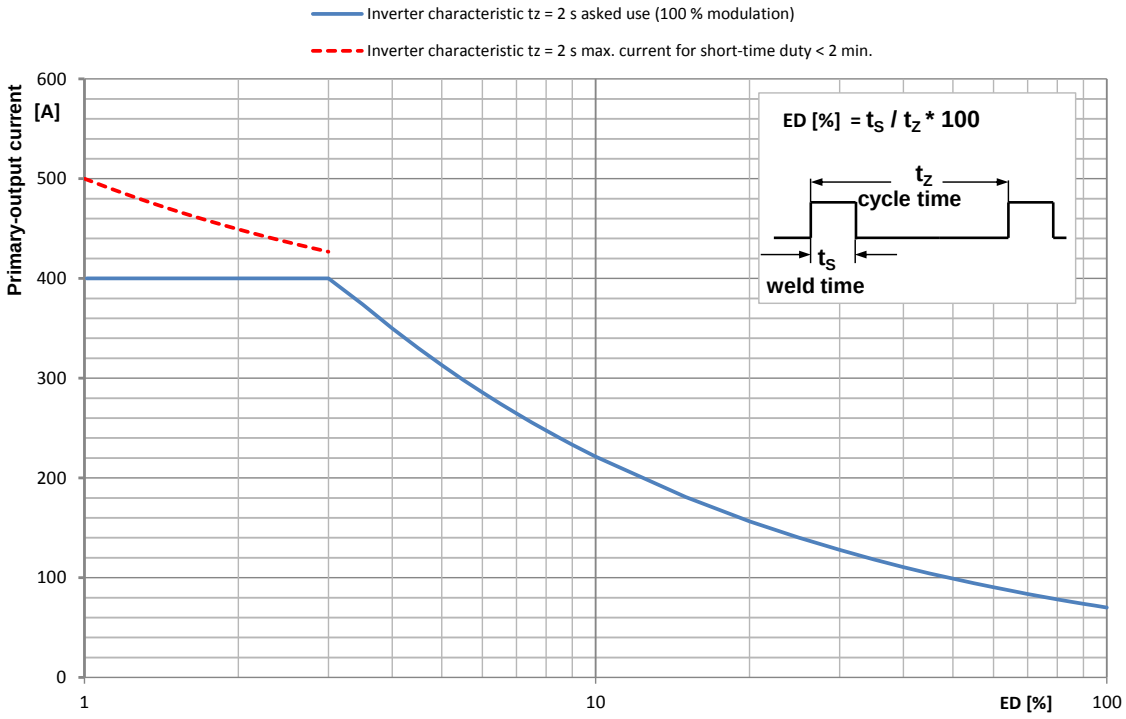
[3] Main nominal current for dimensioning the fuses is specified. The currents may also be lower / higher depending on application

| | GEZEICHNET | GEPRÜFT | | | |
|---|---|---|---|---|---|
| DATUM | 2017-07-11 | 2017-07-13 | DRAWINGNUMBER | 41175-01en | SHEET 1 |
| NAME | Reichardt | Erdmann | | | |
| STATUS: | | | TITLE | HWI2803W / Genius-, Sinius-, AnalogHWIx03W, MFPx03W | SHEETS 1 |

HARMS+WENDE

# Limit value chart x06L

## Load Limit Diagram




**Load curve represents the absolute limits. For reliable continuous operation, these limits should be exploited with a maximum of 85 %.**

### Technical data

| Designation | | HWI406L | HWI506L |
|---|---|---|---|
| Cooling medium | Air | | |
| Line voltage range | 3 ph, -15 %, +20 % | 400 / 440 V | |
| Line voltage range | 3 ph, -15 % +10 % | | 480 V |
| Output voltage | | 500 / 550 V | |
| Output voltage | | | 600 V |
| Rated output | 20 % ED[2)] | 79 kVA | |
| Primary output current | 20 % ED[1)] | 157 A | |
| Primary output current | 100 % ED[1)] | 70 A | |
| Max. primay output current | [10 ms] | 500 A | |
| Main nominal current (max. thermal continuous current) [3)] | | 49 A | |
| Cooling water requirements | | | |
| Cooling water pressure | | | |
| Cooling water connection | | | |
| Ambient temperature | +10 °C bis max. +45 °C | | |
| Relative humidity | 5 % – 85 % No condensation | | |
| Air pressure | 86 kPa – 106 kPa | | |

[1)] Peak current is specified.

[2)] The rated output at 500 V mains voltage is specified.

[3)] Main nominal current for dimensioning the fuses is specified. The currents may also be lower / higher depending on application

| | GEZEICHNET | GEPRÜFT | | | |
|---|---|---|---|---|---|
| DATUM | 2017-07-11 | 2017-07-13 | DRAWINGNUMBER | 41178-01en | SHEET 1 |
| NAME | Reichardt | Erdmann | | | |
| STATUS: | | | TITLE | HWI2806L / Genius-, Sinius-, AnalogHWIx06L, MFPx06L | SHEETS 1 |

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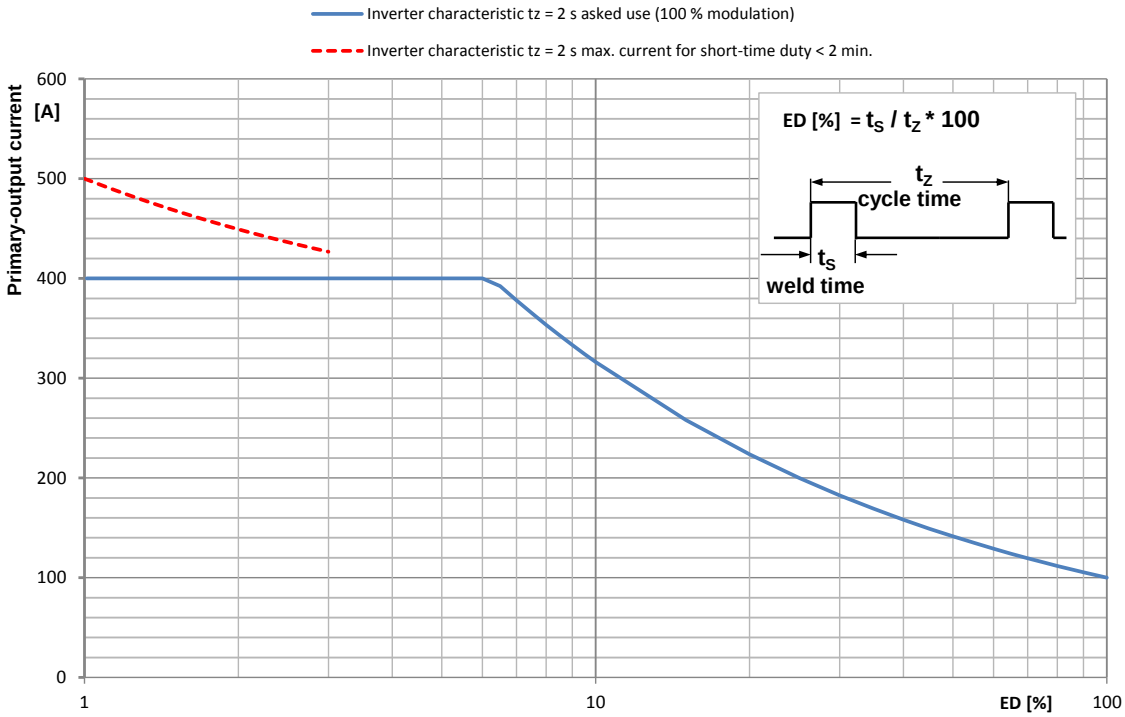
# *Limit value chart x06W*

## Load Limit Diagram




**Load curve represents the absolute limits. For reliable continuous operation, these limits should be exploited with a maximum of 85 %.**

### Technical data

| Designation | | HWI406W | HWI506W |
|---|---|---|---|
| Cooling medium | Water | | |
| Line voltage range | 3 ph, -15 %, +20 % | 400 / 440 V | |
| Line voltage range | 3 ph, -15 % +10 % | | 480 V |
| Output voltage | | 500 / 550 V | |
| Output voltage | | | 600 V |
| Rated output | 20 % ED[2] | 112 kVA | |
| Primary output current | 20 % ED[1] | 224 A | |
| Primary output current | 100 % ED[1] | 100 A | |
| Max. primay output current | [10 ms] | 500 A | |
| Main nominal current (max. thermal continuous current) [3] | | 71 A | |
| Cooling water requirements | 4 l/min | | |
| Cooling water pressure | max. 6 bar | | |
| Cooling water connection | G1/4" nipple with internal cone according to DIN EN 560 | | |
| Ambient temperature | +10 °C bis max. +45 °C | | |
| Relative humidity | 5 % – 85 % No condensation | | |
| Air pressure | 86 kPa – 106 kPa | | |

[1] Peak current is specified.

[2] The rated output at 500 V mains voltage is specified.

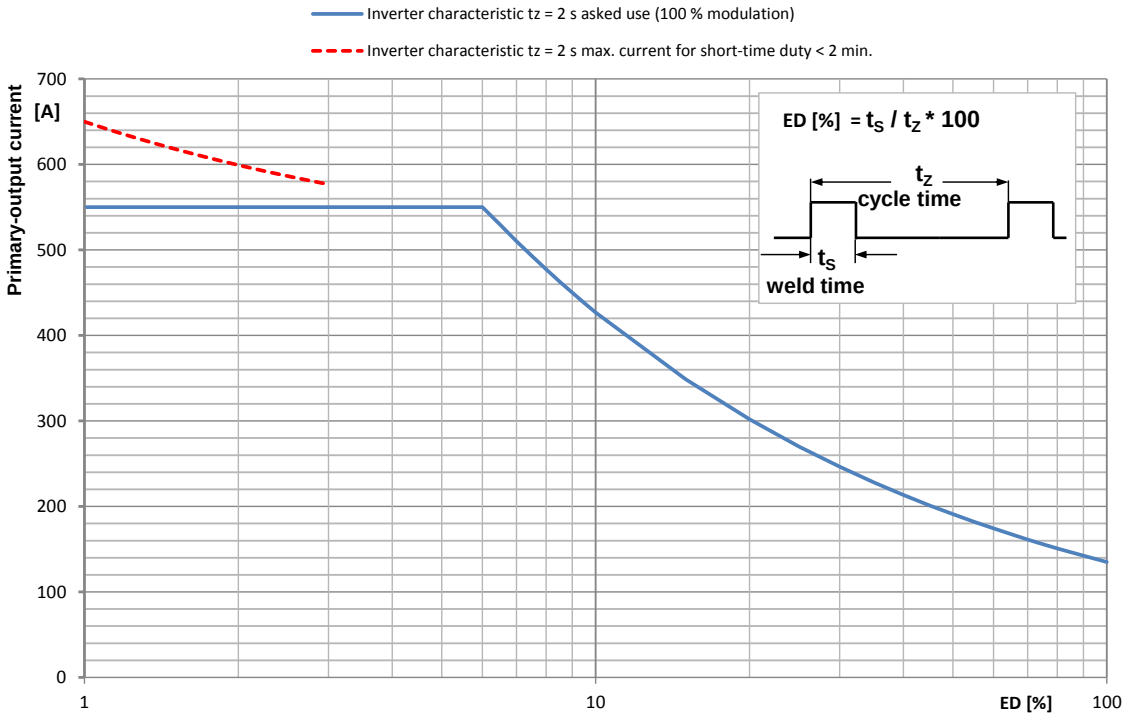
[3] Main nominal current for dimensioning the fuses is specified. The currents may also be lower / higher depending on application

| | GEZEICHNET | GEPRÜFT | | | |
|---|---|---|---|---|---|
| DATUM | 2017-07-11 | 2017-07-13 | DRAWINGNUMBER | 41179-01en | SHEET 1 |
| NAME | Reichardt | Erdmann | | | |
| STATUS: | | | TITLE | HWI2806W / Genius-, Sinius-, AnalogHWIx06W, MFPx06W | SHEETS 1 |

HARMS+WENDE

# Limit value chart x08L

## Load Limit Diagram




**Load curve represents the absolute limits. For reliable continuous operation, these limits should be exploited with a maximum of 85 %.**

### Technical data

| Designation | | HWI408L | HWI508L |
|---|---|---|---|
| Cooling medium | Air | | |
| Line voltage range | 3 ph, -15 %, +20 % | 400 / 440 V | |
| Line voltage range | 3 ph, -15 % +10 % | | 480 V |
| Output voltage | | 500 / 550 V | |
| Output voltage | | | 600 V |
| Rated output | 20 % ED[2] | 151 kVA | |
| Primary output current | 20 % ED[1] | 302 A | |
| Primary output current | 100 % ED[1] | 135 A | |
| Max. primay output current | [10 ms] | 650 A | |
| Main nominal current (max. thermal continuous current) [3] | | 95 A | |
| Cooling water requirements | | | |
| Cooling water pressure | | | |
| Cooling water connection | | | |
| Ambient temperature | +10 °C bis max. +45 °C | | |
| Relative humidity | 5 % – 85 % No condensation | | |
| Air pressure | 86 kPa – 106 kPa | | |

[1] Peak current is specified.

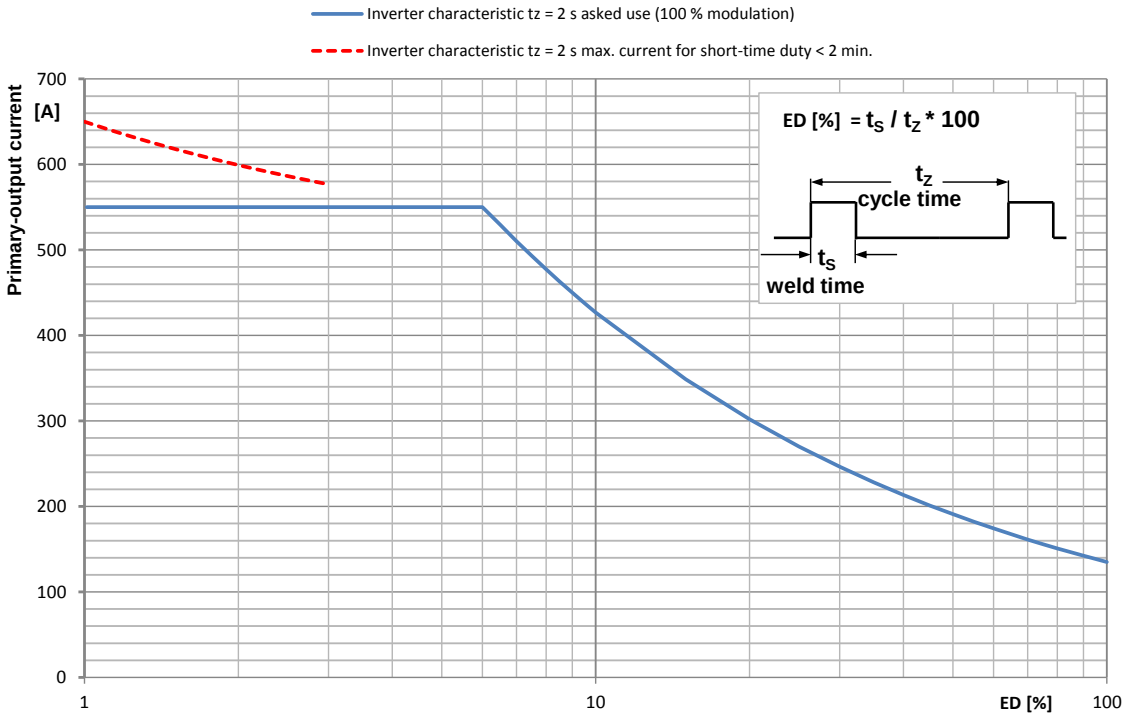
[2] The rated output at 500 V mains voltage is specified.

[3] Main nominal current for dimensioning the fuses is specified. The currents may also be lower / higher depending on application

| | GEZEICHNET | GEPRÜFT | | | |
|---|---|---|---|---|---|
| DATUM | 2017-07-11 | 2017-07-13 | DRAWINGNUMBER | 41180-01en | SHEET 1 |
| NAME | Reichardt | Erdmann | | | |
| STATUS: | | | TITLE | HWI2808L / Genius-, Sinius-, AnalogHWIx08L, MFPx08L | SHEETS 1 |

# *Limit value chart x08W*

## Load Limit Diagram




**Load curve represents the absolute limits. For reliable continuous operation, these limits should be exploited with a maximum of 85 %.**

### Technical data

| Designation | | HWI408W | HWI508W |
|---|---|---|---|
| Cooling medium | Water | | |
| Line voltage range | 3 ph, -15 %, +20 % | 400 / 440 V | |
| Line voltage range | 3 ph, -15 % +10 % | | 480 V |
| Output voltage | | 500 / 550 V | |
| Output voltage | | | 600 V |
| Rated output | 20 % ED[2)] | 151 kVA | |
| Primary output current | 20 % ED[1)] | 302 A | |
| Primary output current | 100 % ED[1)] | 135 A | |
| Max. primay output current | [10 ms] | 650 A | |
| Main nominal current (max. thermal continuous current) [3)] | | 95 A | |
| Cooling water requirements | 4 l/min | | |
| Cooling water pressure | max. 6 bar | | |
| Cooling water connection | G1/4" nipple with internal cone according to DIN EN 560 | | |
| Ambient temperature | +10 °C bis max. +45 °C | | |
| Relative humidity | 5 % – 85 % No condensation | | |
| Air pressure | 86 kPa – 106 kPa | | |

[1)] Peak current is specified.

[2)] The rated output at 500 V mains voltage is specified.

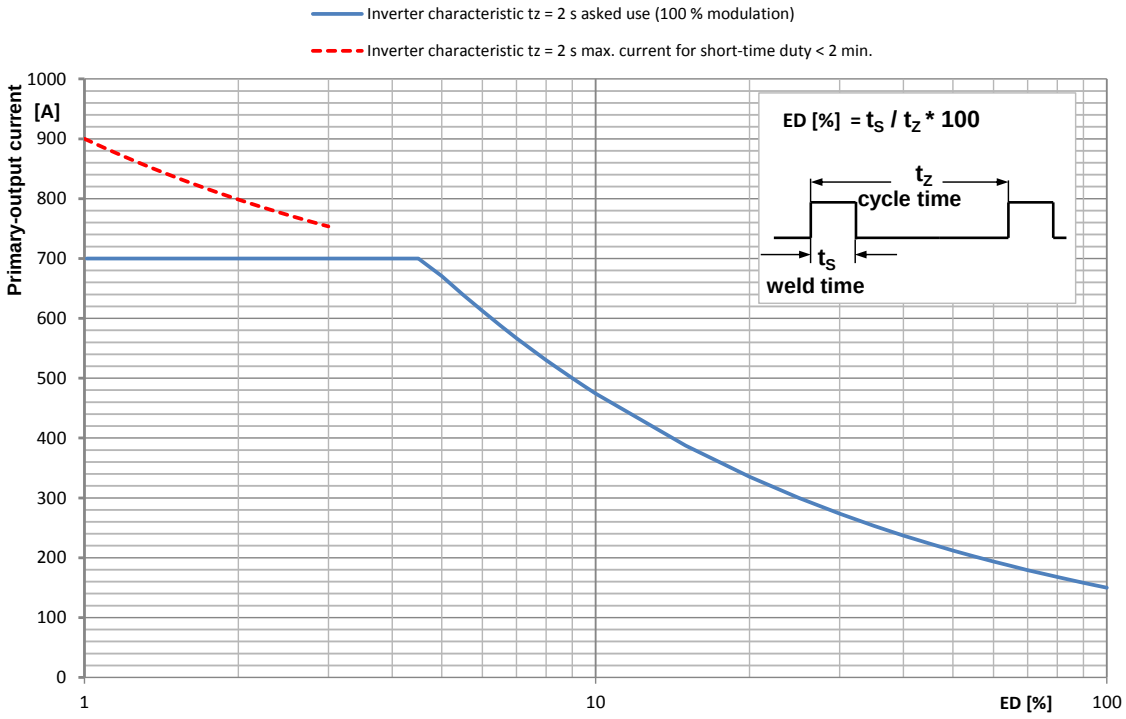
[3)] Main nominal current for dimensioning the fuses is specified. The currents may also be lower / higher depending on application

| | GEZEICHNET | GEPRÜFT | | | |
|---|---|---|---|---|---|
| DATUM | 2017-07-11 | 2017-07-13 | DRAWINGNUMBER | 41181-01en | SHEET 1 |
| NAME | Reichardt | Erdmann | | | |
| STATUS: | | | TITLE | HWI2808W / Genius-, Sinius-, AnalogHWIx08W, MFPx08W | SHEETS 1 |

HARMS+WENDE

# Limit value chart x13L

## Load Limit Diagram




**Load curve represents the absolute limits. For reliable continuous operation, these limits should be exploited with a maximum of 85 %.**

### Technical data

| Designation | | HWI413L | HWI513L |
|---|---|---|---|
| Cooling medium | Air | | |
| Line voltage range | 3 ph, -15 %, +20 % | 400 / 440 V | |
| Line voltage range | 3 ph, -15 % +10 % | | 480 V |
| Output voltage | | 500 / 550 V | |
| Output voltage | | | 600 V |
| Rated output | 20 % ED[2)] | 168 kVA | |
| Primary output current | 20 % ED[1)] | 335 A | |
| Primary output current | 100 % ED[1)] | 150 A | |
| Max. primay output current | [10 ms] | 900 A | |
| Main nominal current (max. thermal continuous current) [3)] | | 106 A | |
| Cooling water requirements | | | |
| Cooling water pressure | | | |
| Cooling water connection | | | |
| Ambient temperature | +10 °C bis max. +45 °C | | |
| Relative humidity | 5 % – 85 % No condensation | | |
| Air pressure | 86 kPa – 106 kPa | | |

[1)] Peak current is specified.

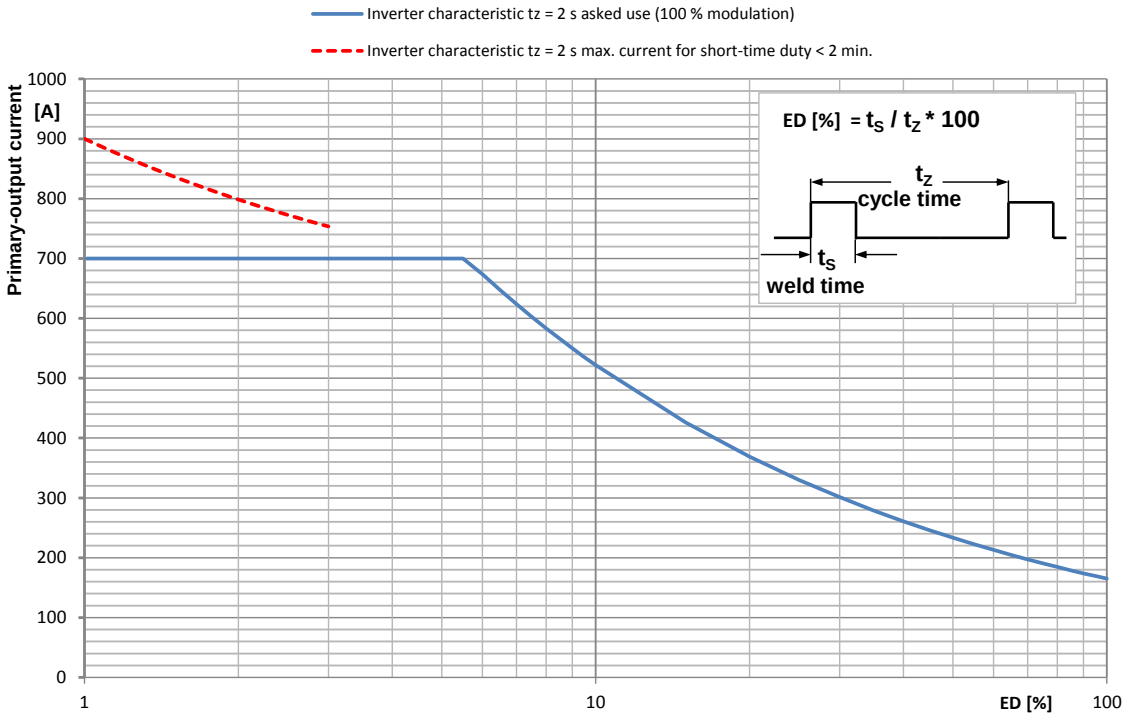
[2)] The rated output at 500 V mains voltage is specified.

[3)] Main nominal current for dimensioning the fuses is specified. The currents may also be lower / higher depending on application

| | GEZEICHNET | GEPRÜFT | | | |
|---|---|---|---|---|---|
| DATUM | 2017-07-11 | 2017-07-13 | DRAWINGNUMBER | 41182-01en | SHEET 1 |
| NAME | Reichardt | Erdmann | | | |
| STATUS: | | | TITLE | HWI2813L / Genius-, Sinius-, AnalogHWIx13L, MFPx13L | SHEETS 1 |

# Limit value chart x13W

## Load Limit Diagram




**Load curve represents the absolute limits. For reliable continuous operation, these limits should be exploited with a maximum of 85 %.**

### Technical data

| Designation | | HWI413W | HWI513W |
|---|---|---|---|
| Cooling medium | Water | | |
| Line voltage range | 3 ph, -15 %, +20 % | 400 / 440 V | |
| Line voltage range | 3 ph, -15 % +10 % | | 480 V |
| Output voltage | | 500 / 550 V | |
| Output voltage | | | 600 V |
| Rated output | 20 % ED[2] | 185 kVA | |
| Primary output current | 20 % ED[1] | 369 A | |
| Primary output current | 100 % ED[1] | 165 A | |
| Max. primay output current | [10 ms] | 900 A | |
| Main nominal current (max. thermal continuous current) [3] | | 117 A | |
| Cooling water requirements | 4 l/min | | |
| Cooling water pressure | max. 6 bar | | |
| Cooling water connection | G1/4" nipple with internal cone according to DIN EN 560 | | |
| Ambient temperature | +10 °C bis max. +45 °C | | |
| Relative humidity | 5 % – 85 % No condensation | | |
| Air pressure | 86 kPa – 106 kPa | | |

[1] Peak current is specified.

[2] The rated output at 500 V mains voltage is specified.

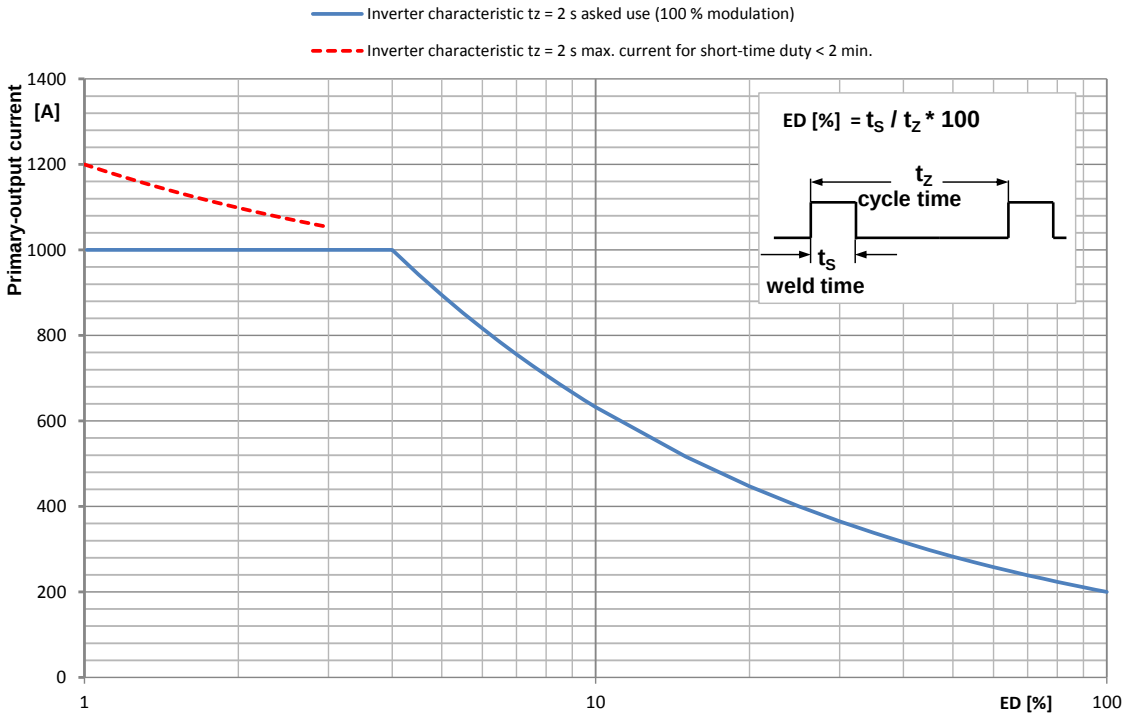
[3] Main nominal current for dimensioning the fuses is specified. The currents may also be lower / higher depending on application

| | GEZEICHNET | GEPRÜFT | | | |
|---|---|---|---|---|---|
| DATUM | 2017-07-11 | 2017-07-13 | DRAWINGNUMBER | 41183-01en | SHEET 1 |
| NAME | Reichardt | Erdmann | | | |
| STATUS: | | | TITLE | HWI2813W / Genius-, Sinius-, AnalogHWIx13W, MFPx13W | SHEETS 1 |

HARMS+WENDE

# Limit value chart x16L

## Load Limit Diagram




**Load curve represents the absolute limits. For reliable continuous operation, these limits should be exploited with a maximum of 85 %.**

### Technical data

| Designation | | HWI416L | HWI516L |
|---|---|---|---|
| Cooling medium | Air | | |
| Line voltage range | 3 ph, -15 %, +20 % | 400 / 440 V | |
| Line voltage range | 3 ph, -15 % +10 % | | 480 V |
| Output voltage | | 500 / 550 V | |
| Output voltage | | | 600 V |
| Rated output | 20 % ED[2)] | 224 kVA | |
| Primary output current | 20 % ED[1)] | 447 A | |
| Primary output current | 100 % ED[1)] | 200 A | |
| Max. primay output current | [10 ms] | 1200 A | |
| Main nominal current (max. thermal continuous current) [3)] | | 141 A | |
| Cooling water requirements | | | |
| Cooling water pressure | | | |
| Cooling water connection | | | |
| Ambient temperature | +10 °C bis max. +45 °C | | |
| Relative humidity | 5 % – 85 % No condensation | | |
| Air pressure | 86 kPa – 106 kPa | | |

[1)] Peak current is specified.

[2)] The rated output at 500 V mains voltage is specified.

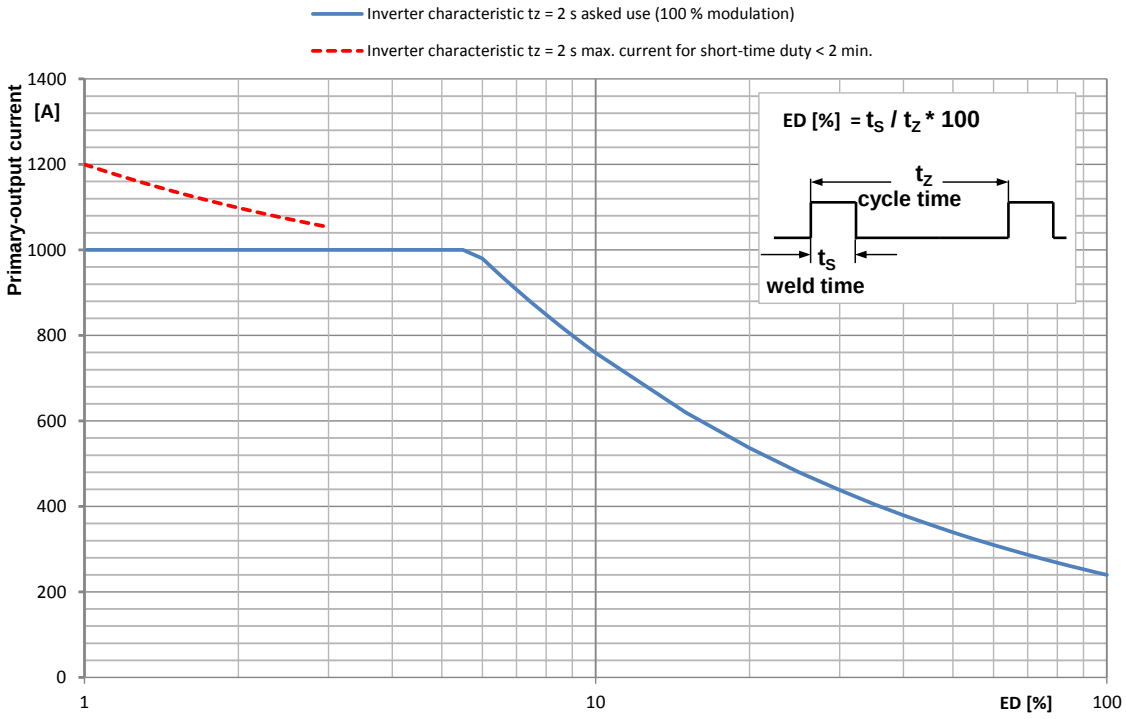
[3)] Main nominal current for dimensioning the fuses is specified. The currents may also be lower / higher depending on application

| | GEZEICHNET | GEPRÜFT | | | |
|---|---|---|---|---|---|
| DATUM | 2017-07-11 | 2017-07-13 | DRAWINGNUMBER | 41187-01en | SHEET 1 |
| NAME | Reichardt | Erdmann | | | |
| STATUS: | | | TITLE | HWI2816L / Genius-, Sinius-, Slave-, AnalogHWIx16L, MFPx16L | SHEETS 1 |

HARMS+WENDE

# Limit value chart x16W

## Load Limit Diagram




**Load curve represents the absolute limits. For reliable continuous operation, these limits should be exploited with a maximum of 85 %.**

### Technical data

| Designation | | HWI416W | HWI516W |
|---|---|---|---|
| Cooling medium | Water | | |
| Line voltage range | 3 ph, -15 %, +20 % | 400 / 440 V | |
| Line voltage range | 3 ph, -15 % +10 % | | 480 V |
| Output voltage | | 500 / 550 V | |
| Output voltage | | | 600 V |
| Rated output | 20 % ED[2] | 269 kVA | |
| Primary output current | 20 % ED[1] | 537 A | |
| Primary output current | 100 % ED[1] | 240 A | |
| Max. primay output current | [10 ms] | 1200 A | |
| Main nominal current (max. thermal continuous current) [3] | | 170 A | |
| Cooling water requirements | 4 l/min | | |
| Cooling water pressure | max. 6 bar | | |
| Cooling water connection | G1/4" nipple with internal cone according to DIN EN 560 | | |
| Ambient temperature | +10 °C bis max. +45 °C | | |
| Relative humidity | 5 % – 85 % No condensation | | |
| Air pressure | 86 kPa – 106 kPa | | |

[1] Peak current is specified.

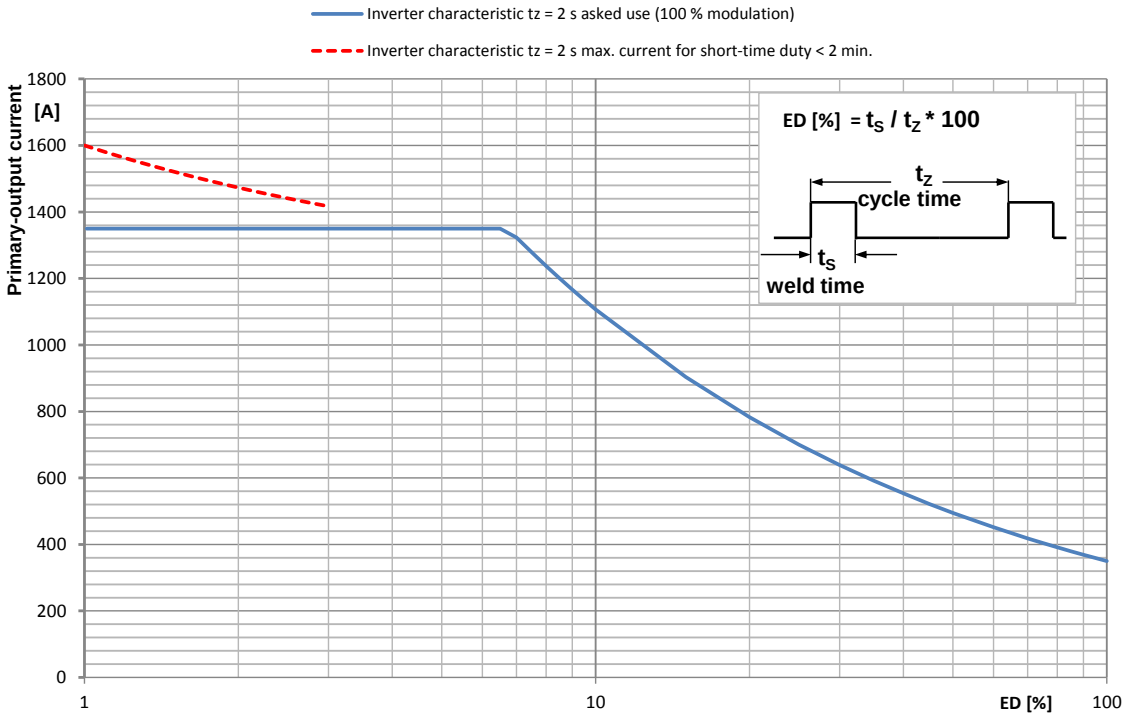
[2] The rated output at 500 V mains voltage is specified.

[3] Main nominal current for dimensioning the fuses is specified. The currents may also be lower / higher depending on application

| | GEZEICHNET | GEPRÜFT | | | |
|---|---|---|---|---|---|
| DATUM | 2017-07-11 | 2017-07-13 | DRAWINGNUMBER | 41188-01en | SHEET 1 |
| NAME | Reichardt | Erdmann | | | |
| STATUS: | | | TITLE | HWI2816W / Genius-, Sinius-, Slave-, AnalogHWIx16W, MFPx16W | SHEETS 1 |

# Limit value chart x24W

## Load Limit Diagram




**Load curve represents the absolute limits. For reliable continuous operation, these limits should be exploited with a maximum of 85 %.**

### Technical data

| Designation | | HWI424W | HWI524W |
|---|---|---|---|
| Cooling medium | Water | | |
| Line voltage range | 3 ph, -15 %, +20 % | 400 / 440 V | |
| Line voltage range | 3 ph, -15 % +10 % | | 480 V |
| Output voltage | | 500 / 550 V | |
| Output voltage | | | 600 V |
| Rated output | 20 % ED[2] | 392 kVA | |
| Primary output current | 20 % ED[1] | 783 A | |
| Primary output current | 100 % ED[1] | 350 A | |
| Max. primay output current | [10 ms] | 1600 A | |
| Main nominal current (max. thermal continuous current) [3] | | 247 A | |
| Cooling water requirements | 4 l/min | | |
| Cooling water pressure | max. 6 bar | | |
| Cooling water connection | G1/4" nipple with internal cone according to DIN EN 560 | | |
| Ambient temperature | +10 °C bis max. +45 °C | | |
| Relative humidity | 5 % – 85 % No condensation | | |
| Air pressure | 86 kPa – 106 kPa | | |

[1] Peak current is specified.

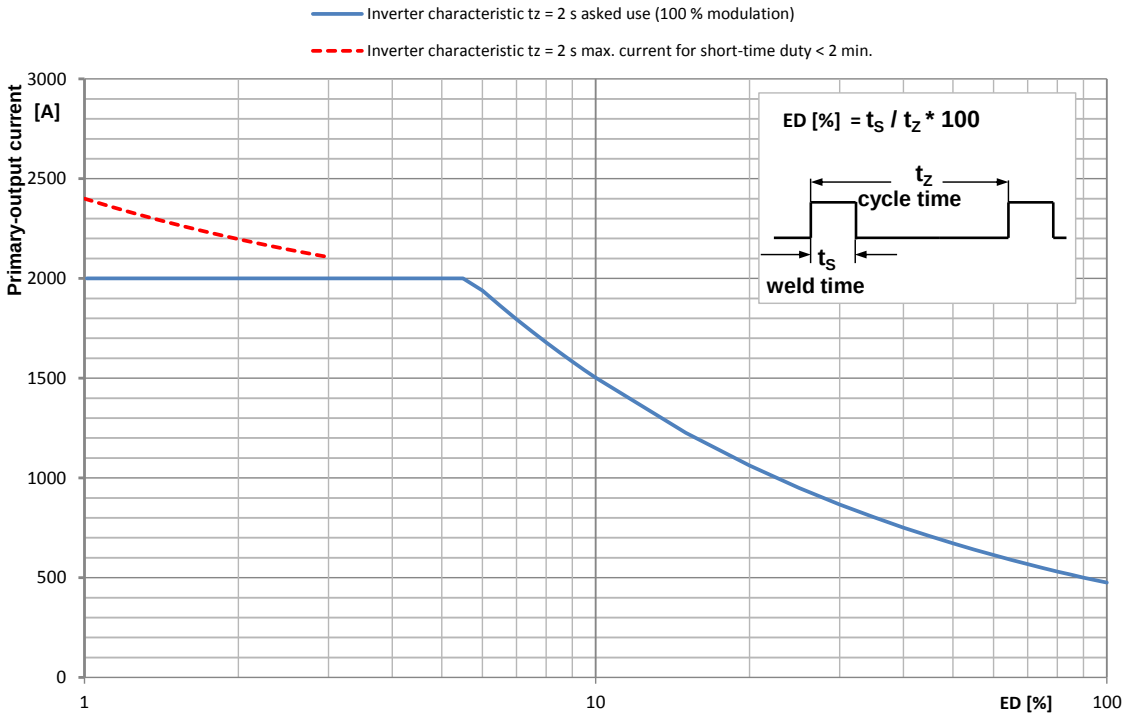
[2] The rated output at 500 V mains voltage is specified.

[3] Main nominal current for dimensioning the fuses is specified. The currents may also be lower / higher depending on application

| | | GEZEICHNET | GEPRÜFT | | | |
|---|---|---|---|---|---|---|
| HARMS WENDE | DATUM | 2017-07-11 | 2017-07-13 | DRAWINGNUMBER | 41190-01en | SHEET 1 |
| | NAME | Reichardt | Erdmann | | | |
| | STATUS: | | | TITLE | HWI2824W, Genius-, Sinius-, Slave-, AnalogHWIx24W, MFPx24W | SHEETS 1 |

# *Limit value chart x36W*

## Load Limit Diagram




**Load curve represents the absolute limits. For reliable continuous operation, these limits should be exploited with a maximum of 85 %.**

### Technical data

| Designation | | HWI436W | HWI536W |
|---|---|---|---|
| Cooling medium | Water | | |
| Line voltage range | 3 ph, -15 %, +20 % | 400 / 440 V | |
| Line voltage range | 3 ph, -15 % +10 % | | 480 V |
| Output voltage | | 500 / 550 V | |
| Output voltage | | | 600 V |
| Rated output | 20 % ED[2] | 531 kVA | |
| Primary output current | 20 % ED[1] | 1062 A | |
| Primary output current | 100 % ED[1] | 475 A | |
| Max. primay output current | [10 ms] | 2400 A | |
| Main nominal current (max. thermal continuous current) [3] | | 336 A | |
| Cooling water requirements | 4 l/min | | |
| Cooling water pressure | max. 6 bar | | |
| Cooling water connection | G1/4" nipple with internal cone according to DIN EN 560 | | |
| Ambient temperature | +10 °C bis max. +45 °C | | |
| Relative humidity | 5 % – 85 % No condensation | | |
| Air pressure | 86 kPa – 106 kPa | | |

[1] Peak current is specified.

[2] The rated output at 500 V mains voltage is specified.

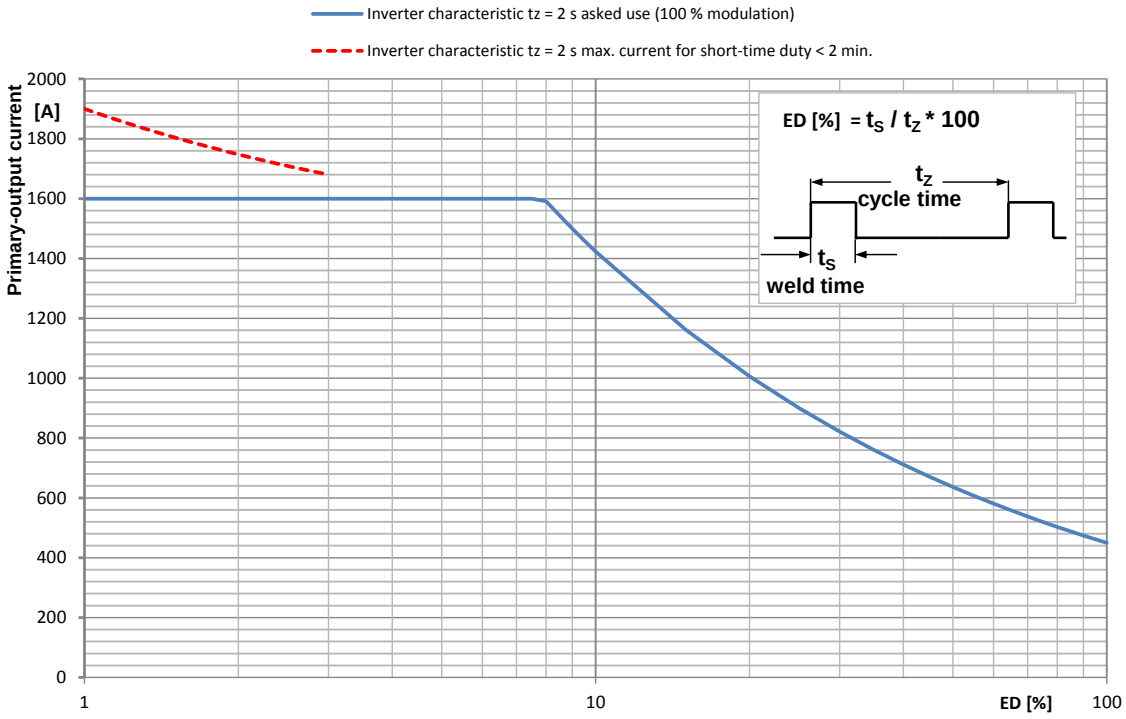
[3] Main nominal current for dimensioning the fuses is specified. The currents may also be lower / higher depending on application

| | GEZEICHNET | GEPRÜFT | | | |
|---|---|---|---|---|---|
| DATUM | 2017-07-11 | 2017-07-13 | DRAWINGNUMBER | 41192-01en | SHEET 1 |
| NAME | Reichardt | Erdmann | | | |
| STATUS: | | | TITLE | HWI2836W, Genius-, Sinius-, Slave-, AnalogHWIx36W, MFPx36W | SHEETS 1 |

HARMS+WENDE

# Limit value chart 2x24W

## Load Limit Diagram




**Load curve represents the absolute limits. For reliable continuous operation, these limits should be exploited with a maximum of 85 %.**

### Technical data

| Designation | | HWI2424W | HWI2524W |
|---|---|---|---|
| Cooling medium | Water | | |
| Line voltage range | 3 ph, -15 %, +20 % | 400 / 440 V | |
| Line voltage range | 3 ph, -15 % +10 % | | 480 V |
| Output voltage | | 500 / 550 V | |
| Output voltage | | | 600 V |
| Rated output | 20 % ED[2] | 503 kVA | |
| Primary output current | 20 % ED[1] | 1006 A | |
| Primary output current | 100 % ED[1] | 450 A | |
| Max. primay output current | [10 ms] | 1900 A | |
| Main nominal current (max. thermal continuous current) [3] | | 318 A | |
| Cooling water requirements | 4 l/min | | |
| Cooling water pressure | max. 6 bar | | |
| Cooling water connection | G1/4" nipple with internal cone according to DIN EN 560 | | |
| Ambient temperature | +10 °C bis max. +45 °C | | |
| Relative humidity | 5 % – 85 % No condensation | | |
| Air pressure | 86 kPa – 106 kPa | | |

[1] Peak current is specified.

[2] The rated output at 500 V mains voltage is specified.

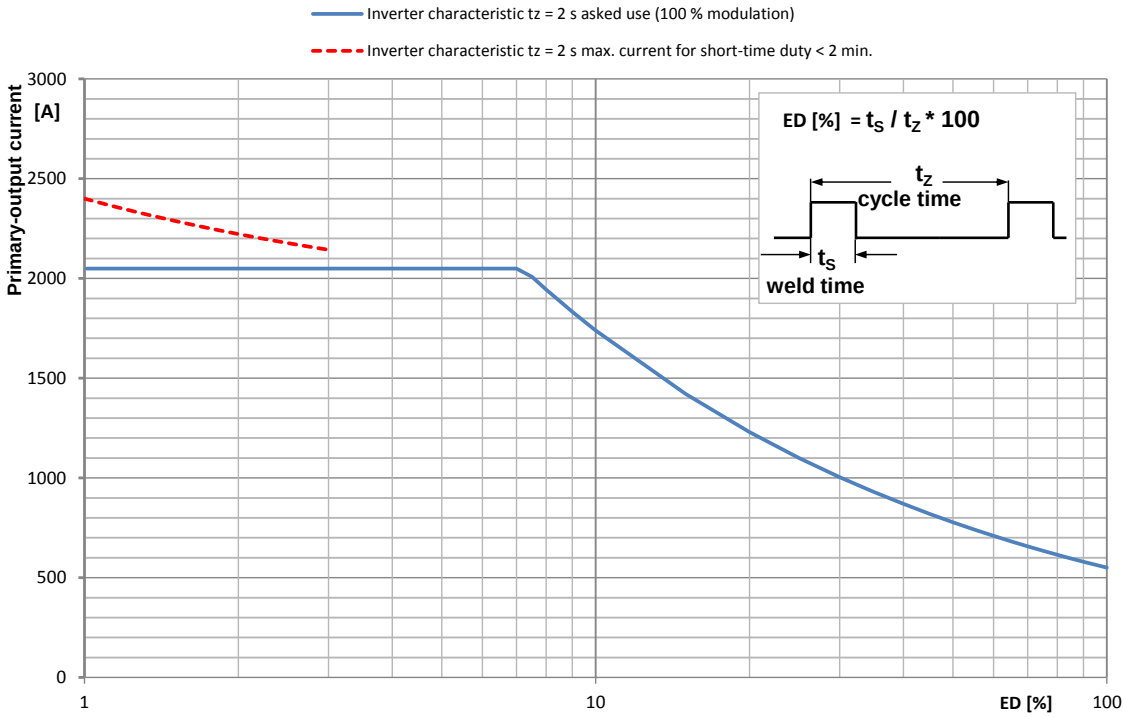
[3] Main nominal current for dimensioning the fuses is specified. The currents may also be lower / higher depending on application

| | GEZEICHNET | GEPRÜFT | | | |
|---|---|---|---|---|---|
| DATUM | 2017-07-11 | 2017-07-13 | DRAWINGNUMBER | 41193-01en | SHEET 1 |
| NAME | Reichardt | Erdmann | | | |
| STATUS: | | | TITLE | HWI2424W, Sinius-, Slave-, AnalogHWI2x24W | SHEETS 1 |

HARMS+WENDE

# Limit value chart 2x32W

## Load Limit Diagram




**Load curve represents the absolute limits. For reliable continuous operation, these limits should be exploited with a maximum of 85 %.**

### Technical data

| Designation | | HWI2432W | HWI2532W |
|---|---|---|---|
| Cooling medium | Water | | |
| Line voltage range | 3 ph, -15 %, +20 % | 400 / 440 V | |
| Line voltage range | 3 ph, -15 % +10 % | | 480 V |
| Output voltage | | 500 / 550 V | |
| Output voltage | | | 600 V |
| Rated output | 20 % ED[2)] | 615 kVA | |
| Primary output current | 20 % ED[1)] | 1230 A | |
| Primary output current | 100 % ED[1)] | 550 A | |
| Max. primay output current | [10 ms] | 2400 A | |
| Main nominal current (max. thermal continuous current) [3)] | | 389 A | |
| Cooling water requirements | 4 l/min | | |
| Cooling water pressure | max. 6 bar | | |
| Cooling water connection | G1/4" nipple with internal cone according to DIN EN 560 | | |
| Ambient temperature | +10 °C bis max. +45 °C | | |
| Relative humidity | 5 % – 85 % No condensation | | |
| Air pressure | 86 kPa – 106 kPa | | |

[1)] Peak current is specified.

[2)] The rated output at 500 V mains voltage is specified.

[3)] Main nominal current for dimensioning the fuses is specified. The currents may also be lower / higher depending on application

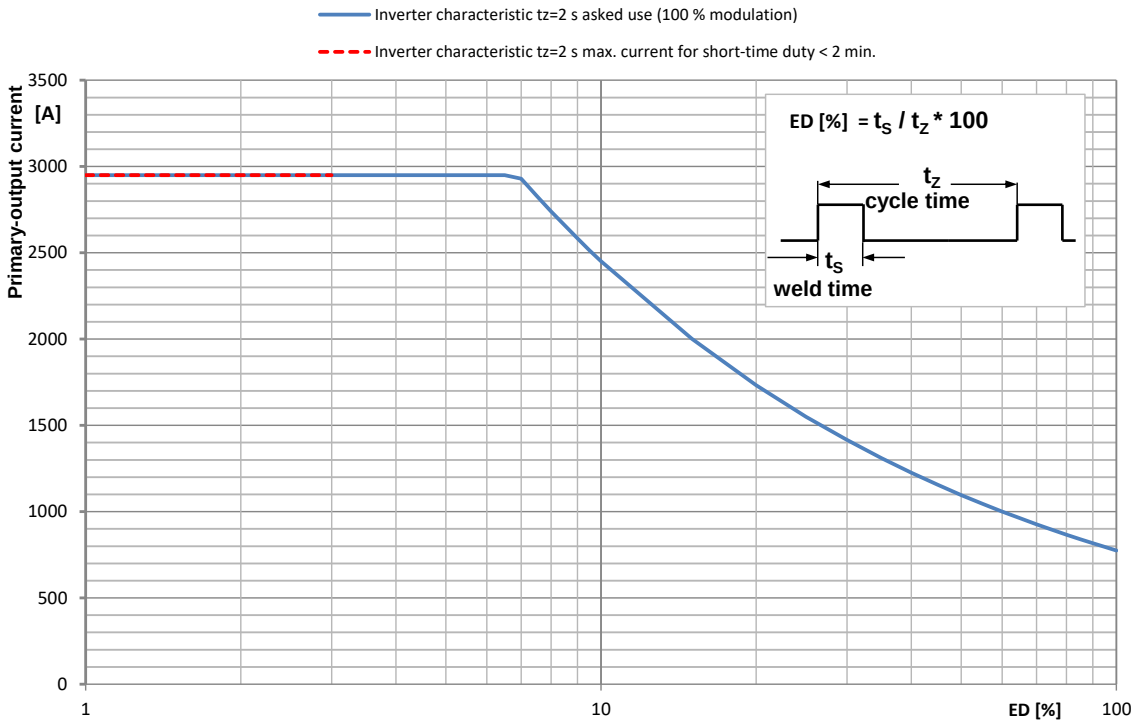
| | GEZEICHNET | GEPRÜFT | | | |
|---|---|---|---|---|---|
| DATUM | 2017-07-11 | 2017-07-13 | DRAWINGNUMBER | 41194-01en | SHEET 1 |
| NAME | Reichardt | Erdmann | | | |
| STATUS: | | | TITLE | HWI2432W, Sinius-, Slave-, AnalogHWI2x32W | SHEETS 1 |

HARMS+WENDE

# Limit value chart 3x40W



## Load Limit Diagram




**Load curve represents the absolute limits. For reliable continuous operation, these limits should be exploited with a maximum of 85 %.**

### Technical data

| Designation | | HWI3440W | HWI3540W |
|---|---|---|---|
| Cooling medium | Water | | |
| Line voltage range | 3 ph, -15 %, +20 % | 400 / 440 V | |
| Line voltage range | 3 ph, -15 % +10 % | | 480 V |
| Output voltage | | 500 / 550 V | |
| Output voltage | | | 600 V |
| Rated output | 20 % ED[2] | 867 kVA | |
| Primary output current | 20 % ED[1] | 1733 A | |
| Primary output current | 100 % ED[1] | 775 A | |
| Max. primay output current | [10 ms] | 2950 A | |
| Main nominal current (max. thermal continuous current) [3] | | 548 A | |
| Cooling water requirements | 6 l/min | | |
| Cooling water pressure | max. 6 bar | | |
| Cooling water connection | G1/4" nipple with internal cone according to DIN EN 560 | | |
| Ambient temperature | +10 °C bis max. +45 °C | | |
| Relative humidity | 5 % – 85 % No condensation | | |
| Air pressure | 86 kPa – 106 kPa | | |

[1] Peak current is specified.

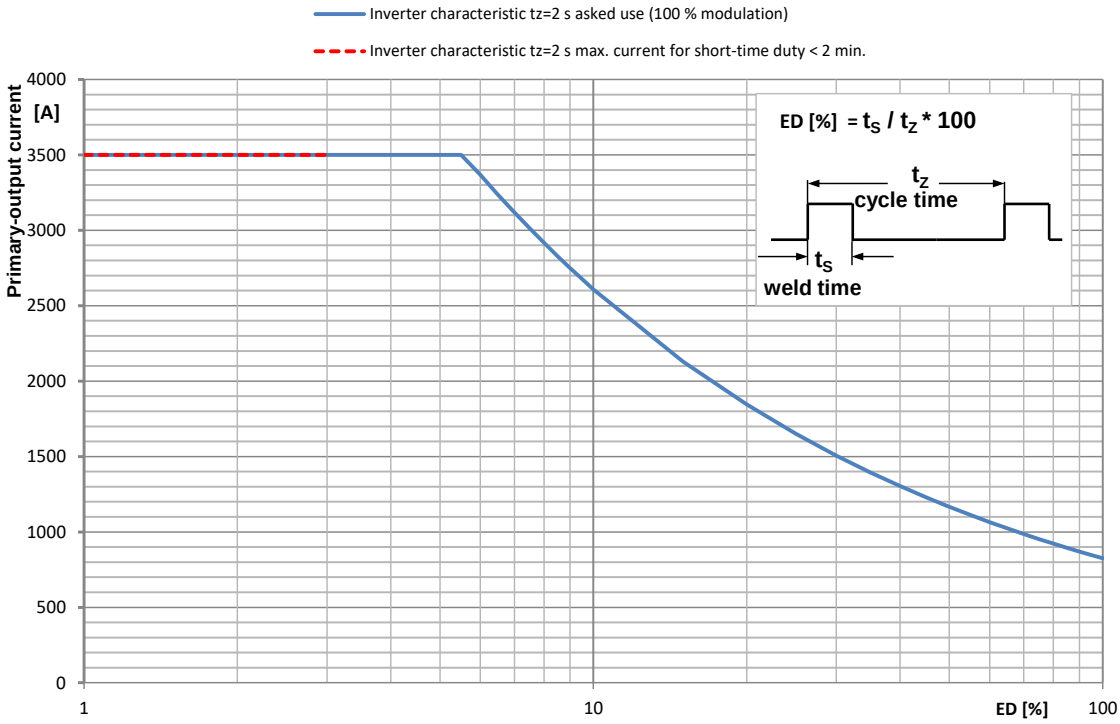
[2] The rated output at 500 V mains voltage is specified.

[3] Main nominal current for dimensioning the fuses is specified. The currents may also be lower / higher depending on application

| | | GEZEICHNET | GEPRÜFT | | | |
|---|---|---|---|---|---|---|
| HWH HARMS+WENDE | DATUM | 2019-10-23 | 2019-10-23 | DRAWINGNUMBER | 41195-02en | SHEET 1 |
| | NAME | Reichardt | Hoops | | | |
| | STATUS: | | | TITLE | HWI2540W, Genius-, Sinius-, Slave-, AnalogHWI3x40W | SHEETS 1 |

# Limit value chart 3x45W

## Load Limit Diagram




**Load curve represents the absolute limits. For reliable continuous operation, these limits should be exploited with a maximum of 85 %.**

### Technical data

| Designation | | HWI3445W | HWI3545W |
|---|---|---|---|
| Cooling medium | Water | | |
| Line voltage range | 3 ph, -15 %, +20 % | 400 / 440 V | |
| Line voltage range | 3 ph, -15 % +10 % | | 480 V |
| Output voltage | | 500 / 550 V | |
| Output voltage | | | 600 V |
| Rated output | 20 % ED[2)] | 923 kVA | |
| Primary output current | 20 % ED[1)] | 1845 A | |
| Primary output current | 100 % ED[1)] | 825 A | |
| Max. primay output current | [10 ms] | 3500 A | |
| Main nominal current (max. thermal continuous current) [3)] | | 583 A | |
| Cooling water requirements | 6 l/min | | |
| Cooling water pressure | max. 6 bar | | |
| Cooling water connection | G1/4" nipple with internal cone according to DIN EN 560 | | |
| Ambient temperature | +10 °C bis max. +45 °C | | |
| Relative humidity | 5 % – 85 % No condensation | | |
| Air pressure | 86 kPa – 106 kPa | | |

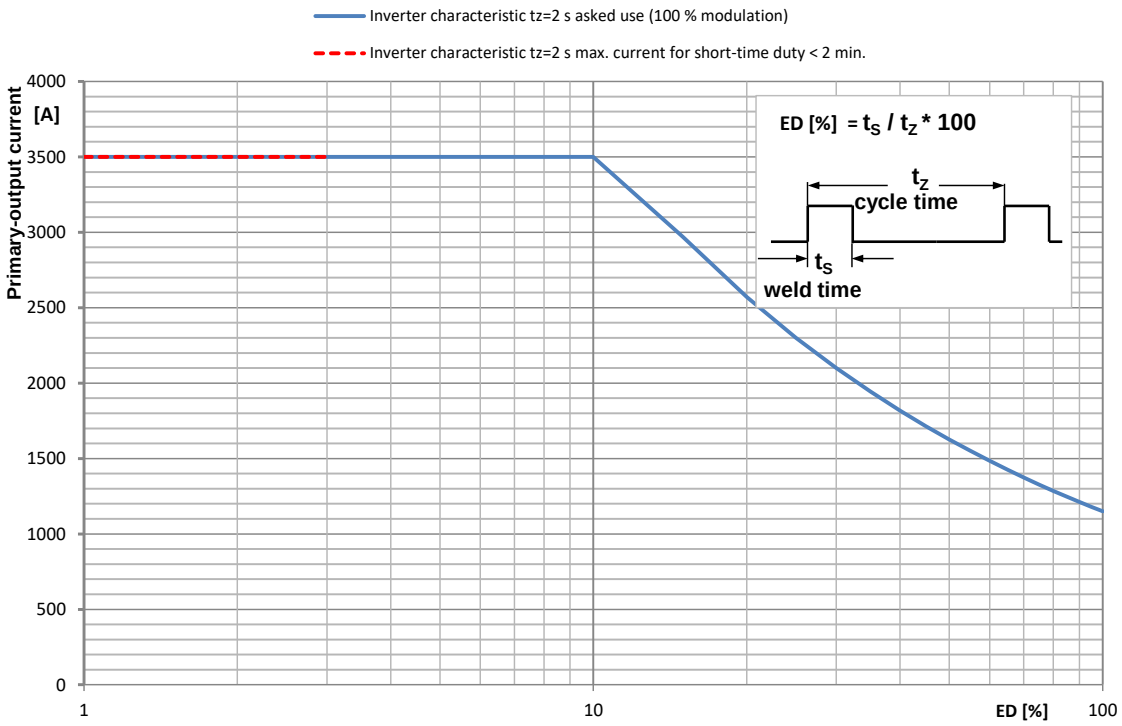
[1)] Peak current is specified.
[2)] The rated output at 500 V mains voltage is specified.
[3)] Main nominal current for dimensioning the fuses is specified. The currents may also be lower / higher depending on application

| | GEZEICHNET | GEPRÜFT | | | |
|---|---|---|---|---|---|
| DATUM | 2019-10-24 | 2019-10-24 | DRAWINGNUMBER | 41196-02en | SHEET 1 |
| NAME | Reichardt | Hoops | | | |
| | | | TITLE | HWI2545W,Genius-, Sinius-, Slave-, AnalogHWI3x45W | SHEETS 1 |
| STATUS: | | | | | |

HARMS WENDE

# Limit value chart 3x60W

## Load Limit Diagram




**Load curve represents the absolute limits. For reliable continuous operation, these limits should be exploited with a maximum of 85 %.**

### Technical data

| Designation | | HWI3460W | HWI3560W |
|---|---|---|---|
| Cooling medium | Water | | |
| Line voltage range | 3 ph, -15 %, +20 % | 400 / 440 V | |
| Line voltage range | 3 ph, -15 % +10 % | | 480 V |
| Output voltage | | 500 / 550 V | |
| Output voltage | | | 600 V |
| Rated output | 20 % ED[2)] | 1286 kVA | |
| Primary output current | 20 % ED[1)] | 2571 A | |
| Primary output current | 100 % ED[1)] | 1150 A | |
| Max. primay output current | [10 ms] | 3500 A | |
| Main nominal current (max. thermal continuous current) [3)] | | 813 A | |
| Cooling water requirements | 8 l/min | | |
| Cooling water pressure | max. 6 bar | | |
| Cooling water connection | G1/4" nipple with internal cone according to DIN EN 560 | | |
| Ambient temperature | +10 °C bis max. +45 °C | | |
| Relative humidity | 5 % – 85 % No condensation | | |
| Air pressure | 86 kPa – 106 kPa | | |

[1)] Peak current is specified.

[2)] The rated output at 500 V mains voltage is specified.

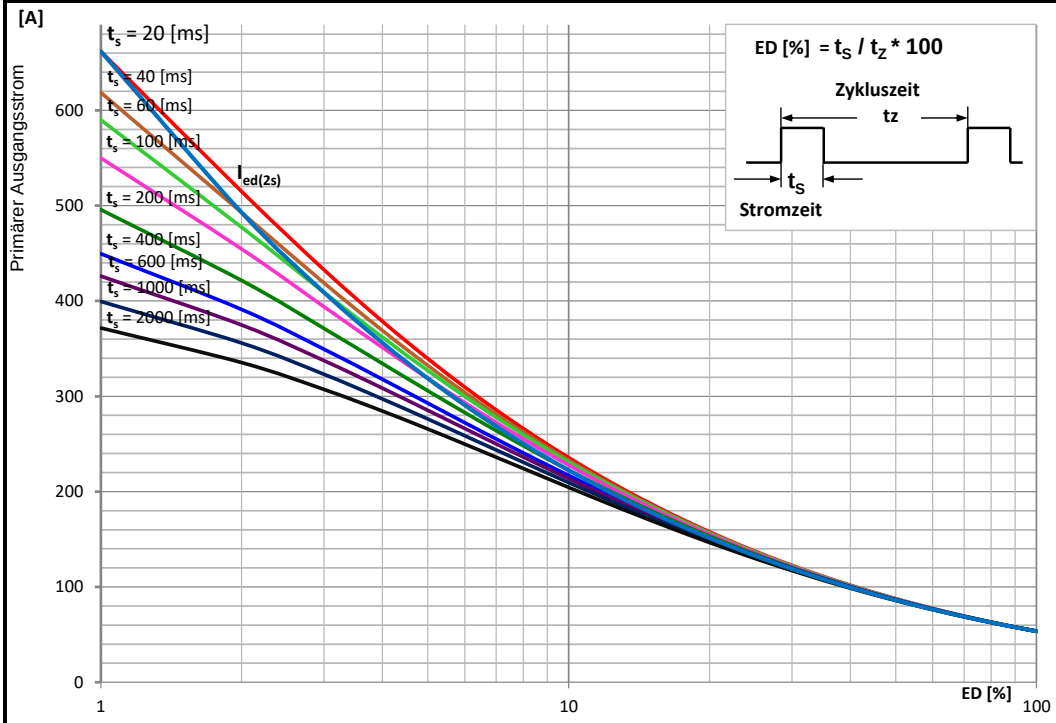
[3)] Main nominal current for dimensioning the fuses is specified. The currents may also be lower / higher depending on application

| | GEZEICHNET | GEPRÜFT | | | |
|---|---|---|---|---|---|
| DATUM | 2019-10-24 | 2019-10-24 | DRAWINGNUMBER | 41197-02en | SHEET 1 |
| NAME | Reichardt | Hoops | | | |
| | | | TITLE | HWI2560W,Genius-, Sinius-, Slave-, AnalogHWI3x60W | SHEETS 1 |
| STATUS: | | | | | |

# *Limit value chart LE-L45A*



| | Grenzwertdiagramm | 45A |
|---|---|---|




**Belastungskurve stellt den absoluten Grenzwert dar. Für zuverlässigen Dauerbetrieb sollten diese Grenzwerte mit höchstens 85% ausgenutzt werden.**

## Technische Daten

| Leistungsklasse | LE | 45A / 400V | 45A / 500V |
|---|---|---|---|
| Kühlmedium | | Luft | |
| Nennspannung | 1 ph, -20 %, +10 % | 400V | 500V |
| Netzfrequenz | 50 / 60 Hz | | |
| | | | |
| Primärer Ausgangsstrom | 100 % ED | 53,58 A | |
| Max. primärer Ausgangsstrom | 20 ms / 1% ED[1)] | 661,9 A | |
| Max. primärer Ausgangsstrom | 60 ms / 5% ED[1)] | 327 A | |
| Netz-Nennstrom (max. thermischer Dauerstrom) | [2)] | 53,58 A | |
| Kühlwasseranschluss | G1/4" Nippel mit Innenkegel nach DIN EN 560 | | |
| Kühlwasserbedarf | | | |
| Kühlwasserdruck | max. 6 bar | | |
| Kühlwassertemperatur | +25 °C | | |
| Umgebungstemperatur | +45 °C | | |
| Relative Luftfeuchtigkeit | 5 % – 85 % keine Betauung | | |
| Luftdruck | 86 kPa – 106 kPa | | |

[1)] angegeben ist Spitzenstrom.

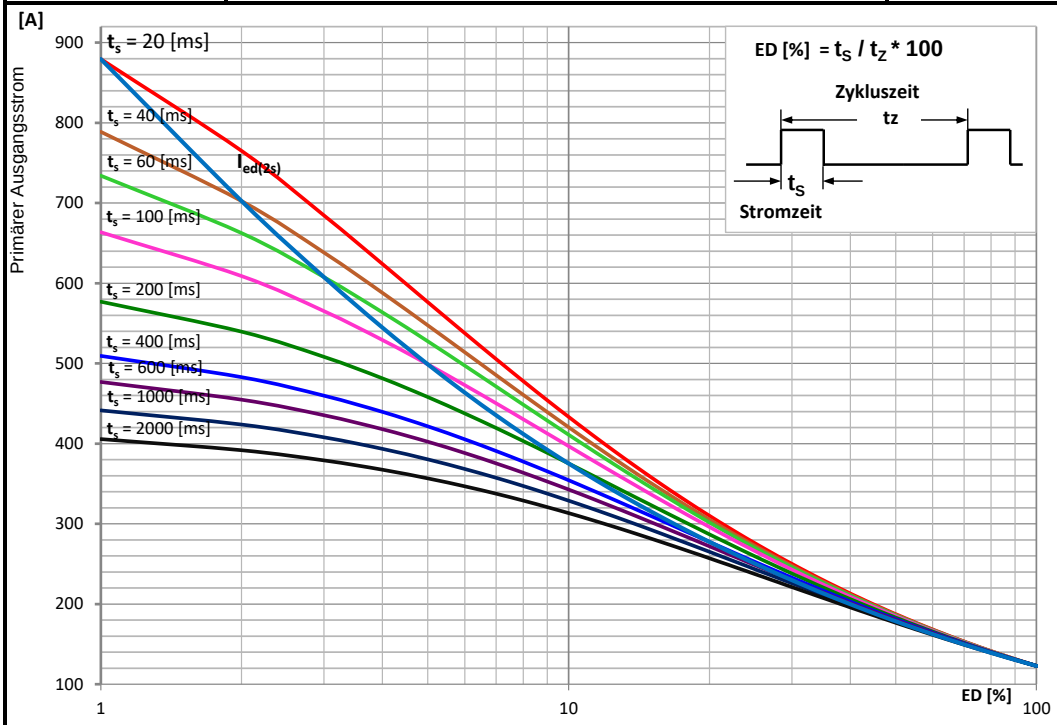
[2)] Angegeben ist der max. thermischer Dauerstrom zur Auslegung der Sicherung. Die Ströme können abhängig von der Anwendung auch niedriger/höher sein.

| | | GEZEICHNET | GEPRÜFT | | | |
|---|---|---|---|---|---|---|
| HWH HARMS+WENDE | DATUM | 2019-02-15 | 2019-02-15 | ZEICHNUNGSNUMMER | 46951-00de | BLATT 1 |
| | NAME | Reichardt | Gercke | | | |
| | STATUS: | | | BENENNUNG | LE100-, LE200-L45A | BLÄTTER 1 |

# Limit value chart LE-125A



## Grenzwertdiagramm — 125A




**Belastungskurve stellt den absoluten Grenzwert dar. Für zuverlässigen Dauerbetrieb sollten diese Grenzwerte mit höchstens 85% ausgenutzt werden.**

### Technische Daten

| Leistungsklasse | LE | 125A / 400V | 125A / 500V |
|---|---|---|---|
| Kühlmedium | | Wasser | |
| Nennspannung | 1 ph, -20 %, +10 % | 400V | 500V |
| Netzfrequenz | 50 / 60 Hz | | |
| | | | |
| Primärer Ausgangsstrom | 100 % ED | 122,9 A | |
| Max. primärer Ausgangsstrom | 20 ms / 1% ED[1)] | 879,5 A | |
| Max. primärer Ausgangsstrom | 60 ms / 5% ED[1)] | 528 A | |
| Netz-Nennstrom (max. thermischer Dauerstrom) | [2)] | 122,9 A | |
| Kühlwasseranschluss | G1/4" Nippel mit Innenkegel nach DIN EN 560 | | |
| Kühlwasserbedarf | 4 l/min | | |
| Kühlwasserdruck | max. 6 bar | | |
| Kühlwassertemperatur | +25 °C | | |
| Umgebungstemperatur | +45 °C | | |
| Relative Luftfeuchtigkeit | 5 % – 85 % keine Betauung | | |
| Luftdruck | 86 kPa – 106 kPa | | |

[1)] angegeben ist Spitzenstrom.

[2)] Angegeben ist der max. thermischer Dauerstrom zur Auslegung der Sicherung. Die Ströme können abhängig von der Anwendung auch niedriger/höher sein.

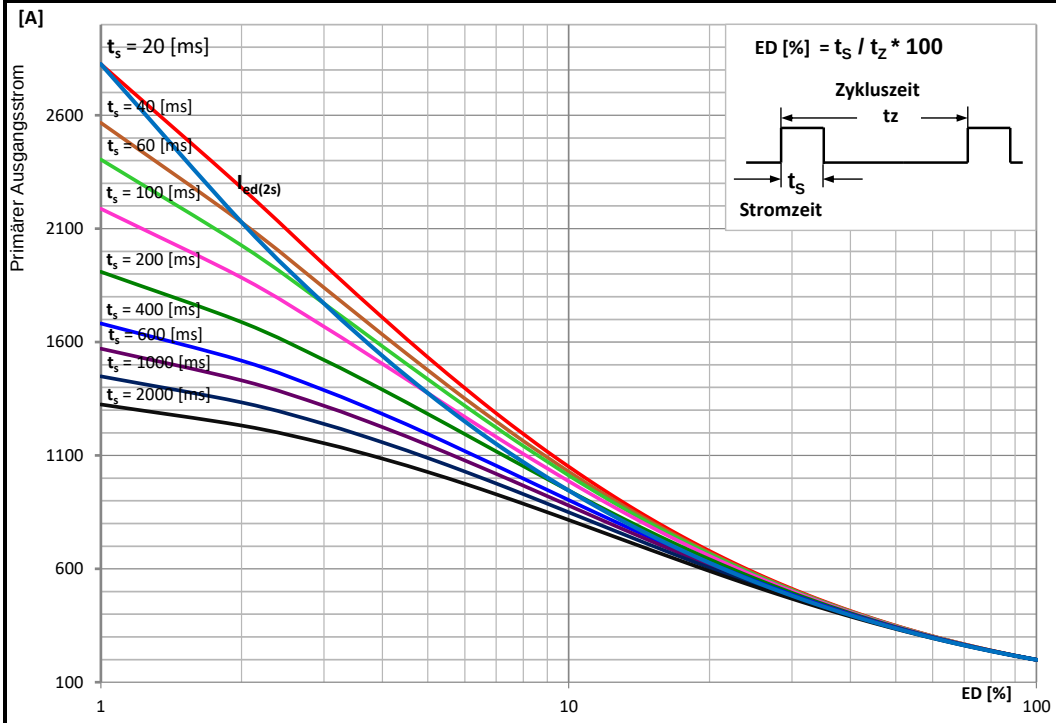
| | GEZEICHNET | GEPRÜFT | | | |
|---|---|---|---|---|---|
| DATUM | 2018-08-24 | 2018-08-24 | ZEICHNUNGSNUMMER | 46952-00de | BLATT 1 |
| NAME | Reichardt | Gercke | | | |
| | | | BENENNUNG | LE100-, LE200-SiniusACI1-0125A-W | BLÄTTER 1 |
| STATUS: | | | | | |

HARMS WENDE

# *Limit value chart LE-L200A*



| | Grenzwertdiagramm | 200A |
|---|---|---|




**Belastungskurve stellt den absoluten Grenzwert dar. Für zuverlässigen Dauerbetrieb sollten diese Grenzwerte mit höchstens 85% ausgenutzt werden.**

## Technische Daten

| Leistungsklasse | LE | 200A / 400V | 200A / 500V |
|---|---|---|---|
| Kühlmedium | | Wasser | |
| Nennspannung | 1 ph, -20 %, +10 % | 400V | 500V |
| Netzfrequenz | 50 / 60 Hz | | |
| | | | |
| Primärer Ausgangsstrom | 100 % ED | 199,3 A | |
| Max. primärer Ausgangsstrom | 20 ms / 1% ED[1)] | 2826 A | |
| Max. primärer Ausgangsstrom | 60 ms / 5% ED[1)] | 1436 A | |
| Netz-Nennstrom (max. thermischer Dauerstrom) | [2)] | 199,3 A | |
| Kühlwasseranschluss | G1/4" Nippel mit Innenkegel nach DIN EN 560 | | |
| Kühlwasserbedarf | 4 l/min | | |
| Kühlwasserdruck | max. 6 bar | | |
| Kühlwassertemperatur | +25 °C | | |
| Umgebungstemperatur | +45 °C | | |
| Relative Luftfeuchtigkeit | 5 % – 85 % keine Betauung | | |
| Luftdruck | 86 kPa – 106 kPa | | |

[1)] angegeben ist Spitzenstrom.

[2)] Angegeben ist der max. thermischer Dauerstrom zur Auslegung der Sicherung. Die Ströme können abhängig von der Anwendung auch niedriger/höher sein.

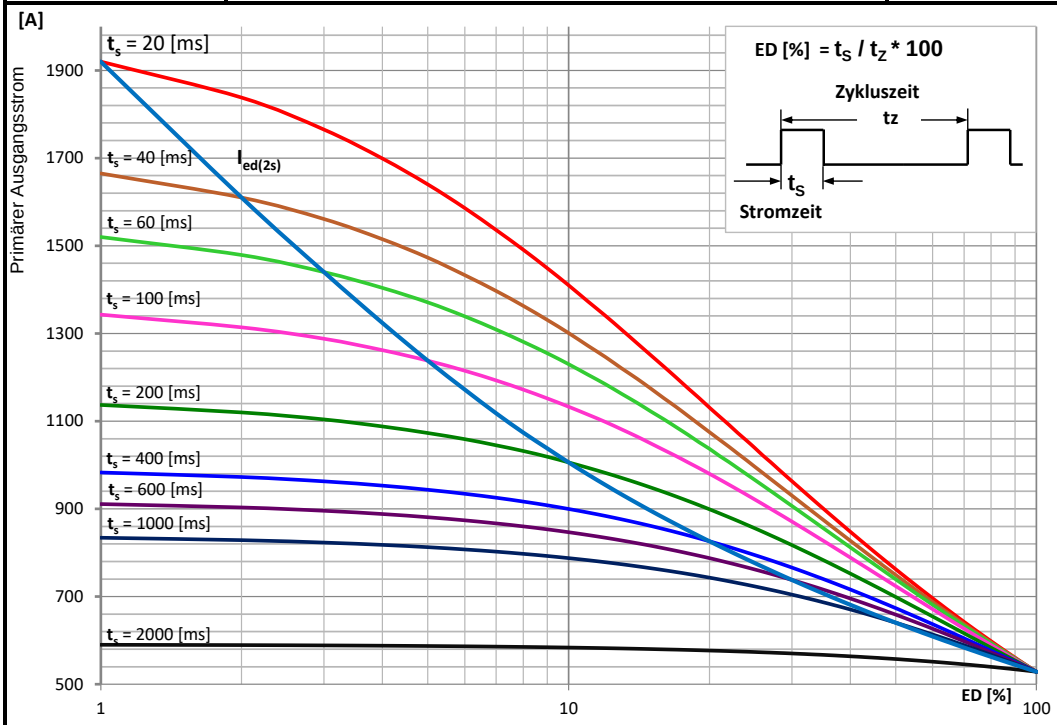
| | GEZEICHNET | GEPRÜFT | | | |
|---|---|---|---|---|---|
| DATUM | 2018-08-24 | 2018-08-24 | ZEICHNUNGSNUMMER | 46953-00de | BLATT 1 |
| NAME | Reichardt | Gercke | | | |
| | | | BENENNUNG | LE100-, LE200-L200A | BLÄTTER 1 |
| STATUS: | | | | | |

HWH HARMS+WENDE

# Limit value chart LE-580A



| | Grenzwertdiagramm | 580A |
|---|---|---|




**Belastungskurve stellt den absoluten Grenzwert dar. Für zuverlässigen Dauerbetrieb sollten diese Grenzwerte mit höchstens 85% ausgenutzt werden.**

## Technische Daten

| Leistungsklasse | LE | 580A / 400V | 580A / 500V |
|---|---|---|---|
| Kühlmedium | | Wasser | |
| Nennspannung | 1 ph, -20 %, +10 % | 400V | 500V |
| Netzfrequenz | 50 / 60 Hz | | |
| | | | |
| Primärer Ausgangsstrom | 100 % ED | 528,6 A | |
| Max. primärer Ausgangsstrom | 20 ms / 1% ED[1)] | 1920 A | |
| Max. primärer Ausgangsstrom | 60 ms / 5% ED[1)] | 1371 A | |
| Netz-Nennstrom (max. thermischer Dauerstrom) | [2)] | 528,6 A | |
| Kühlwasseranschluss | G1/4" Nippel mit Innenkegel nach DIN EN 560 | | |
| Kühlwasserbedarf | 4 l/min | | |
| Kühlwasserdruck | max. 6 bar | | |
| Kühlwassertemperatur | +25 °C | | |
| Umgebungstemperatur | +45 °C | | |
| Relative Luftfeuchtigkeit | 5 % – 85 % keine Betauung | | |
| Luftdruck | 86 kPa – 106 kPa | | |

[1)] angegeben ist Spitzenstrom.

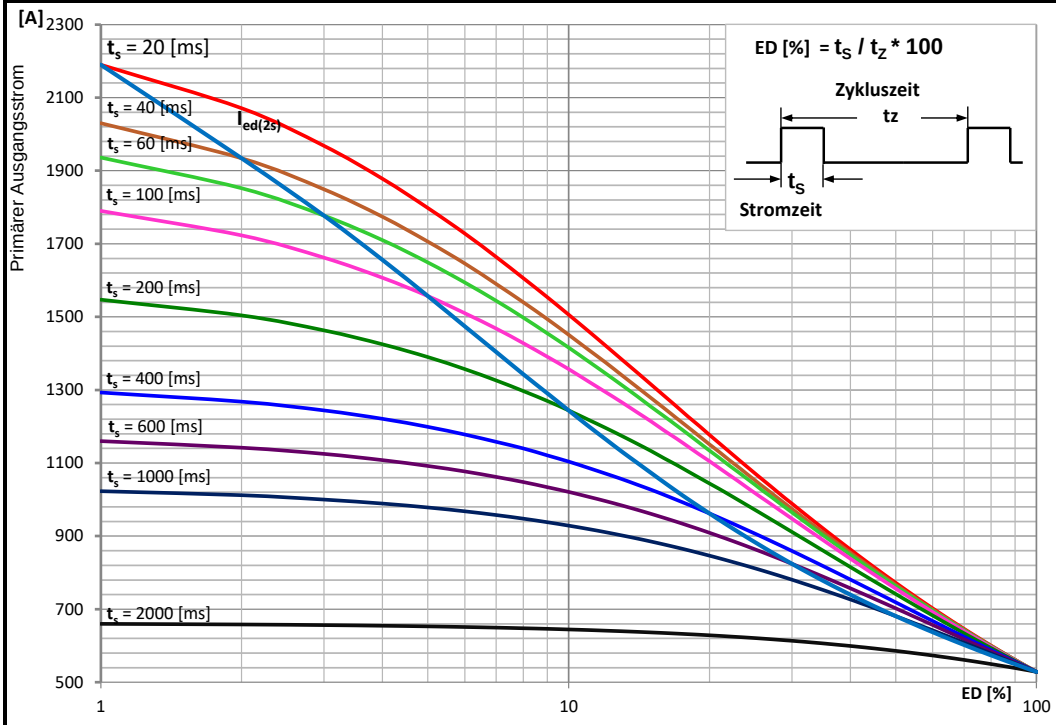
[2)] Angegeben ist der max. thermischer Dauerstrom zur Auslegung der Sicherung. Die Ströme können abhängig von der Anwendung auch niedriger/höher sein.

| | | GEZEICHNET | GEPRÜFT | | | |
|---|---|---|---|---|---|---|
| HARMS WENDE | DATUM | 2019-02-14 | 2019-02-14 | ZEICHNUNGSNUMMER | 46954-00de | BLATT 1 |
| | NAME | Reichardt | Erdmann | | | |
| | | | | BENENNUNG | LE100-, LE200-, LE28-580A | BLÄTTER 1 |
| | STATUS: | | | | | |

# *Limit value chart LE-1135A*



| | Grenzwertdiagramm | 1135A |
|---|---|---|




**Belastungskurve stellt den absoluten Grenzwert dar. Für zuverlässigen Dauerbetrieb sollten diese Grenzwerte mit höchstens 85% ausgenutzt werden.**

## Technische Daten

| Leistungsklasse | LE | 1135A / 400V | 1135A / 500V |
|---|---|---|---|
| Kühlmedium | | Wasser | |
| Nennspannung | 1 ph, -20 %, +10 % | 400V | 500V |
| Netzfrequenz | 50 / 60 Hz | | |
| | | | |
| Primärer Ausgangsstrom | 100 % ED | 528,6 A | |
| Max. primärer Ausgangsstrom | 20 ms / 1% ED[1)] | 2190 A | |
| Max. primärer Ausgangsstrom | 60 ms / 5% ED[1)] | 1649 A | |
| Netz-Nennstrom (max. thermischer Dauerstrom) | [2)] | 528,6 A | |
| Kühlwasseranschluss | G1/4" Nippel mit Innenkegel nach DIN EN 560 | | |
| Kühlwasserbedarf | 4 l/min | | |
| Kühlwasserdruck | max. 6 bar | | |
| Kühlwassertemperatur | +25 °C | | |
| Umgebungstemperatur | +45 °C | | |
| Relative Luftfeuchtigkeit | 5 % – 85 % keine Betauung | | |
| Luftdruck | 86 kPa – 106 kPa | | |

[1)] angegeben ist Spitzenstrom.

[2)] Angegeben ist der max. thermischer Dauerstrom zur Auslegung der Sicherung. Die Ströme können abhängig von der Anwendung auch niedriger/höher sein.

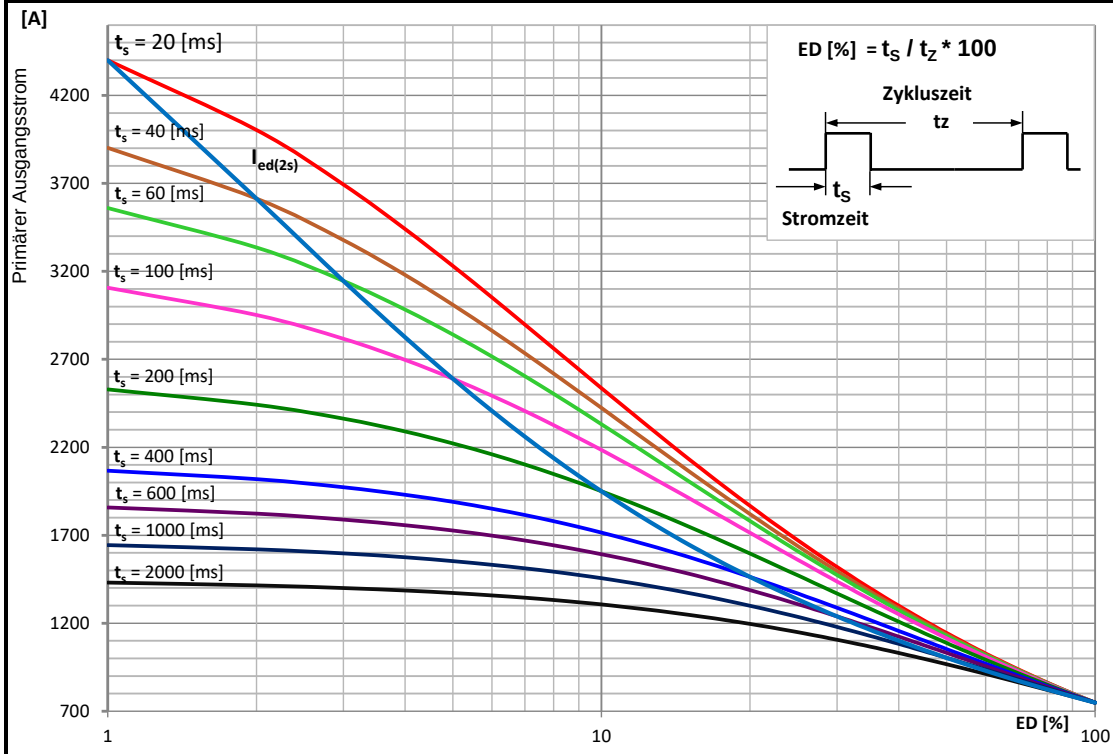
| | GEZEICHNET | GEPRÜFT | | | |
|---|---|---|---|---|---|
| DATUM | 2018-08-24 | 2018-08-24 | ZEICHNUNGSNUMMER | 46955-00de | BLATT 1 |
| NAME | Reichardt | Gercke | | | |
| STATUS: | | | BENENNUNG | LE100-, LE200-, SiniusACI1-1135A | BLÄTTER 1 |

HARMS+WENDE

# Limit value chart LE-700A



| | Grenzwertdiagramm | 700A |
|---|---|---|




**Belastungskurve stellt den absoluten Grenzwert dar. Für zuverlässigen Dauerbetrieb sollten diese Grenzwerte mit höchstens 85% ausgenutzt werden.**

## Technische Daten

| Leistungsklasse | LE | 700A / 400V | 700A / 500V |
|---|---|---|---|
| Kühlmedium | | Wasser | |
| Nennspannung | 1 ph, -20 %, +10 % | 400V | 500V |
| Netzfrequenz | 50 / 60 Hz | | |
| | | | |
| Primärer Ausgangsstrom | 100 % ED | 748,6 A | |
| Max. primärer Ausgangsstrom | 20 ms / 1% ED[1)] | 4400 A | |
| Max. primärer Ausgangsstrom | 60 ms / 5% ED[1)] | 2841 A | |
| Netz-Nennstrom (max. thermischer Dauerstrom) | [2)] | 748,6 A | |
| Kühlwasseranschluss | G1/4" Nippel mit Innenkegel nach DIN EN 560 | | |
| Kühlwasserbedarf | 4 l/min | | |
| Kühlwasserdruck | max. 6 bar | | |
| Kühlwassertemperatur | +25 °C | | |
| Umgebungstemperatur | +45 °C | | |
| Relative Luftfeuchtigkeit | 5 % – 85 % keine Betauung | | |
| Luftdruck | 86 kPa – 106 kPa | | |

[1)] angegeben ist Spitzenstrom.

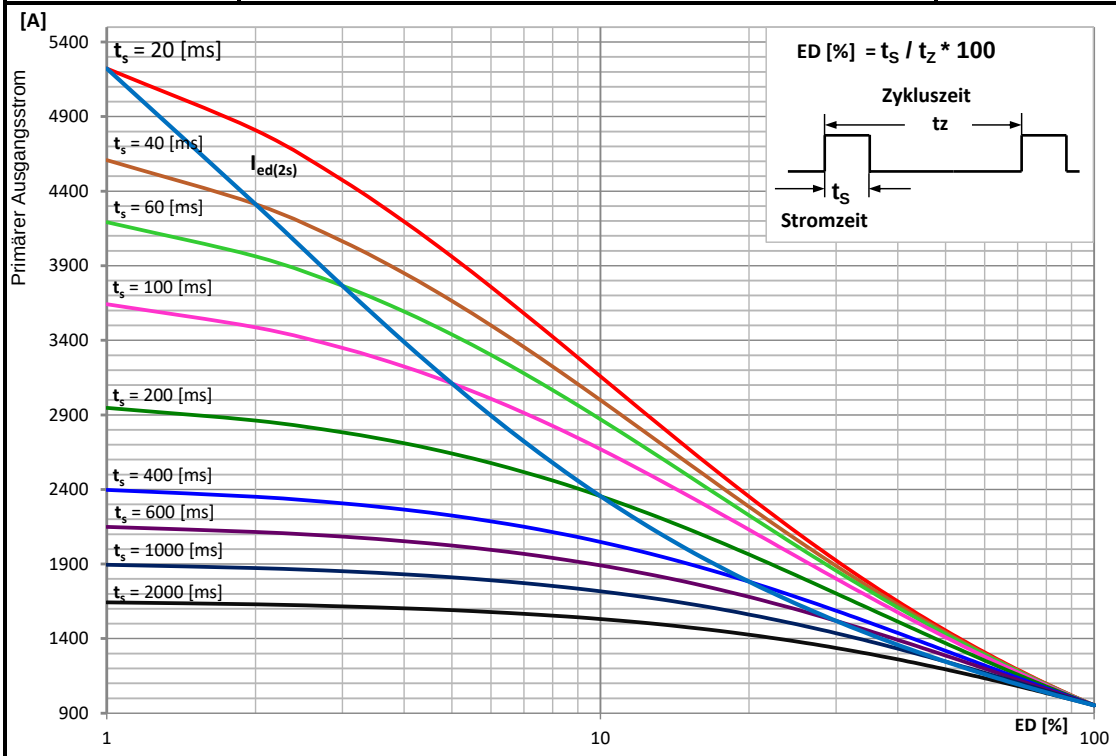
[2)] Angegeben ist der max. thermischer Dauerstrom zur Auslegung der Sicherung. Die Ströme können abhängig von der Anwendung auch niedriger/höher sein.

| | GEZEICHNET | GEPRÜFT | | | |
|---|---|---|---|---|---|
| DATUM | 2018-08-24 | 2018-08-24 | ZEICHNUNGSNUMMER | 46909-00de | BLATT 1 |
| NAME | Reichardt | Gercke | | | |
| | | | BENENNUNG | LE6-, LE7-, LE10-, LE11, LE19-, LE20-, LE5000-0700A | BLÄTTER 1 |
| STATUS: | | | | | |

# *Limit value chart LE-900A*



| | Grenzwertdiagramm | 900A |
|---|---|---|




**Belastungskurve stellt den absoluten Grenzwert dar. Für zuverlässigen Dauerbetrieb sollten diese Grenzwerte mit höchstens 85% ausgenutzt werden.**

## Technische Daten

| Leistungsklasse | LE | 900A / 400V | 900A / 500V |
|---|---|---|---|
| Kühlmedium | | Wasser | |
| Nennspannung | 1 ph, -20 %, +10 % | 400V | 500V |
| Netzfrequenz | 50 / 60 Hz | | |
| | | | |
| Primärer Ausgangsstrom | 100 % ED | 952,8 A | |
| Max. primärer Ausgangsstrom | 20 ms / 1% ED[1)] | 5222 A | |
| Max. primärer Ausgangsstrom | 60 ms / 5% ED[1)] | 3439 A | |
| Netz-Nennstrom (max. thermischer Dauerstrom) | [2)] | 952,8 A | |
| Kühlwasseranschluss | G1/4" Nippel mit Innenkegel nach DIN EN 560 | | |
| Kühlwasserbedarf | 4 l/min | | |
| Kühlwasserdruck | max. 6 bar | | |
| Kühlwassertemperatur | +25 °C | | |
| Umgebungstemperatur | +45 °C | | |
| Relative Luftfeuchtigkeit | 5 % – 85 % keine Betauung | | |
| Luftdruck | 86 kPa – 106 kPa | | |

[1)] angegeben ist Spitzenstrom.

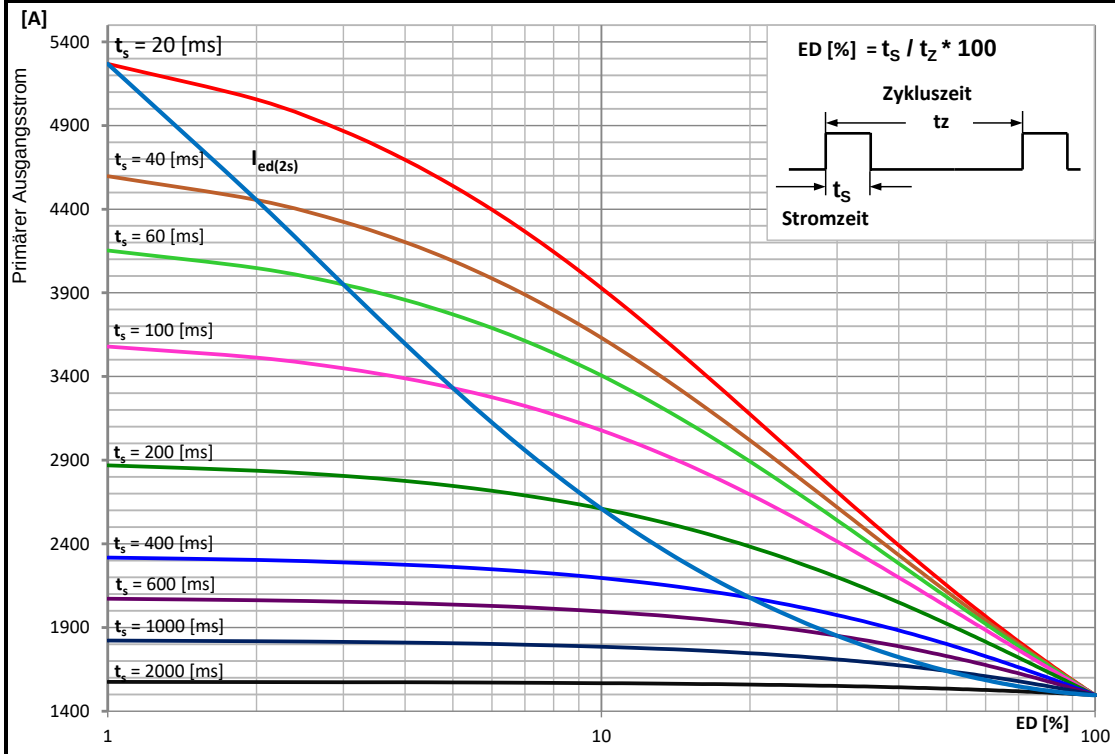
[2)] Angegeben ist der max. thermischer Dauerstrom zur Auslegung der Sicherung. Die Ströme können abhängig von der Anwendung auch niedriger/höher sein.

| | GEZEICHNET | GEPRÜFT | | | |
|---|---|---|---|---|---|
| DATUM | 2018-08-24 | 2018-08-24 | ZEICHNUNGSNUMMER | 46909-00de | BLATT 1 |
| NAME | Reichardt | Gercke | | | |
| | | | BENENNUNG | LE6-, LE7-, LE10-, LE11, LE19-, LE20-, LE5000-0700A | BLÄTTER 1 |
| STATUS: | | | | | |

# Limit value chart LE-1440A



| | Grenzwertdiagramm | 1440A |
|---|---|---|




**Belastungskurve stellt den absoluten Grenzwert dar. Für zuverlässigen Dauerbetrieb sollten diese Grenzwerte mit höchstens 85% ausgenutzt werden.**

## Technische Daten

| Leistungsklasse | LE | 1440A / 400V | 1440A / 500V |
|---|---|---|---|
| Kühlmedium | | Wasser | |
| Nennspannung | 1 ph, -20 %, +10 % | 400V | 500V |
| Netzfrequenz | 50 / 60 Hz | | |
| | | | |
| Primärer Ausgangsstrom | 100 % ED | 1496 A | |
| Max. primärer Ausgangsstrom | 20 ms / 1% ED[1)] | 5268 A | |
| Max. primärer Ausgangsstrom | 60 ms / 5% ED[1)] | 3771 A | |
| Netz-Nennstrom (max. thermischer Dauerstrom) | [2)] | 1496 A | |
| Kühlwasseranschluss | G1/4" Nippel mit Innenkegel nach DIN EN 560 | | |
| Kühlwasserbedarf | 4 l/min | | |
| Kühlwasserdruck | max. 6 bar | | |
| Kühlwassertemperatur | +25 °C | | |
| Umgebungstemperatur | +45 °C | | |
| Relative Luftfeuchtigkeit | 5 % – 85 % keine Betauung | | |
| Luftdruck | 86 kPa – 106 kPa | | |

[1)] angegeben ist Spitzenstrom.

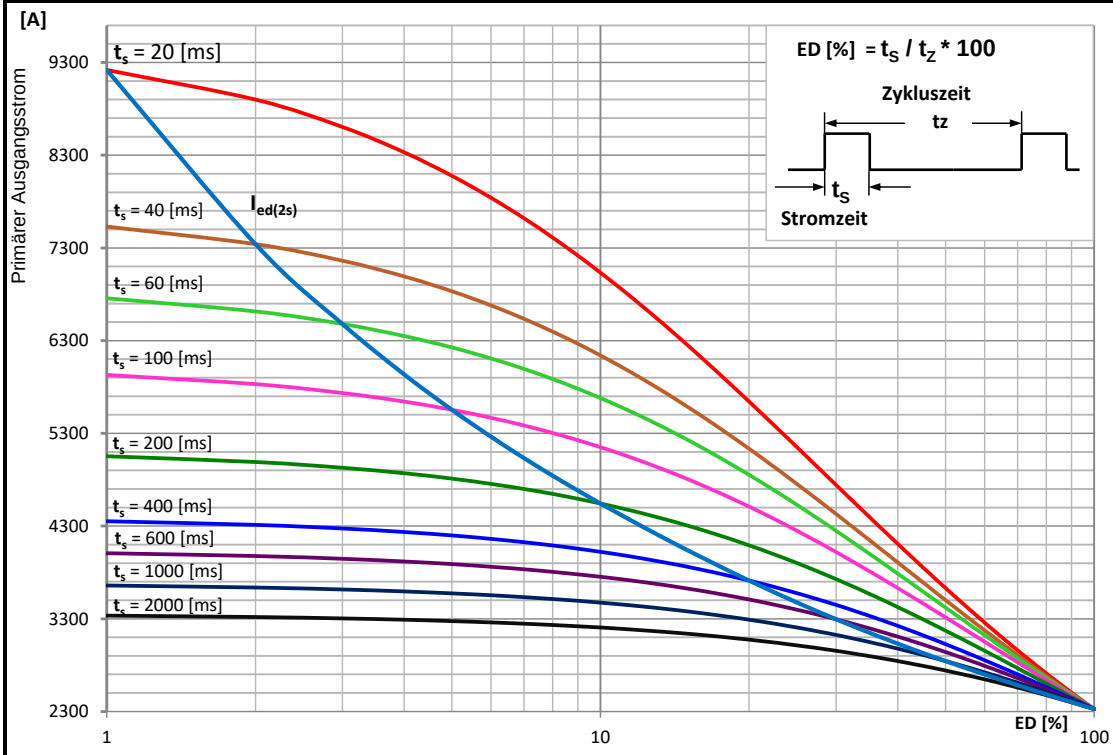
[2)] Angegeben ist der max. thermischer Dauerstrom zur Auslegung der Sicherung. Die Ströme können abhängig von der Anwendung auch niedriger/höher sein.

| | GEZEICHNET | GEPRÜFT | | | |
|---|---|---|---|---|---|
| DATUM | 2019-02-19 | 2019-02-19 | ZEICHNUNGSNUMMER | 46911-00de | BLATT 1 |
| NAME | Reichardt | Gercke | | | |
| | | | BENENNUNG | LE6-, LE7-, LE10-, LE11, LE19-, LE20-, LE5000-1440A | BLÄTTER 1 |
| STATUS: | | | | | |

# *Limit value chart LE-2335A*



| | Grenzwertdiagramm | 2335A |
|---|---|---|




Das Grenzwertdiagramm ist bei einer Kühlwassertemperatur von 25°C berechnet. Bei höheren Kühlwassertemperaturen verringern sich die Ausgangsströme.

Das Grenzwertdiagramm bezieht sich auf die Spannungsvarianten 110 V - 440 V, 480 V - 500 V, 550 V und 600 V.

| Technische Daten | | |
|---|---|---|
| Primärer Ausgangsstrom | 100 % ED | 2327 A |
| Max. primärer Ausgangsstrom | 20 ms / 1% ED[1)] | 9219 A |
| Max. primärer Ausgangsstrom | 60 ms / 5% ED[1)] | 6227 A |
| Netz-Nennstrom (max. thermischer Dauerstrom) | [2)] | 2327 A |
| Kühlmedium | Wasser | |
| Kühlwasserbedarf | 4 l/min | |
| Kühlwasserdruck | max. 6 bar | |
| Kühlwassertemperatur | +25 °C | |
| Relative Luftfeuchtigkeit | 5 % – 85 % keine Betauung | |
| Luftdruck | 86 kPa – 106 kPa | |

[1)] angegeben ist Spitzenstrom.

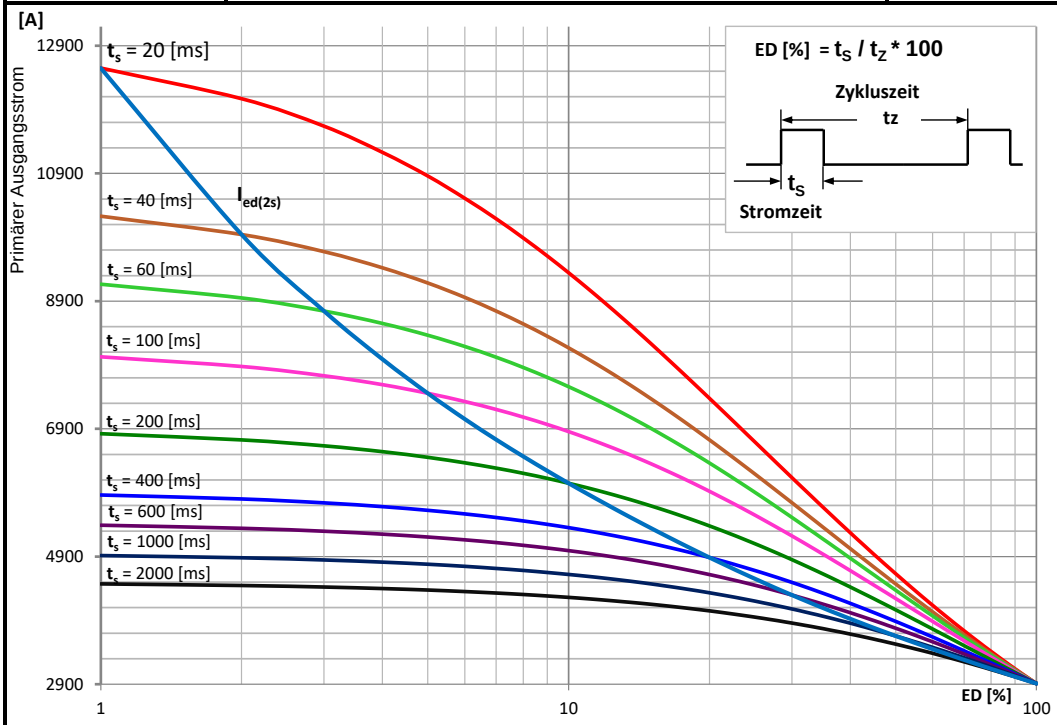
[2)] Angegeben ist der max. thermischer Dauerstrom zur Auslegung der Sicherung. Die Ströme können abhängig von der Anwendung auch niedriger/höher sein.

| | GEZEICHNET | GEPRÜFT | | | |
|---|---|---|---|---|---|
| DATUM | 2019-06-06 | 2019-06-06 | ZEICHNUNGSNUMMER | 46912-00de | BLATT 1 |
| NAME | Reichardt | Gercke | | | |
| STATUS: | | | BENENNUNG | LE6-, LE7-, LE10-, LE11, LE19-, LE20-, LE5000-, SiniusACI1-2335A | BLÄTTER 1 |

# Limit value chart LE-2950A



| | Grenzwertdiagramm | 2950A |
|---|---|---|




**Belastungskurve stellt den absoluten Grenzwert dar. Für zuverlässigen Dauerbetrieb sollten diese Grenzwerte mit höchstens 85% ausgenutzt werden.**

## Technische Daten

| Leistungsklasse | LE | 2950A / 400V | 2950A / 500V |
|---|---|---|---|
| Kühlmedium | | Wasser | |
| Nennspannung | 1 ph, -20 %, +10 % | 400V | 500V |
| Netzfrequenz | 50 / 60 Hz | | |
| | | | |
| Primärer Ausgangsstrom | 100 % ED | 2912 A | |
| Max. primärer Ausgangsstrom | 20 ms / 1% ED[1)] | 12550 A | |
| Max. primärer Ausgangsstrom | 60 ms / 5% ED[1)] | 8366 A | |
| Netz-Nennstrom (max. thermischer Dauerstrom) | [2)] | 2912 A | |
| Kühlwasseranschluss | G1/4" Nippel mit Innenkegel nach DIN EN 560 | | |
| Kühlwasserbedarf | 4 l/min | | |
| Kühlwasserdruck | max. 6 bar | | |
| Kühlwassertemperatur | +25 °C | | |
| Umgebungstemperatur | +45 °C | | |
| Relative Luftfeuchtigkeit | 5 % – 85 % keine Betauung | | |
| Luftdruck | 86 kPa – 106 kPa | | |

[1)] angegeben ist Spitzenstrom.

[2)] Angegeben ist der max. thermischer Dauerstrom zur Auslegung der Sicherung. Die Ströme können abhängig von der Anwendung auch niedriger/höher sein.

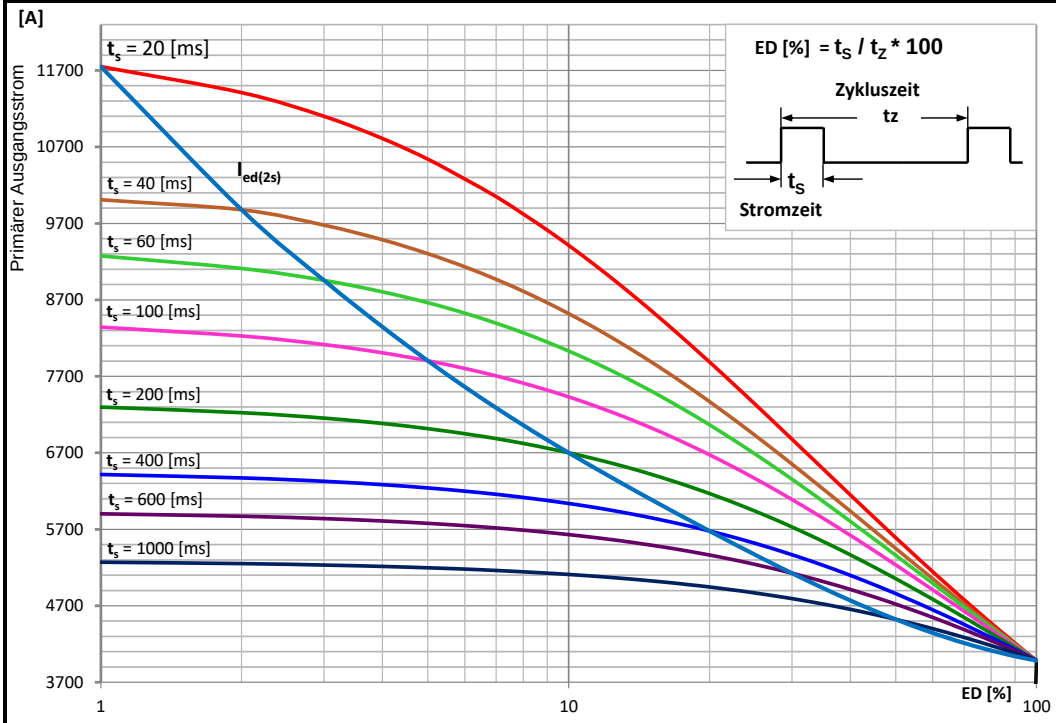
| | GEZEICHNET | GEPRÜFT | ZEICHNUNGSNUMMER | 46913-00de | BLATT | 1 |
|---|---|---|---|---|---|---|
| DATUM | 2019-02-19 | 2019-02-19 | | | | |
| NAME | Reichardt | Gercke | | | | |
| | | | BENENNUNG | LE6-, LE7-, LE10-, LE11, LE19-, LE20-, LE5000-, SiniusACI1-2950A | BLÄTTER | 1 |
| STATUS: | | | | | | |

HARMS WENDE

# *Limit value chart LE-3700A*



| | Grenzwertdiagramm | 3700A |
|---|---|---|




**Belastungskurve stellt den absoluten Grenzwert dar. Für zuverlässigen Dauerbetrieb sollten diese Grenzwerte mit höchstens 85% ausgenutzt werden.**

## Technische Daten

| Leistungsklasse | LE | 3700A / 400V | 3700A / 500V |
|---|---|---|---|
| Kühlmedium | | Wasser | |
| Nennspannung | 1 ph, -20 %, +10 % | 400V | 500V |
| Netzfrequenz | 50 / 60 Hz | | |
| | | | |
| Primärer Ausgangsstrom | 100 % ED | 3700 A | |
| Max. primärer Ausgangsstrom | 20 ms / 1% ED[1)] | 11750 A | |
| Max. primärer Ausgangsstrom | 60 ms / 5% ED[1)] | 8663 A | |
| Netz-Nennstrom (max. thermischer Dauerstrom) | [2)] | 3700 A | |
| Kühlwasseranschluss | G1/4" Nippel mit Innenkegel nach DIN EN 560 | | |
| Kühlwasserbedarf | 4 l/min | | |
| Kühlwasserdruck | max. 6 bar | | |
| Kühlwassertemperatur | +25 °C | | |
| Umgebungstemperatur | +45 °C | | |
| Relative Luftfeuchtigkeit | 5 % – 85 % keine Betauung | | |
| Luftdruck | 86 kPa – 106 kPa | | |

[1)] angegeben ist Spitzenstrom.

[2)] Angegeben ist der max. thermischer Dauerstrom zur Auslegung der Sicherung. Die Ströme können abhängig von der Anwendung auch niedriger/höher sein.

| | GEZEICHNET | GEPRÜFT | | | |
|---|---|---|---|---|---|
| DATUM | 2019-02-19 | 2019-02-19 | ZEICHNUNGSNUMMER | 46914-00de | BLATT 1 |
| NAME | Reichardt | Gercke | | | |
| STATUS: | | | BENENNUNG | LE6-, LE7-, LE10-, LE11, LE19-, LE20-, LE5000-, SiniusACI1-3700A | BLÄTTER 1 |

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