



Product catalogue 2026



**Automotive**

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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.

# HARMS+WENDE GROUP

## The Harms+Wende Group - top together!

The challenges of the global markets 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](http://www.harms-wende.de)



**PROCON PAS** Process automation for selected technologies

[www.procon-pas.de](http://www.procon-pas.de)



**Process quality management for joining technologies**

[www.hwh-qst.de](http://www.hwh-qst.de)

## Genius product series



Fig. 2-1 *GeniusMFI* inverters



Fig. 2-2 *GeniusHWI* inverters

## Description

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

The CPU and as i. e. weld board for the basis of the *Genius* inverters. Further functions 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 flexible. Even the system's basic equipment includes visualisation of the last ten resistance, current and voltage curves.

## Operating concepts

Central operation of up to 60 Inverter systems with the XPegasus operating software via Ethernet. (XPegasus subject to be purchased separately).

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

## Machine and robot connection

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



GeniusHWI403-416



GeniusHWI424-436

GeniusHWI403-436

Power classes	HWIx03L	HWIx03W	HWIx06L	HWIx06W	HWIx08L	HWIx08W
Mains supply voltage	4= 400 V / 440 V 3 ph, 5= 480 V 3 ph					
Maximum output current	250 A	250 A	500 A	500 A	650 A	650 A
Output current @ 20% ED	84 A	112 A	157 A	224 A	302 A	302 A
Output current @ 100% ED	38 A	50 A	70 A	100 A	135 A	150 A
Rated power @ 20% ED	42 kVA	56 kVA	79 kVA	112 kVA	151 kVA	168 kVA
Cooling Media	Air	Water	Air	Water	Air	Water
Gross weight	ca. 27 kg	ca. 21 kg	ca. 27 kg	ca. 21 kg	ca. 27 kg	ca. 21 kg
Cooling water requirement	-	4 l/min 1 gal./ L	-	4 l/min 1 gal./ L	-	4 l/min 1 gal./ L

Power classes	HWIx13L	HWIx13W	HWIx16L	HWIx16W	HWIx24W	HWIx36W
Mains supply voltage	4= 400 V / 440 V 3 ph, 5= 480 V 3 ph					
Maximum output current	900 A	900 A	1200 A	1200 A	1600 A	2400 A
Output current @ 20% ED	335 A	369 A	447 A	537 A	783 A	1062 A
Output current @ 100% ED	150 A	165 A	200 A	240 A	350 A	475 A
Rated power @ 20% ED	168 kVA	185 kVA	224 kVA	269 kVA	392 kVA	531 kVA
Cooling Media	Air	Water	Air	Water	Air	Water
Gross weight	30 kg	24 kg	30 kg	24 kg	26 kg	26 kg
Cooling water requirement	-	4 l/min 1 gal./ L	-	4 l/min 1 gal./ L	4 l/min 1 gal./ L	4 l/min 1 gal./ L

## GeniusHWI440 - GeniusHWI460



GeniusHWI440-460

Power classes	HWI3x40W	HWI3x45W	HWI3x60W
Mains supply voltage	4= 400 V / 440 V 3 ph, 5= 480 V 3 ph		
Maximum output current	2950 A	3500 A	3500 A
Output current @ 20% ED	1733 A	1845 A	2571 A
Output current @ 100% ED	775 A	825 A	1286 A
Rated power @ 20% ED	867 kVA	923 kVA	1286 kVA
Cooling Media	Water		
Gross weight	75 kg	75 kg	75 kg
Cooling water requirement	6 L/min 1,5 gal./ L	6 L/min 1,5 gal./ L	8 L/min 2 gal./ L

## GeniusMFI



Fig. 2-3 *GeniusMFI* inverters

### Description



The *GeniusMFI* product series is an air-cooled medium-frequency power unit into which the modular Genius control system, consisting of a card insert, is integrated.

The *GeniusMFI* is the most frequently used inverter, both locally and globally. We have now made our inverter even more flexible. It not only automatically recognises the supply voltage from 400 to 480 V, but can also be configured with an internal or external supply voltage for the Genius card insert. The latter must be defined during production, but is only a very minor step.

The *GeniusMFI* series inverters have been developed specifically according to the requirements of body shell construction in the automotive industry. The Genius MFI is characterised by its compact design, its inexpensive and high-performance air cooling and its specifically coordinated power range. Thanks to its wide input voltage range of 400 to 480 V at a mains frequency of 50 or 60 Hz, there is nothing to stop its global use. Variant diversity is reduced, thus simplifying stock-keeping and reducing costs. The *GeniusMFI* series devices are fully compatible with the *GeniusHWI* series plug-in cards, thus enabling the entire range of applications despite their compact dimensions. The integrated display quickly provides information on the current status of the device.

## Overview of medium-frequency systems

Here is the basic information on the medium-frequency systems in the Product catalogue:

Function scope	GeniusMFI	GeniusHWI
Illustrations		
Uses	Body shell construction, thin sheet welding, automotive engineering	Projection welding, aluminium welding
Operating concepts	Control systems with networked PC operation, XPegasus interface	
Programs	256-1024	
Current control program	Pre-heating current, main current, post-heating current	
Regulation	KSR	
Optional extensions	IQR	IQR, AMC / DCM, AMF
Monitoring systems / inspectors	Limit value monitoring, envelope, current and voltage, control stroke inspectors, distance measurement	
Analysis functions	Current, voltage, resistance, force curve	
Machine connection	Digital 24 V I/O, fieldbus systems	
Electrode management	Pre-warning, electrode wear, stepper function, milling function	
Valves	1 proportional valve 0-10V, 1 solenoid valve	
Mains voltage	400 - 440 V, 480 V, 690 V	
Output current	600 A -800 A	200 A -3500 A

## Function scope (BUS)

For spot and projection applications with extended function scope.

The *GeniusMFI/HWI* product range offers maximum functionality and flexibility. The "BUS" 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 as well as 512 or 1024 programs.

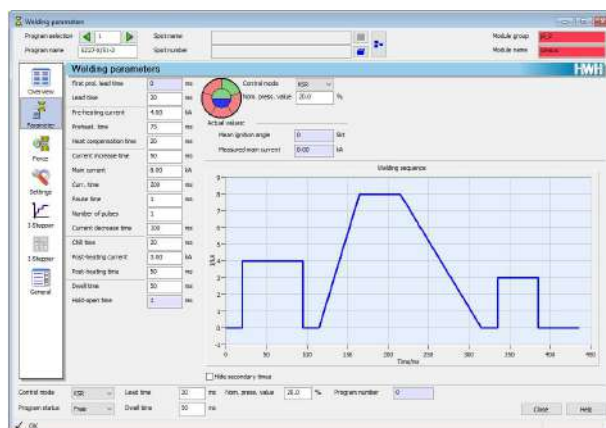
Constant current regulation, IQR and process stability (Q-Inspector) form part of the BUS equipment as does visualisation of the current, voltage and resistance curves of the last 10 welding processes.

We have additionally integrated the current inspector and the voltage inspector into the BUS equipment. 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 six further bus interfaces. As standard, the inverters are equipped with an Ethernet network interface, enabling you to network all devices.

## Standard function scope

- 512 - 1024 programs
- 3 main current times (pre-heating, main, post-heating time)
- BUS interface
- Adaptive regulation (IQR)
- 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 41.



### Adaptive regulation (IQR)

- Quality control depending on the resistance curve
- Elimination of interferences
- Welding time adaptation

### I-Inspector (current)

- Limit value
- Mean envelope value
- Reference envelope value

### U-Inspector (voltage)

- Limit value
- Mean envelope value
- Reference envelope value

### Q-inspector (process stability)

- Reference curve
- Simple operation
- Live process drift display

### R-inspector (resistance)

- Limit value
- Mean envelope value
- Reference envelope value

### SP-inspector (spatter)

## Function scope (ECO)

For spot and projection applications with extended function scope.

The *GeniusHWI* product range offers maximum functionality and flexibility. The "ECO" 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 as well as 256 programs.

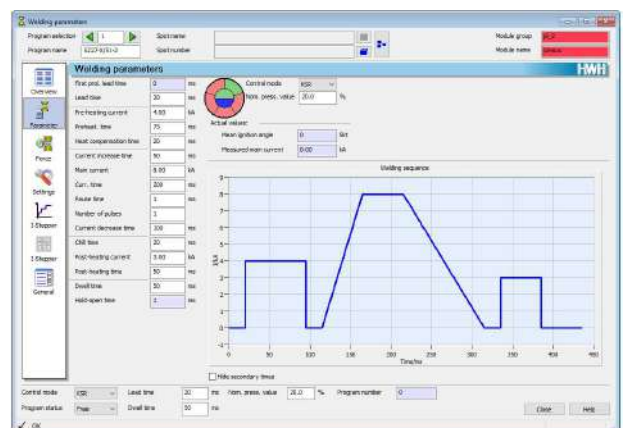
Constant current regulation forms part of the ECO equipment as does visualisation of the current, voltage and resistance curves of the last 10 welding processes.

At the same time, it can also be prepared for our IQR and 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 six further bus interfaces. As standard, the inverters are equipped with an Ethernet network 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 0-10V
- Current limit value monitoring
- Further interfaces, see options and equipment, "[Function scope](#)" auf Seite 41.



The following inspectors can be individually selected.

### S-Inspector (distance)

- Component control
- Sink-in distance
- Final dimension

### H-Inspector (control stroke)

- Limit value
- Mean envelope value
- Reference envelope value

### I-Inspector (current)

- Limit value
- Mean envelope value
- Reference envelope value

### R-Inspector (resistance)

- Limit value
- Mean envelope value
- Reference envelope value

### U-Inspector (voltage)

- Limit value
- Mean envelope value
- Reference envelope value

### SP-Inspector (spatter)

## Manual function (MAN) function scope

For manual spot applications.

The GeniusHWI inverter series offers maximum functionality and flexibility. The "manual system" version is the professional for manual welding tasks to be undertaken in mechanical engineering.

Manual electrode holder mode enables welding using two different guns. Each gun has its own assigned programs, counters and signals. The function is parameterised using the user interface.

The guns' welding processes are independent of each other; however, welding can only be carried out with one gun. Welding with both guns at the same time is not possible. If one gun has a fault, welding can be performed using the other gun. Each gun has its own parameter set and its own signals.

As in the BUS equipment, the manual function also encompasses constant current regulation, a current inspector and voltage inspector as well as visualisation of the current, voltage and resistance curves of the last 10 welding processes. We have additionally integrated the current inspector and the voltage inspector into the MAN equipment. At the same time, it can also be prepared for our IQR and PQS welding system.

Electrode management and proportional valve control are, of course, also included. Actuation is planned via the I/O level. As standard, the inverters are equipped with an Ethernet network interface, enabling you to network all devices.

The power connections for the *GeniusHWI406* to *GeniusHWI416* devices are designed with terminals. From *GeniusHWI424* to *GeniusHWI436*, connection rails are used.

## Standard function scope

- 2x4 programs
- Adaptive regulation (IQR)
- 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 0-10V



Fig. 2-4 *GeniusMFI408W-MAN-24V*

### I-Inspector (current)

- Limit value
- Mean envelope value
- Reference envelope value

### U-Inspector (voltage)

- Limit value
- Mean envelope value
- Reference envelope value

### R-Inspector (resistance)

- Limit value
- Mean envelope value
- Reference envelope value

## BUS and MAN function scope

Function scope	GeniusMFI / GeniusHWI ECO	GeniusMFI / GeniusHWI BUS	GeniusMFI / GeniusHWI MAN
Operating concepts	PC with XPEgasus operating software		
Programs	256	512 - 1024	8
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)	Optional	Optional	No
I-Inspector (current envelope)	optional	Yes	Yes
U-Inspector (voltage envelope)	optional	Yes	Yes
H-Inspector (control stroke envelope)	Optional		
R-Inspector (resistance)	Optional	Yes	
SP-Inspector (spatter)	Optional	Yes	Optional
IQR (integrated quality control)	Optional	Yes	Yes
Q-Inspector	optional	Yes	optional
PQS (PQS-ready)	Optional		
AMC / DCM - ALU Mode Classic + Dynamic Conditioning Mode	Optional		
AMF - Aluminium Mode Force	Optional		
BD - component trace	Optional		
PDD - Process Data Documentation	Optional		
TT - Trace Tag	Optional		
HSC - High Speed Current	Optional		

## Inspectoren

monitoring functions

Inspectors are parameter monitoring functions allowing to verify if they appear in a certain tolerance band. Depending on the model purchased different inspectors are available. Inspectors installed are visible in XPe-gasus interface.

The following inspectors are available:

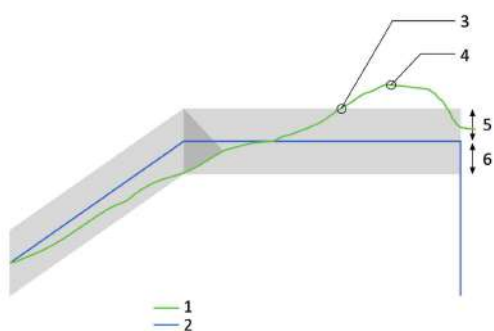


Fig. 2-5 Envelope with absolute tolerance

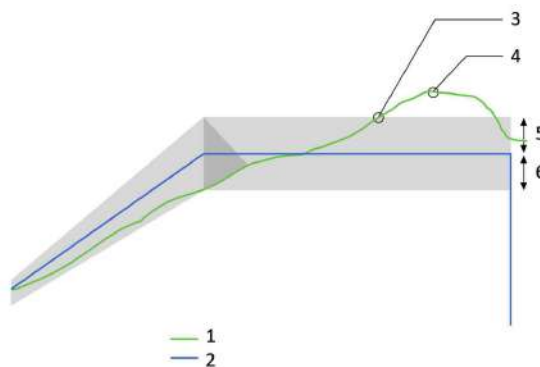


Fig. 2-6 Envelope with relative tolerance

- 1 Measured value curve
- 2 Reference curve
- 3 Tolerance band
- 4 Measured value outside of the tolerance
- 5 Positive, permissible tolerance deviation
- 6 Negative, permissible tolerance deviation

The following inspectors are available:

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

## I-Inspector (current)

Monitoring the current curve value during an ongoing weld (in-line) 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 is the direct feedback from the inverter from values sensed.

Fig. 2-7 *XPegasus* screenshot showing the I Inspector

## Applications:

- Spot welding with non regulated current
- Projection weld with non regulated current

## 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 be able to monitor the the voltage a cable must be wired to the secondary side of the transformer. 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 *X*Pegasus 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 electrode 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 a weld classified as good.

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

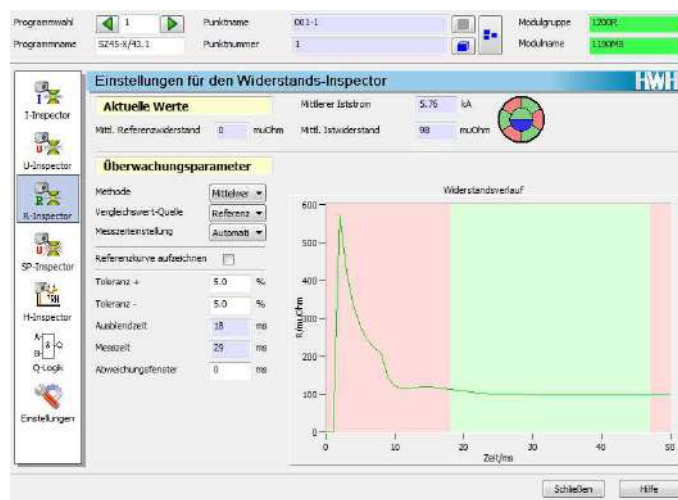


Fig. 2-9 X Pegasus representation with open R-Inspector settings

## 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)

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

Constant current regulation keeps the weld current on a user selected set value independent of changing weld conditions.

TA bandwidth of changes of the regulator value are an indication of the process stability. Exceeding the set tolerance band will lead to a warning and an indication of a bad weld. 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 weld applications.

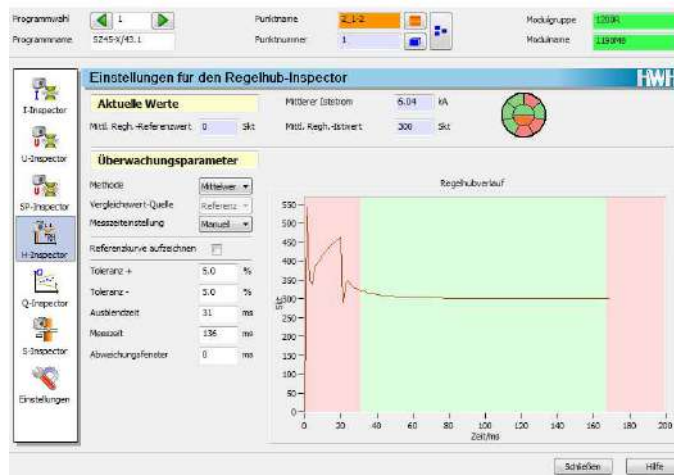


Fig. 2-10 X-Pegasus representation with open H-Inspector settings

## 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 (quality inspector)

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

Particular attention is paid here to the simplicity of operation.

The reference is determined from real 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 algorithm. 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 monitoring over longer periods.

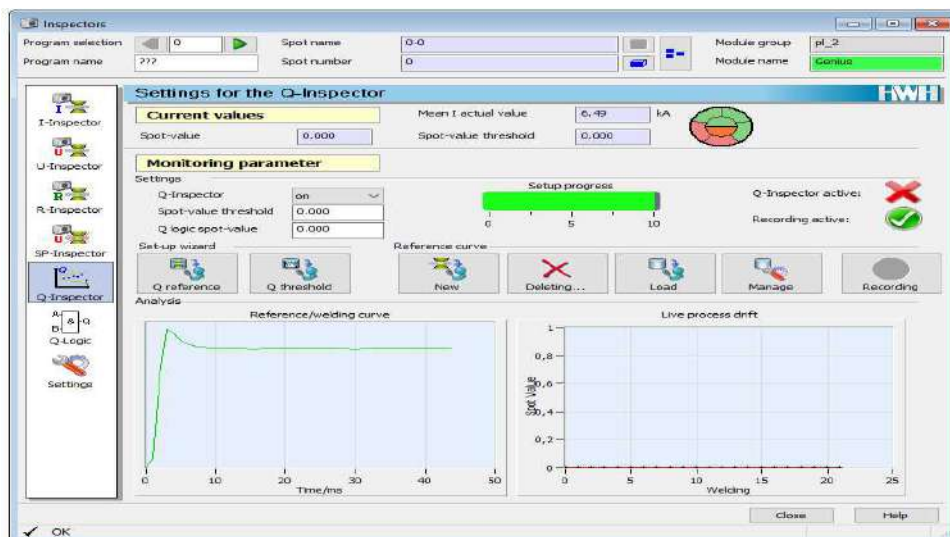


Fig. 2-11 XPEGASUS Q-Inspector user interface

## 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 travel of the electrodes is measured and monitored with the specified tolerances. A preset travel 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
- Travel distance monitoring
- Final travel position monitoring
- Profile indexing

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

## SP-Inspector (spatter):

The SP-Inspector function monitors the occurrence of welding spatter.

The spatter rate of a welding program provides information on process quality: if spatter occurs early on during welding, the welding spot may possibly not hold. Spatter may generally result in less stable welding spots. The occurrence of spatter can be determined based on the voltage curve of the welding process. The SP-Inspector represents the voltage curve in a curve. If the voltage dips significantly in the displayed curve, this is an indication of spatter.

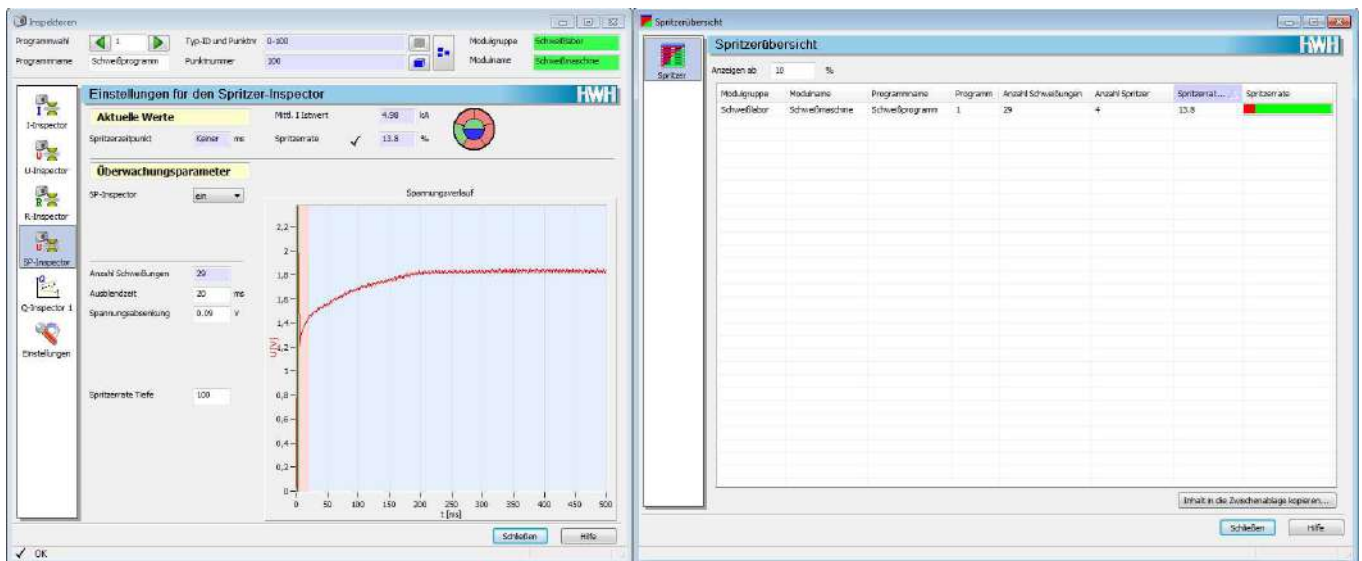


Fig. 2-12 XPEGASUS SP-Inspector user interface

## Optionen

Depending on the application and welding task, we offer different optional hard- and software packs of our Genius inverters.

If you need a good documentation of your welding quality, we have different packages available for you. As examples 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.

Option	Seite
IQR = Integrierte Qualitätsregelung	"IQR - integrated quality control" auf Seite 25
IQflex = Integrierte Qualitätsregelung inkl. Q-/IQ-Inspector & IQR	"IQFlex - Integrated Quality Control incl. Q-/IQ-Inspector & IQR" auf Seite 26

Option	Seite
PQS = Vorbereitung für PQS-Lizenz	"PQS-ready – preparation for PQS licence" auf Seite 30
PDD = Process-Data-Dokumentation nur mit der Feldbuskarte PNSe/PNSo (ProfiNet Slave)	"PDD - Process Data Documentation" auf Seite 32
TT -Trace Tag	"TT - Trace Tag " auf Seite 33
AMC /DCM = Alu-Mode-Classic / AMC + Dynamic Conditioning Mode / DCM	AMC - Aluminium Mode Classic
AMF = Aluminium Mode Force	"AMF - Aluminium Mode Force" auf Seite 34
BD = Vorbereitet für die Bauteildokumentation über den Feldbus	"BD component trace" auf Seite 36
HSC = High Speed Current	"HSC High Speed Current" auf Seite 37
Master	Master
MM1 = Multi-Mess-Funktion	MM1
MM2 = Multi-Mess-Funktion	MM2
MTS = Multi Tool System	

## IQR - integrated quality control

The integrated quality stabilizing control IQR reacts to events in the resistance welding process that are characteristic of the resistance curve and power curve. Based on this event information, the intelligence of the recognition is used to adjust the current during welding at millisecond intervals. This makes it possible to control disturbance variables in the welding process.

The welding time adjustment is controlled depending on the time of the maximum resistance. The most striking point in the resistance curve is the end of the warm-up phase and the start of melting. From this point onwards, the resistance curve begins to fall again as the contact resistance between the materials is eliminated and the electrode begins to sink in. We call this point the "resistance maximum". This point in time varies. It depends on the disturbance variables that influence the heating process.

### Influencing disturbance variables that are compensated are e.g.:

- the electrode diameter
- the shunt conditions
- the mains voltage fluctuations
- power losses due to poor fit

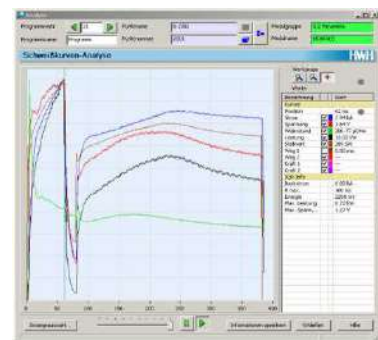


Fig. 2-13 X-Pegasus illustration with IQR settings

### Benefits and advantages at a glance

- adaptively controlled from the 1st welding spot without creating a reference
- Robust and stable process right from the start
- Basic parameters can be derived from KSR
- Low parameterization effort
- Power control e.g. for 22MnB5
- Greatly reduced commissioning times
- >95 % iO quality achievable at the first start-up.

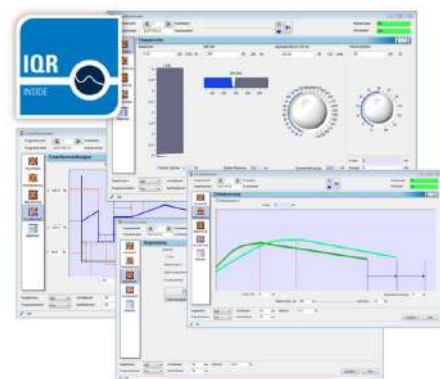


Fig. 2-14 X-Pegasus display with IQR settings

From the time of the resistance maximum, the previously increasing setpoint value of the current from previous process information is held at its current level with a delay. This results in a new welding power for the further course of the weld, depending on the disturbance variables. By programming the initial current and the steepness of the increase, called "aggressiveness", the heating can be changed up to the maximum resistance. If, as in rare cases, this is not sufficient, the welding time can also be adjusted depending on the maximum resistance. In this case, the effect on the cycle time must be taken into account. Experience has shown that variations of no more than  $\pm 5$  ms occur in robot applications.

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

The new integrated quality-stabilizing flexible product package consisting of reference-controlled regulation IQF and proven integrated quality-stabilizing regulation IQR for events in the resistance welding process.

The IQflex system includes, i,eriments and production or start with IQR from constant current tables and then create references from event-controlled actual curves. For flexible adaptive regulation and optimized monitoring from the first welding point based on the proven Genius platform.

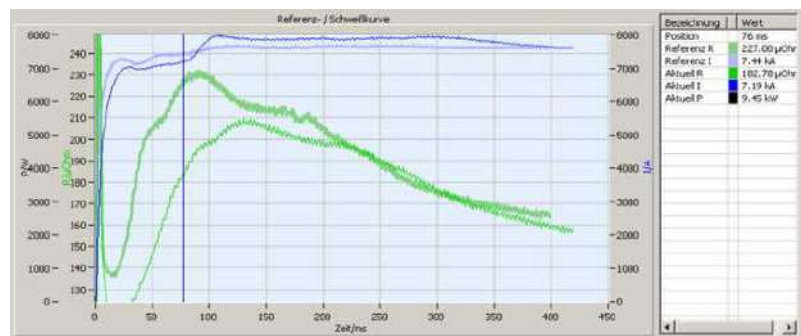
Short commissioning times and easy operation guarantee efficient and cost-effective production. The adaptive package IQflex is specially optimized for these requirements and guarantees the safe spot welding of steel materials.

The basis for our controller are the elementary process variables current and voltage. A precise and reliable measurement signal is available by simple voltage tapping on the secondary side of the transformer. From this, all necessary process variables can be determined.

The actual welding tongs or machines remain free of cables to ensure easy maintenance. By means of the process resistance, which is recalculated every millisecond, the controller adjusts the welding current individually to the requirements of each welding point. This ensures a short process time since the required energy is concentrated. Minimizing cycle time is one of the most important criteria of our customers for the use of IQflex.

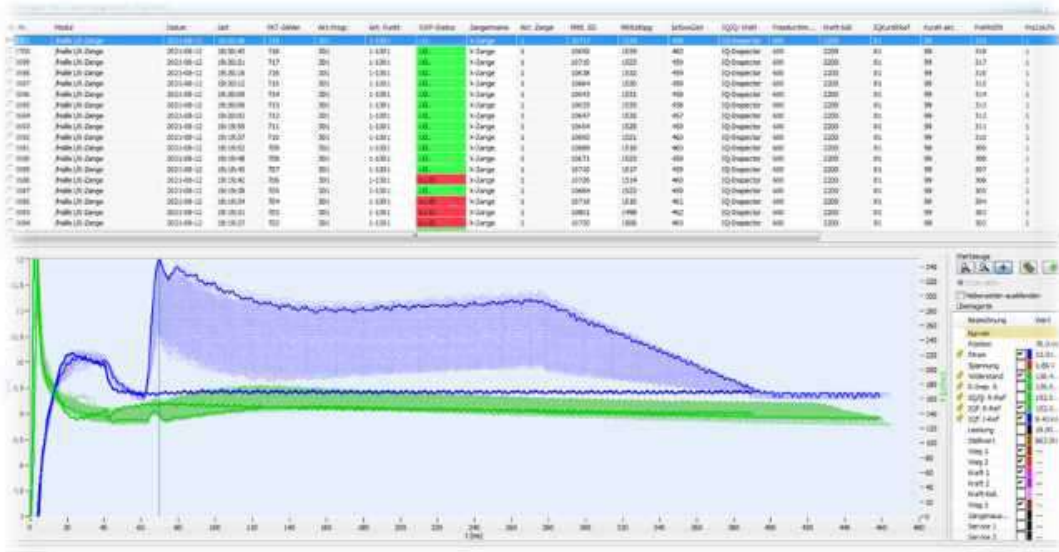
### Features at a glance.

- Fast and flexible parameter adjustment through events or reference
- Shunt, electrode wear, and mains voltage compensation
- Compensation of force fluctuations or poor fit



The integrated pre-conditioning enables stable conditions to be established between the electrode cap and the workpiece surface at the beginning of the actual welding process. Regardless of whether the material used is coated or contaminated, welding with IQflex is successful. With a wide-ranging parameterization, IQflex is not only suitable for use in automated manufacturing, but also for the use of hand-held welding tongs.

Only a few welding programs are required to weld a wide range of different combinations of materials with different sheet thicknesses. The IQ-Inspector monitors the quality of each weld, helping you to fully meet your customer requirements.



Automatic stepper with expulsion reduction

**Benefits and advantages at a glance:**

- Adaptive control from the first point
- Reliable monitoring with our new IQ Inspector from the first welding point
- Industry 4.0 documentation grace to the integrated database
- 100% compatibility with existing IQR parameters
- Further reduced commissioning times
- Reduced commissioning times
- Monitoring and adaptive control without laboratory effort possible
- Adaptive wear adjustment with automatic stepper

**IQ-Ergebnisse**

Überwachungsparameter						
Lfd. Nr.	Überschneidung	Energie	Sortierzeit	IQ-Regelung	Falsch-Beschädigung	Qualitätswert
10	100%	98%	89%	96%	75%	0,62
6	100%	99%	89%	96%	75%	0,80
0	100%	99%	89%	96%	75%	0,60
7	100%	98%	89%	96%	75%	0,80
6	100%	98%	89%	96%	75%	0,80
5	100%	99%	89%	96%	75%	0,86
4	98%	89%	KSP	75%	Aus	0,72

Individual weight parameters



## MSM - Measurement and storage module

The MSM measurement and memory module is our new product for mounting on the welding gun. With an Ethernet point-to-point connection, measurement signals for current, voltage and force recorded on the welding gun can be transmitted to the associated welding controller in 1 ms cycles using medium-frequency welding technology.

The module's memory is used for welding parameters, wear counter readings and set-up values. Tool-specific data such as motor parameters and all calibration values for servomotor drive systems are also stored.

This eliminates the need for long, interference-prone shielded cables to the control system. The docking of tools such as welding guns also enables them to be used by several robots.

The measurement and memory module can be retrofitted to existing systems.

### Features at a glance

- Short, low-interference measuring lines
- Storage of set-up data and parameters
- Storage of motor data and its calibration values
- Wear values are stored in the tool
- Second force input for calibration measurement
- 2 measurement inputs each for double transformer applications
- Compatible with standard cables (installation space and connectors)
- Retrofittable



## Benefits and advantages at a glance

- Interference-free measurement signals
- Tools with set-up values from the test bench for fast commissioning
- Tool change and sharing with wear and set-up values
- Set-up measurements without long measuring cables or data transfer
- Direct measuring connections for 2 transformers without terminal distribution protection of the motors due to correct current output with motor identification
- Interchangeability when using standard cables
- Compatible and upgradeable to existing systems

## *PQS-ready – preparation for PQS licence*

PQS-ready enables your inverter to install our PQS inline process monitoring system. PQS software licenses are installed on your inverters performing dedicated process monitoring of parameters as current and voltage. The software is called PQS-res.

## 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.

## PQS Process monitoring

Our process monitoring systems offer the option of seamlessly monitoring and fully documenting your joining process. Parameters such as current, voltage, resistance, energy, force or penetration can be recorded and monitored. They are used for spot and projection welding, but can also be used for butt and strand welding, for example.

With a Genius welding controller, our process monitoring can be used directly as an integrated option with the PQS-Ready option. Our QUADRIGO measuring module is used with any other welding controller. Mains frequency (50Hz), medium frequency (1,000Hz) or high frequency (10kHz) applications can be monitored. Our monitoring systems are also designed for capacitor discharge welding (CD) and are specially adapted to the respective joining process.

## PQS - The proven monitoring system

- Recording the effective values and signal curves of current, voltage, resistance, power, force and displacement
- Monitoring of the process based on known limit values
- Q-stop logic
- Storage of process data in a database with permanent archiving
- Central operation of up to 16 measuring points on one PC
- Zentrale Bedienung von bis zu 16 Messstellen auf einem PC
- Network-compatible versions with server and remote client user interfaces available
- Machine connection via various fieldbus systems and 24V I/O

## XPQS – The new dimension of process monitoring

The new XPQS is a further development of the proven PQS process monitoring system, which is reflected by the "X" in the name.

In addition to simplifying commissioning and operation, there are new functionalities such as "outlier detection". This function automatically calculates limits over a preset period on a statistical basis. This means that strongly deviating process variables - the so-called "outliers" - can be detected immediately if they lie outside the limits calculated by the system.

Another new function is the freely configurable monitoring for wear detection. Here, exceeding or falling below a defined range of a parameter (preferably the mean value of the resistance, which usually reflects the electrode wear well) is evaluated as "wear" and signaled separately.

With these two functions, it is possible to influence possible process faults at an early stage during the running-in phase of the systems.

## Properties (in addition to PQS)

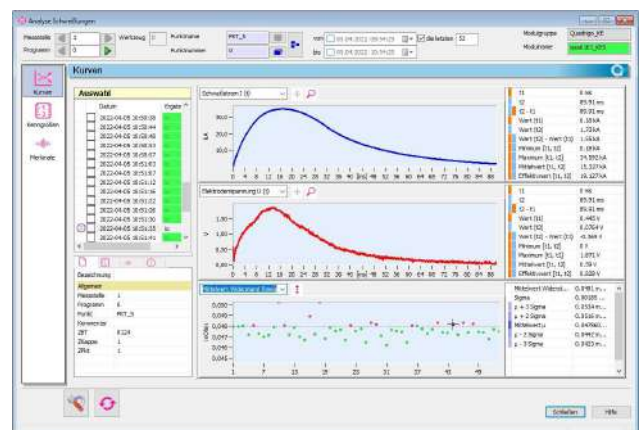
### Benefits and advantages at a glance

- Comprehensive process analysis
- Powerful monitoring functions
- Increased competitive advantage and high productivity
- Reduction of inspection costs and inspection time
- Effective production processes
- Comprehensive process documentation
- Visualizes trends of your process enabling you to perform preemtive maintenance.



XPQS LiveView

- New, easy-to-use user interface, simple commissioning
- also available as an easy-to-install workstation version
- Better measurement resolution for short welding times and displacement/force measurement
- Support of two displacement and force channels, e.g. for double-head applications
- Extensive statistical analyses
- Use for component documentation
- OPC-UA interface optionally available



XPQS Analysis

## PDD - Process Data Documentation

### Option: PDD

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

Process data is available directly after each weld. The set is complete with the end-of-sequence signal (EOS). The data is then transferred to the database through the field bus or Ethernet.

### Characteristics of Process Data Documentation

- Up to 10 parameters can be selected per weld schedule (weld process).
- The 10 parameters can be selected from a parameter pool. Available parameters are described in a quick guide for easy setup
- Process data is available at the inverter to the next weld

Data is available through parameter IDs

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).
- G201 MIO card with 24 V I/O

Remark: Process curves cannot be transferred by PDD mechanism.

## *TT - Trace Tag*

### **Option: TT**

The "Trace Tag" is an accompanying identifier adding for any Genius unit.

This enables the user to add a weld spot identifier to the module's archive data via the Ethernet interface (UDP). (UDP) as data set of 32 ASCII characters.

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

Trace Tag currently operates on Profinet and EthernetIP field bus Genius units. 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. In case the inverter has been turned off, data must be sent again to be stored in the archive.

## Prerequisites

- Genius firmware version: 2.70 or higher
- **X**Pegasus Gold: version 5.2.31 and higher.
- UDP-capable network.
- Setting port numbers.
- Archive configuration.

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

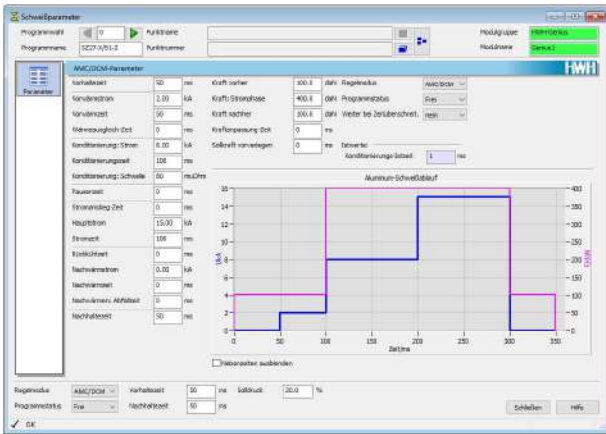


Fig. 2-15 Visualisation of XPEGASUS aluminium parameters

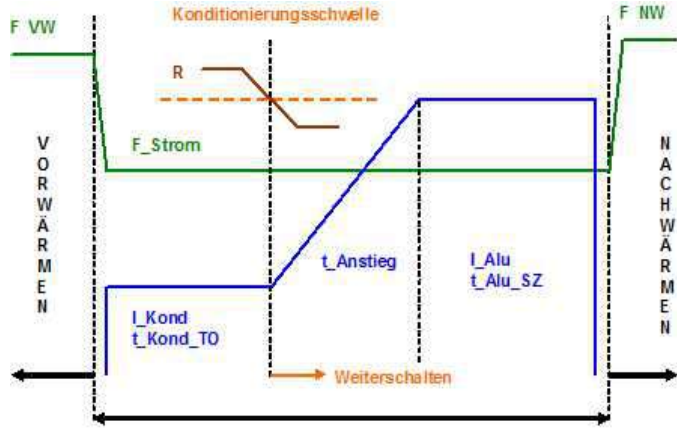


Fig. 2-16 Visualisation of XPEGASUS aluminium current profile

## Description of: AMC / DCM

The "AM/DCM" Mode has a twin purpose. Out allows to stabilize the weld process but getting rid of layers or items between the sheets or electrodes. Second it allows to join aluminium stack-ups also.

Grace to the pre-conditioning phase non desired items between the electrodes are eliminated. This pre-conditioning phase is adaptive and the total weld time is never longer as programmed. rather than shorter in most cases.

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.

The weld schedule starts with the conditioning phase. In this period of time the resistance is measured. When a set threshold value is passed, the weld is kicked in as a constanc current weld. Synchronous with the weld a force profile does run to support the weld.

The mode does operate with pneumatical and servo electric guns.

The "AMC / DCM is programmed through XPEGASUS.

## AMF - Aluminium Mode Force

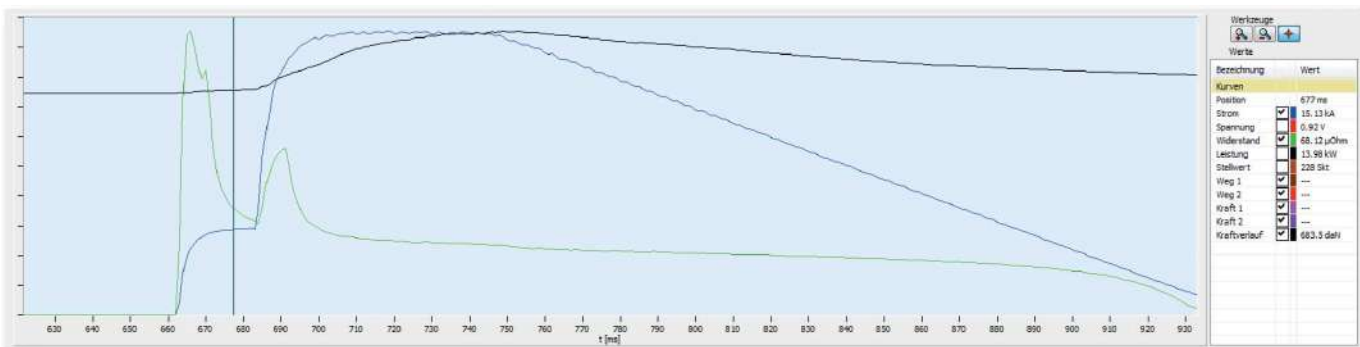


Fig. 2-17 Aluminium current profile

## Description

Aluminium Mode Force from Harms & Wende is the next evolutionary stage in process-consistent aluminium material\* resistance spot welding. Based on years of experience with proven Aluminium Mode Classic, this has been extended with pioneering functions. The combination of tried-and-tested AMC functions with new, integrated process monitoring and adaptive regulation is a feature which is unique to Harms & Wende's AMF. Designed as a fully-integrated module for the XPegasus user interface, the AMF provides all functions required for aluminium welding process parameterisation, monitoring and adaptive regulation in a central location. The AMF is available as an option for all GeniusHWI series inverters, and can also be retrofitted in existing systems.

\*E.g. 5000 and 6000 alloys

## Characteristics

- Adaptive preconditioning based on the process resistance
- Constant spot quality even with fluctuating surface quality
- Adaptive process regulation to compensate interferences
- Surface and material quality monitoring
- Integrated, force-based process monitoring and evaluation
- Simple evaluation using meaningful quality parameters
- Constant cycle time
- Comfortable operation via XPegasus software
- Available for Harms & Wende GeniusHWI series inverters

Aluminium Mode Force in detail:

The new Aluminium Mode Force (AMF) from Harms & Wende combines the proven strengths of Aluminium Mode Classic with pioneering functions for monitoring and regulating the aluminium welding process. Integrated process monitoring has been developed based on the requirements and wishes of our customers.

This specifically uses the physical characteristics of the aluminium material. The spot pressure which occurs during spot growth is detected and evaluated. This effect forms the basis for the inline quality evaluation. The quality parameter derived from it is used to monitor the welding spot quality and the process as a whole.

Aluminium Mode Force is also supplemented by a number of other functions for monitoring and process analysis. Thanks to the modular structure of the XPegasus operating software, AMF can also be integrated into existing systems with GeniusHWI inverters.

## BD component trace

### Anwendungsbeispiel mehrerer Fügeaufgaben mit Teilebezug :

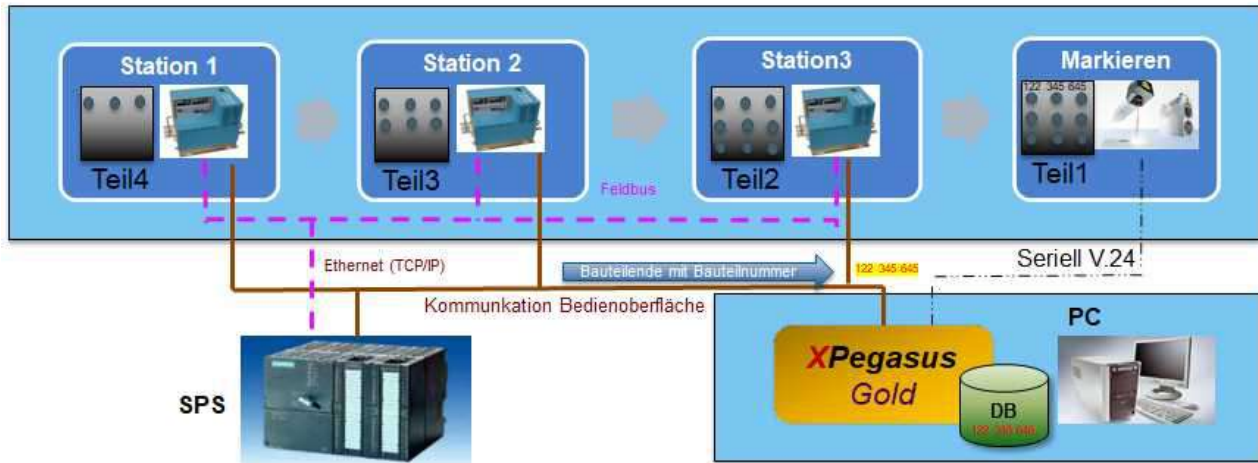


Fig. 2-18 Application example: joining system for hybrid engines

## Description

Component trace makes products traceable through a combination of weld data and product related information as the serial number, article number or other related information. Data is combined through a protocol running between the PLC and the Genius timer module. 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 weld schedule program and the component code, to XPegasus, where they can be displayed. The data can be transferred to the customer for further processing.

## Requirements

- XPegasus Version 6.2 or higher

## HSC High Speed Current

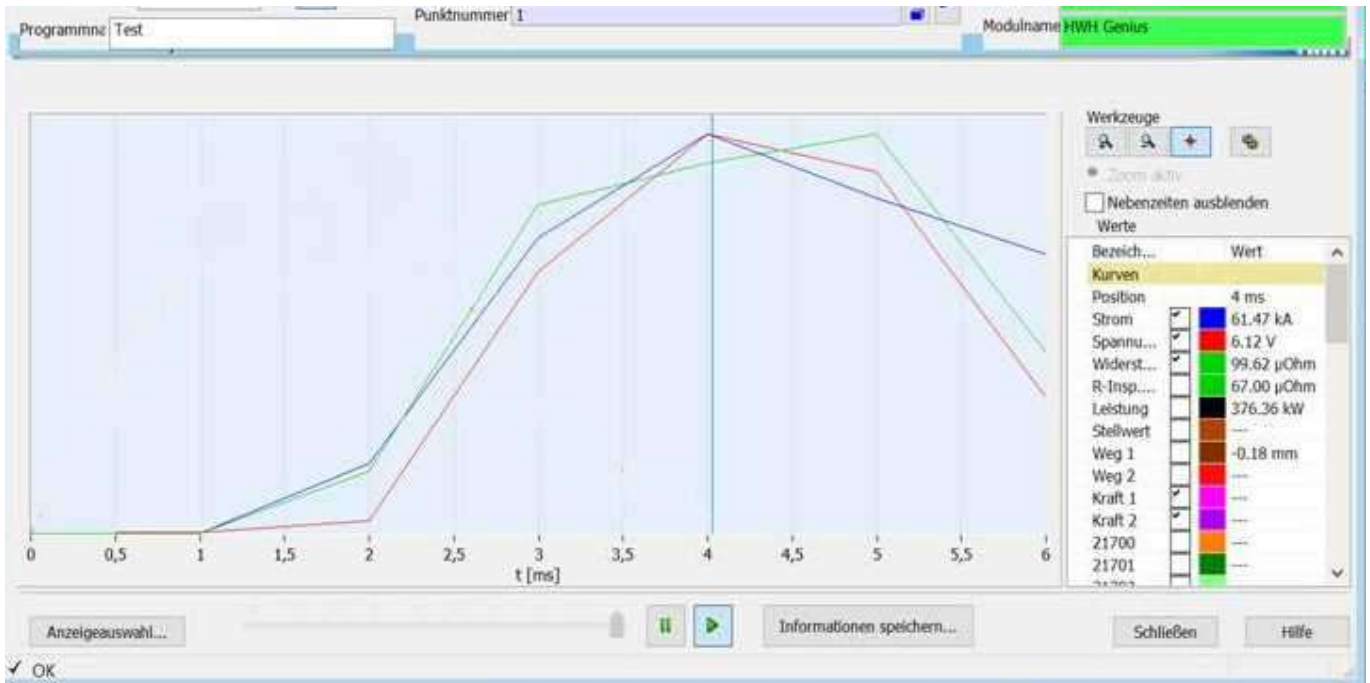


Fig. 2-19 Application example: High Speed Current function

## Description

The "High Speed Current" HSC lifts your projection weld to a new level. It pushes the current to the requested set value in a very short time by a modulation of the current.

HSC shows its strength on UHSS materials where extrem short weld times are beneficial. Fast modulation of the secondary voltage is necessary to achieve this.

When joining weld nuts on UHSS materials it is crucial to reach the current set value as fast as possible - HSC makes it happen.

A typical setup consists of a standard Genius MFDC inverter and a transformer. The transformer shall have a secondary voltage of 17 to 21 V. The Gennius must have the option HSC installed. The combination of high secondary voltage and HSC enable this fast current raise replacing CD modules with an affordable price. An existing inverter can also be upgraded with HSC any time. Current raise times of less than 10 ms to 60 kA can easily be achieved.

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. High speed current suits any Genius MFDC inverter. The units are available with up to 3500 A max output current.

## Requirements:

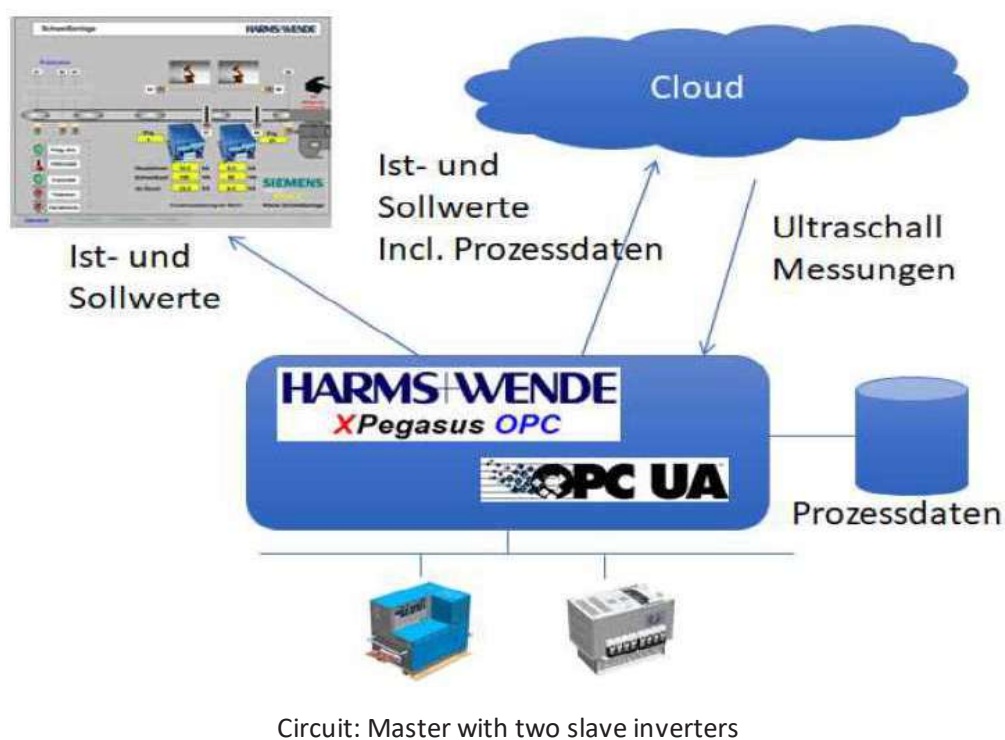
- X Pegasus Gold or higher

## Master-Slave systems

When your inverter single inverter does no longer suit the application since more current or longer weld times are needed, the output values can be amplified by adding more power units. The first inverter is called Master unit, the remaining slave units. The master is a regular inverter holding schedules, calibrations and more. The slaves listen to the master unit when to weld synchronously.

At least one transformer is wired up to the master and each slave. It may be multiple ones. Crucial is to keep transformers and cable identical to maintaining synchronous load. A master-slave system can hold max one master and three slaves.

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



## Requirements

- Minimum inverter power class 240 kva (1200 A)
- Option Master in the master inverter must be ordered from factory, slaves can be added any time as needed.

## Multi Measurement 1 (MM1)

Our Genius inverters are known for its flexibility. A G202 inverter board provides measurement input channels. These can be used i. e. for displacement measurement or force feedback. Intuitive calibration makes the setup simple and fast and just a few requirements are need to use this feature.

### Hardware requirements MM1 (option)

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

### Software requirements MM1 (option)

- S-Inspector in 16-bit resolution, see S-Inspector (displacement measurement)
- Force build-up control

### Requirements

- G202-AIOX
- **X**Pegasus 6.X or higher

## Multi Measurement 2 (MM2)

Option MM2 is an extension of the measuring standard inputs by an additional plug-in module G202 in a Genius system. This module is intended for use with, for example, a double-head welding system. The force sensor is connected to the force measuring input. Parameters for the force calibration as well as the parameters for force build-up control are entered via the X Pegasus HMI user interface, starting from version 6 or higher. A dedicated page is provided for the force inspector. The force build-up control monitors the force shortly before the weld time starts at the end of the hold time. The force is measured and compared with the set tolerance values. If it is beyond the set tolerance band, a message is generated.

### Hardware requirements MM2 (option)

- 2 x displacement measurement input - analog 0-10V, 0-20mA, 16 bit resolution
- 2 x force measurement input - analog 0-10V, 0-20mA, 16 bit resolution

### Software requirements MM2 (option)

- S-Inspector in 16-bit resolution, see S-Inspector (displacement measurement)
- Force build-up control

### Requirements

- G202-AIO
- X Pegasus HMI 6 or higher

## GeniusMFI product code

	GeniusMFI	U	LL	ww	zzz
<b>Family designation</b>	_____				
<b>Supply voltage</b>	_____				
<ul style="list-style-type: none"> <li>• 4 = 400 - 440 V 50/60 Hz, L1, L2, L3, PE</li> <li>• 5 = 480 - 500 V 50/60 Hz, L1, L2, L3, PE</li> <li>• 7 = 690 V 50/60 Hz, L1, L2, L3, N, PE</li> </ul>		4 5 7			
<b>Output classes</b>	_____				
<ul style="list-style-type: none"> <li>• 06L = 160 kVA</li> <li>• 08L = 300 A</li> <li>• 10L = 400 A</li> </ul>			06L 08L 10L		
<b>Function scope</b>	_____				
<ul style="list-style-type: none"> <li>• ECO = simple applications</li> <li>• BUS = robot-automated systems</li> <li>• MAN = manual systems</li> </ul>				ECO BUS MAN	
<b>Machine and robot connections</b>	_____				
<ul style="list-style-type: none"> <li>• See machine and robot connections table</li> </ul>					-zzz

## GeniusHWI product code

	GeniusHWI	U	LL	ww	zzz
<b>Family designation</b>					
<b>Mains supply voltage</b>					
<ul style="list-style-type: none"> <li>4 = 400 - 440 V, 50/60 Hz</li> <li>5 = 480 V, 50/60 Hz</li> <li>7 = 690 V, 50/60 Hz</li> </ul>		4			
		5			
		7			
<b>Output class and cooling type</b>					
<ul style="list-style-type: none"> <li>03L = 37 kVA</li> <li>03W or WA = 50 kVA</li> <li>06L = 70 kVA</li> <li>06W or WA = 110 kVA</li> <li>08L = 100 kVA</li> <li>08W or WA = 135 kVA</li> <li>13L = 165 kVA</li> <li>13W or WA = 195 kVA</li> <li>16L = 220 kVA</li> <li>16W or WA = 270 kVA</li> <li>24W = 385 kVA</li> <li>36W = 525 kVA</li> </ul>					
			03L		
			03W[A]		
			06L		
			06W[A]		
			08L		
			08W[A]		
			13L		
			13W[A]		
			16L		
			16W[A]		
			24W		
			36W		
<b>Function pack</b>					
<ul style="list-style-type: none"> <li>ECO = simple applications</li> <li>BUS = robot-automated systems</li> <li>MAN = manual systems</li> </ul>					
					ECO
					BUS
					MAN
<b>Machine and robot connections</b>					
<ul style="list-style-type: none"> <li>See machine and robot connections table</li> </ul>					-zzz

### Cooling:

L = Air cooled (force)

W = Water cooled inside panel

WA = Water cooled outside panel

## Machine and robot connections -zzz

### Machine and robot connections

<ul style="list-style-type: none"> <li>I/O = 24 V I/O</li> <li>PBS = Profibus DP electrical</li> <li>IBSe = Interbus electrical</li> <li>IBSo = Interbus optical</li> <li>PNIE = Profinet electrical</li> </ul>					
					I/O
					PBS
					IBSe
					IBSo
					PNIE

Machine and robot connections		-ZZZ
• PNlo = Profinet optical slave		PNlo
• PNSe = Profinet electrical slave		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
<b>Genius optional software functions</b>		
• AMC /DCM = Alu-Mode-Classic / AMC + Dynamic Conditioning Mode / DCM		AMC / DCM
• AMF = Aluminium Mode Force		AMF
• BD = prepared for component documentation via fieldbus		BD
• HSC = High Speed Current		HSC
• IQflex = Integrierte Qualitätsregelung inkl. Q-/IQ-Inspector & IQR		IQflex
• IQR = Adaptive feedback welding pack for steel		IQR
• Master		MASTER
• MM1 = Multi-Mess-Funktion		MM1
• MM2 = Multi-Mess-Funktion		MM2
• MTS = Multi Tool System		MTS
• PDD = Process Data Documentation with PNSe/PNSo (Profinet Slave) fieldbus card only		PDD
• PQS = preparation for PQS licence		PQS
• QI = inspector for quality		QI
• TT = Trace Tag		TT

## 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 than 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.

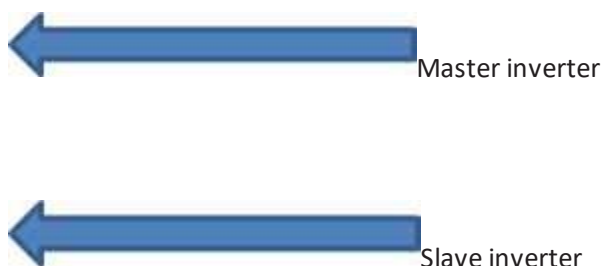


Fig. 2-20 Control cabinet with GeniusHWI master/slave

## SlaveHWI product code

	SlaveHWI	B	U	LL
<b>Family designation / device name</b>	_____			
<b>Design</b>	_____			
<ul style="list-style-type: none"> <li>• _ = MF inverter, small design (dimensions =380x310x325 mm)</li> <li>• 2 = MF inverter, design (dimensions =720x310x325 mm)</li> <li>• 3 = MF inverter, design (dimensions = 778x389x345 mm)</li> </ul>		2 3		
<b>Supply voltage</b>	_____			
<ul style="list-style-type: none"> <li>• 4 = 400 - 440 V, 50/60 Hz</li> <li>• 5 = 480 V, 50/60 Hz</li> </ul>			4 5	
<b>Output classes</b>	_____			
<ul style="list-style-type: none"> <li>• 16L = 220 kVA</li> <li>• 16W or WA = 270 kVA</li> <li>• 24W = 365 kVA</li> <li>• 36W = 525 kVA</li> </ul>				16L 16W[A] 24W 36W
<i>Available in design 2</i>				
<ul style="list-style-type: none"> <li>• 24W = 500 kVA</li> <li>• 32W = 625 kVA</li> </ul>				24W 32W
<i>Available in design 3</i>				
<ul style="list-style-type: none"> <li>• 36W = 525 kVA</li> <li>• 40W = 900 kVA</li> <li>• 45W = 950 kVA</li> <li>• 60W = 1300 kVA</li> </ul>				36W 40W 45W 60W

## Product codes for weld enclosures

### Weld enclosures

This section describes enclosures for the inverter selected. When a complete package is supplied the product code of the inverter and the weld enclosure are combined

On the sticker holding the serial number the article number of the panel is named first, followed by the inverter article number:

45567-12345

45567 Weld enclosure article number

12345 Inverter article number

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

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

#### Cabinet designation

- SR = cabinet for mounting on robot cabinet
- SH = cabinets for suspended mounting

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

Family	A	B	C	D	E
<b>Inverter design</b>	HWI MFI				
<ul style="list-style-type: none"> <li>• Genius -</li> <li>• Genius -</li> </ul>					
<b>Control cabinet supply voltage</b>		4 5 7			
<ul style="list-style-type: none"> <li>• 400 V - 440 V</li> <li>• 480 V</li> <li>• 690 V</li> </ul>					
<b>Output classes</b>					
<ul style="list-style-type: none"> <li>• 03 = 37 kVA (L) - 50 kVA (W)</li> <li>• 06 = 70 kVA (L) - 110 kVA (W)</li> <li>• 08 = 100 kVA (L) - 135 kVA (W)</li> <li>• 13 = 165 kVA (L) - 195 kVA (W)</li> <li>• 16 = 220 kVA (L) - 270 kVA (W)</li> <li>• 24 = 385 kVA</li> <li>• 36 = 525 kVA</li> <li>• 40 = 900 kVA</li> <li>• 45 = 950 kVA</li> <li>• 60 = 1300 kVA</li> </ul>			03 06 08 13 16 24 36 40 45 60		
<b>Cooling</b>				W WA L	
<ul style="list-style-type: none"> <li>• W = water cooling</li> <li>• WA = external water</li> <li>• L = air cooling</li> </ul>					

Family	A	B	C	D	E
<b>I/O profile with the version number of the 24 V unit</b>					
<ul style="list-style-type: none"> <li>• M48V1.04</li> </ul>					M48V1.04
<ul style="list-style-type: none"> <li>• M49V1.02</li> </ul>					M49V1.02
<ul style="list-style-type: none"> <li>• M61V1.01</li> </ul>					M61V1.01
<ul style="list-style-type: none"> <li>• M88V1.00</li> </ul>					M88V1.00

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

**Cabinet designation**

- SR = cabinet for mounting on robot cabinet
- SH = cabinets for suspended mounting

Family	1	2	3	4	5	6
<b>Weld enclosure size</b>						
• 0 = 24 x 47 x 16 inch	0					
• 1 = 29 x 24 x 350 inch	1					
• 2 = 24 x 47 x 16 inch	2					
• 3 = 32 x 63 x 20 inch	3					
<b>Socket</b>						
• 0 = without		0				
• 1 = 4 inch		1				
• 2 = 8 inch		2				
• 3 = closed bottom		3				
<b>Door hinges (mounting side)</b>						
• 0 = right			0			
• 1 = left			1			
• 2 = both sides			2			
<b>Mains breaker</b>						
• 0 = Eaton load-interrupter switch				0		
• 1 = Eaton power switch				1		
• 2 = ABB load-interrupter switch				2		
• 3 = ABB power switch				3		
<b>Mains switch amperage</b>						
• 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	
<b>Personal protection</b>						
• 0 = without						0
• 1 = Residual current monitoring						1
• 2 = differential current monitoring, higher currents W60AB						2
• 3 = Mains breaker with integrated residual current monitoring.						3
• 4 = fault voltage monitoring PFU6 (SI10)						4

Family	7	8	9	10	11	12	13
<b>Location electrical connections</b>							
• 0 = without	0						
• 1 = rear	1						
• 2 = bottom	2						
• 3 = top	3						
• 4 = left	4						
• 5 = right	5						
<b>Electrical connections</b>							
• 0 = without		0					
• 1 = passage		1					
• 2 = pluggable		2					
<b>Location of media supplies</b>							
• 0 = without			0				
• 1 = rear			1				
• 2 = bottom			2				
• 3 = top			3				
• 4 = left			4				
• 5 = right			5				
<b>Media type</b>							
• 0 = without				0			
• 1 = 3/8" external thread water connection on cabinet				1			
• 2 = M22x1.5 24° external thread water connection on cabinet				2			
• 3 = M16x1.5 24° water connection on inverter				3			
• 4 = 1/4" 60° water connection on inverter				4			
• 5 = HIP water 1/2" 37°, air 3/8" 45°				5			
• 6 = HIP water 1/2" M22x1.5 24°, air M16x1.5 24°				6			
<b>Signals on terminal</b>							
• 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		
<b>24 V-Power supply</b>							
• 0 = without						0	
• 1 = internally via power supply 3 A						1	
• 2 = externally via 2x AIDA						2	
• 3 = externally via 1x AIDA						3	
• 4 = externally via XLP						4	
• 5 = externally via XLP						5	
<b>Lamps &amp; Push buttons as control elements</b>							
• 0 = without operating element							0
• 1 = with operating element							1

HIP = Media plate air-water

Available weld enclosure panel dimensions:

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

*Variant table*

Weld enclosure dimensions	Operation	Mains breaker [A]						
		63	100	125	160	200	250	400
24 x 47 x 16 inch	X	X	X	X				
29 x 24 x 350 inch	X	X	X	X	X			
24 x 47 x 16 inch	X	X	X	X	X	X	X	
32 x 63 x 20 inch	X	X	X	X	X	X	X	X

**Usage example of the inverter model:**

Product code (left to right)	Description
Cabinet designation	SM
A	GeniusHWI
B	400 - 440 V
C	406
D	W
E	M48V1.04

**Usage example of the control cabinet version**

Digit product code	Code digit - description
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 50mm <sup>2</sup> )
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	SM-GeniusHWI408L-M48V1.04 - 100-111-10005-000

**Preferred type: spot welding - SR-GeniusMFI408L BUS -vv PNIe [M49V-1.02]:** Weld enclosure for mounting on robot enclosure 100-111-1100-050-00-de

Location in the code	Inverter version
1	1 - BxHxT: 740x600x350mm, RAL7035
2	0 - without base
3	0 - Right-hand door hinge, Double bit 3 mm locking mechanism
4	1 - Eaton power switch
5	1 - 100 A
6	1 - Personal protection: Residual current monitoring (max 3x 50mm <sup>2</sup> )
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

**Preference type: projection welding - SR-GeniusHWI416WA BUS - [M49V-1.02]:** Weld enclosure for mounting on machine frame 000-021-2114-010-00-de

Location in the code	Inverter version
1	0 - BxHxT: 600x760x350mm, RAL7035
2	0 - without base
3	0 - Right-hand door hinge, Double bit 3 mm locking mechanism
4	0 - Eaton load-interrupter switch with U-trip 24VDC
5	2 - 125 A
6	1 - Personal protection: Residual current monitoring (max 3x 50mm <sup>2</sup> )
7	2 - location of the electrical connections: Control cabinet bottom
8	1 - type of electrical connections: passage
9	1 - Control cabinet rear
10	4 - 1/4" male thread, inner cone 60°
11	0 - without signals on Terminal block / accessories
12	1 - internal via power supply 3A with XLP and XL8
13	0 - without operating elements
14	0 - Reserve
15	0 - Reserve

**Preference type: projection welding - SG-GeniusHWI424WA/436WA - [M49V-1.02]:** Weld enclosure for mounting on socket 220-152-2014-010-00-de

Location in the code	Inverter version
1	2 - BxHxT: 600x1200x400mm, RAL7035
2	2 - Height: 200 mm
3	0 - Right-hand door hinge, Double bit 3 mm locking mechanism
4	1 - Eaton power switch
5	5 - 250 A
6	2 - differential current monitoring, higher currents W60AB
7	2 - location of the electrical connections: Control cabinet bottom
8	0 - without connections electrical (type)
9	1 - Control cabinet rear
10	4 - 1/4" male thread, inner cone 60°
11	0 - without signals on Terminal block / accessories
12	1 - internal via power supply 3A with XLP and XL8
13	0 - without operating elements
14	0 - Reserve
15	0 - Reserve

## PC operating software

### XPegasus Silver

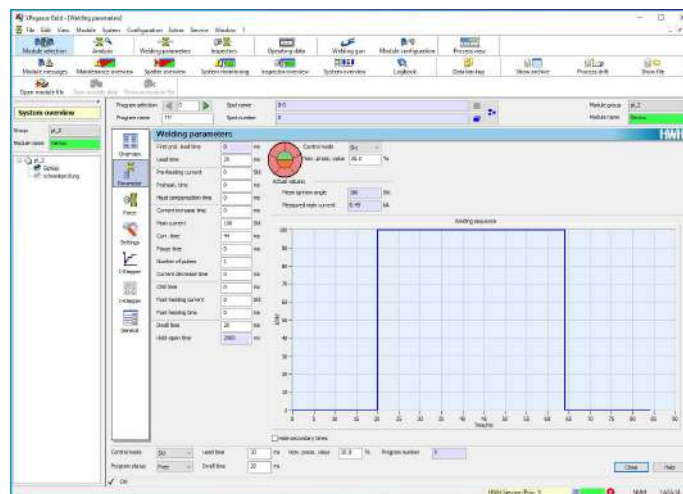
#### Programming and operating

XPegasus Silver includes all functions to program and operate your weld timer modules. The user gains a continuous and quick overview about the current state of each weld timer module with ability to program it.

XPegasus Silver is the base model with a full set of powerful functions for your production and enables up to 60 users can be defined.

#### 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 easy operation. For user ease of use, XPegasus shows functions as installed on the weld timer unit only.



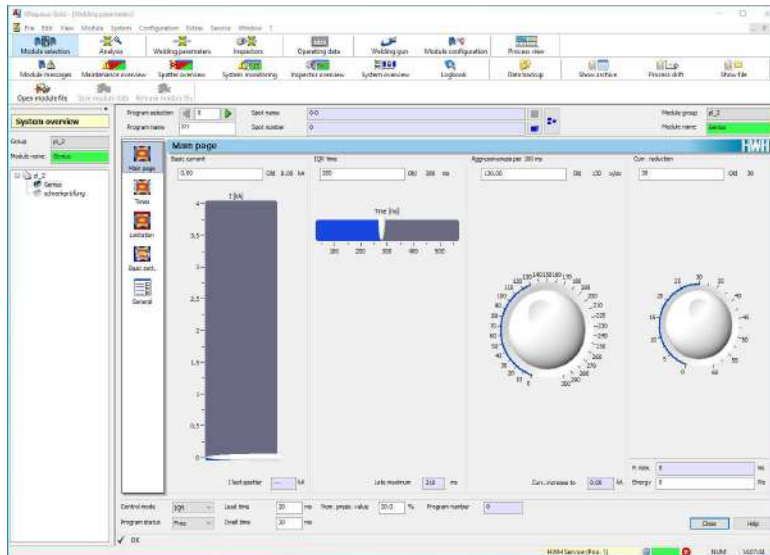
#### Analyse your process

Recent weld feedback data is graphically shown in the analysis window. This is a power tool in the commissioning phase as well every day to check weld processes. 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.

## 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.



## The Universal interface

XPegasus Silver identifies weld timers connected and shows what these timers have installed.

Weld timers suitable are:

- GeniusMFI, GeniusHWI
- GeniusAC
- HWI 28XX EVA / EVA-IQR
- Ratia 73 IQ0 bis IQ2

Also in mixed operation, of course.

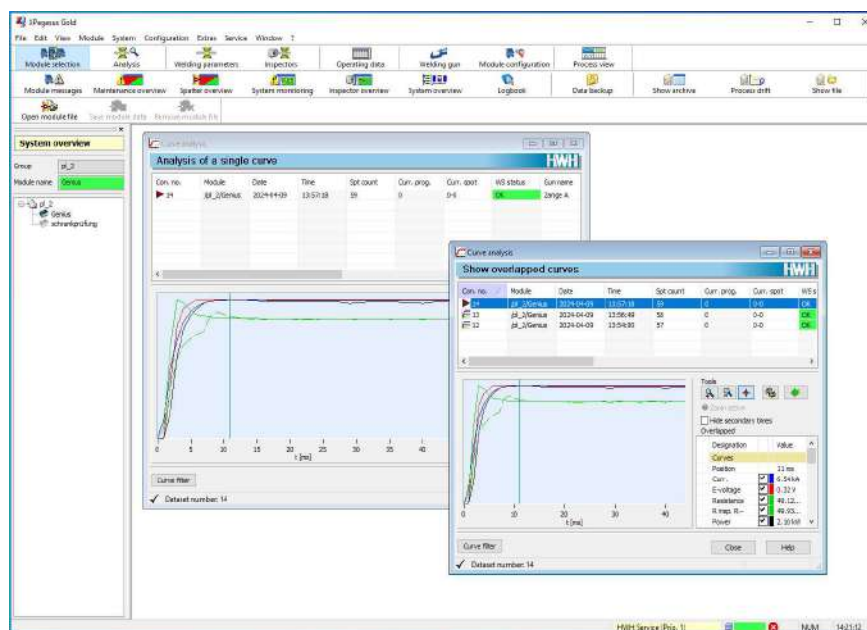
## XPegasus Gold

### Controlling, operating and archiving

The XPegasus Gold extends XPegasus Silver by an SQL database for documentation of weld parameters. Up to 60 modules can be connected and administrated typically.

### Monitor your welding processes

XPegasus Gold allows the user to review your welds by viewing the database.



### Secure your knowledge

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

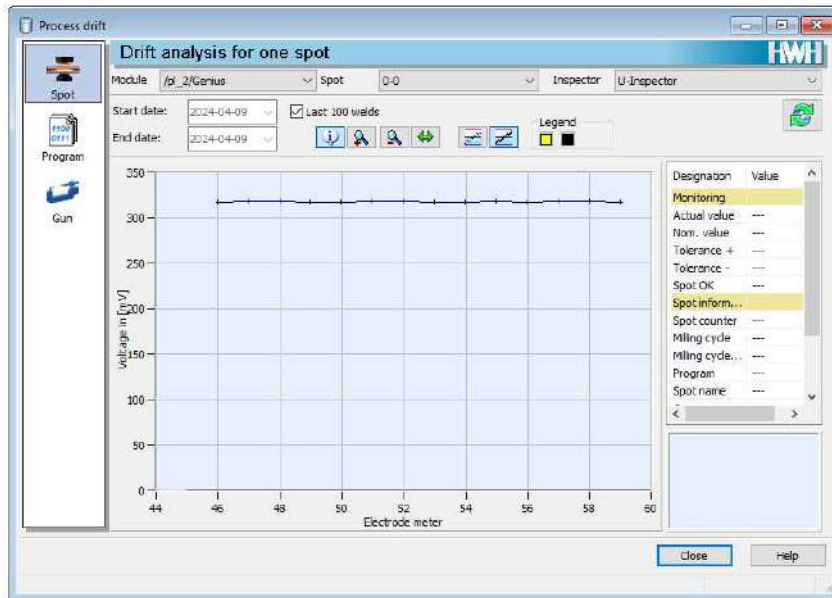
XPegasus Gold highlights:

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

## 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.



## The universal user interface

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

Use XPegasus Gold to operate your

- GeniusMFI, GeniusHWI
- GeniusAC
- HWI 28XX EVA / EVA-IQR
- Ratia 73 IQ0 bis IQ2

Also in mixed operation, of course.

## XPegasus Platinum

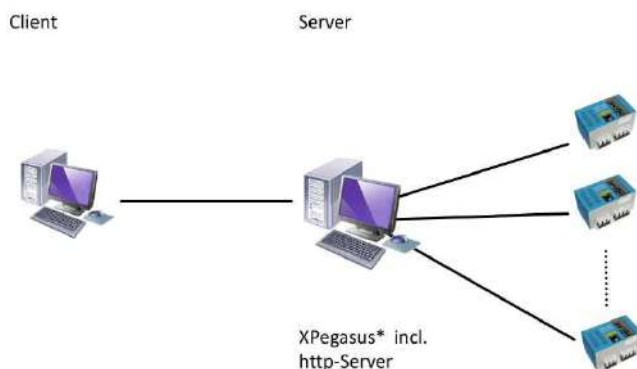
### Controlling, operating, archiving and as a server-client application

XPegasus Platinum extends the Gold version by a dedicated server solution. It's the dedicated solution for large systems in large and divided productions over different plants. 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.

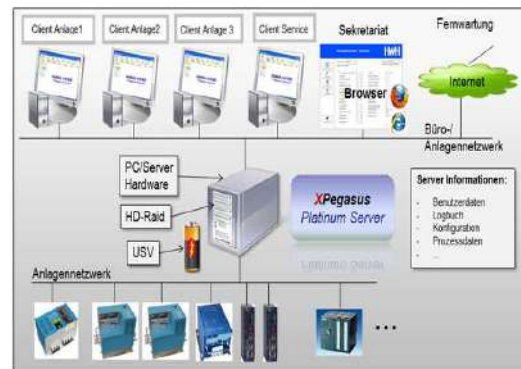
#### Monitor your welding processes

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!

## **X**Pegasus *Platinum compact*

### **Server/client solution for small installations**

The **X**Pegasus **Platinum compact** is the smaller brother of **X**Pegasus **Platinum** offers all functions as the bigger model and is only limited to 10 modules. It is offered for a lower and affordable price.

**X**Pegasus **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).

As **X**Pegasus **Platinum** also the compact version can be extended by an OPC UA interface.

### **Target group / users**

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

### **Advantages**

**X**Pegasus **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.

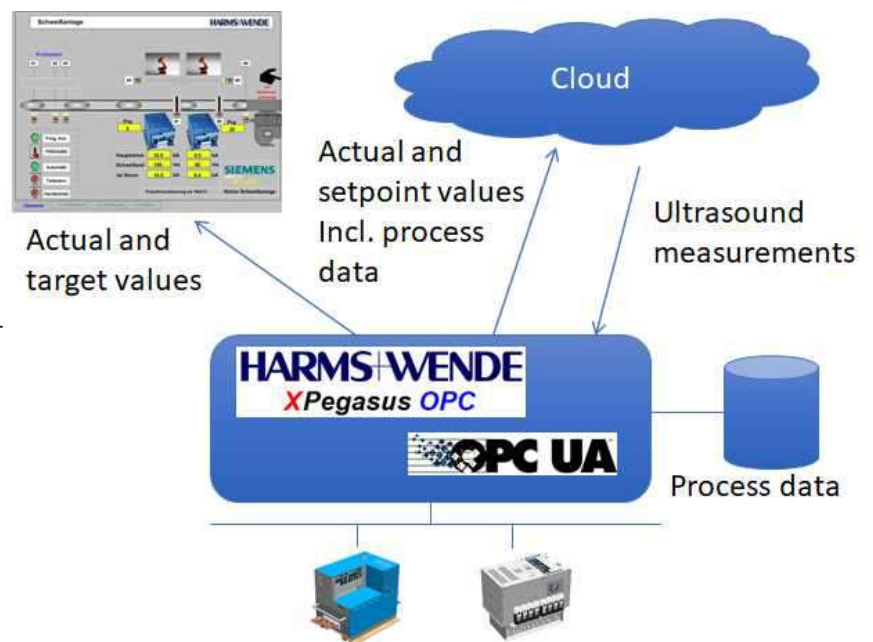
In addition, **X**Pegasus **Platinum compact** can be considered as an entry-level variant into the **Platinum** functionality. If your plant becomes larger in the future or if you then want to integrate several plants into a cluster, the software can always be converted into the full version or subsequent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

## 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.

We recommend that you take advantage of a training course when using this technology for the first time. Our experts will help you and your team to make integration into your application as easy as possible so that you don't lose any time. Get in touch with us.

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

Xcomand2.1 is the comfort HMI to one Genius MFDC inverters on machines performing demanding welds with extended monitoring and data storage (option). No network is required, the system operates standalone.

The special designed mains screen holds core information about the process at a glance.

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

The setup is very intuitive and easy to operate. Learning times are short and time to have the whole system operational short.

Quick buttons can be customized and set to functions needed in your production. This brings the system to WYSIYG state - just whats needed - no overhead.

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 X Pegasus models

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

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

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

ZUP: is our multi gun system for prototype shops.

The following PC equipment is recommended: X Pegasus data sheet		
PC	With current hardware equipment	
Processor	Processor with multi-core technology with at least 1.8 GHz Performance class (example): Intel Core™ i3 or higher 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 With activated archive function	
Number of modules for simple database control & operation	X Pegasus Silver/Gold X Pegasus Platinum X Pegasus Platinum compact	40 modules permissible 60 modules permissible 10 Module zulässig 3 Clients
Number of modules for extended database documentation & analysis	X Pegasus Silver/Gold X Pegasus Platinum X Pegasus Platinum compact	20 modules permissible 30 modules permissible 10 Module zulässig 3 Clients

## **X**Pegasus **X**Lab - Process transfer from laboratory to production - Lab2Fab

The purpose of Lab2Fab is to shorten the ramp-up time of high volume production lines drastically by a rapid and reliable data transfer from the lab to the line. Each material stackup combination (MSC) of your planned production is made under standardized and controlled conditions. The XLab software serves as operative software to create your everyday IQflex schedules for steel spot welding.

Following your specified weld test procedure, a weld recipe is generated for the current (MSC) which holds a data for the acceptable weld range from acceptable spot diameter to the expulsion limit. These recipes are accepted then by your quality assurance and end up encrypted in the database to prevent unwanted manipulation.

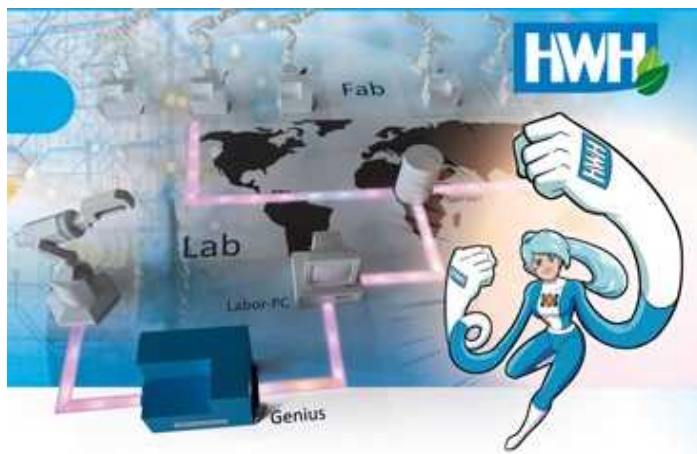
The centralized plant management using XPEGASUS Platinum+ HMI the generated recipes are transferred to all weld timers. The new IQflex technology package automatically reacts on weld gun characteristics, material fluctuations and more. In case adjustments are required, just pick another approved recipe - just use what has been approved. The method works on regular steel materials to UHSS types and is suitable for large OEM systems and tier installations.

### Features:

- Qualification of your materials in the lab
- Easy operation and process adaptation
- Simple parameterization even for complex sheet metal combinations
- Improved balance between offsite and onsite parameterization
- Retrofittable as a software upgrade for existing Genius inverters
- 100% compatibility with existing process settings (with Genius inverters)

### Benefits:

- Short commissioning times through the use of proven parameters
- Consistent quality through intelligent process monitoring
- Reduced product implementation cost through the use of a central parameter database
- Global availability of technical expertise through centralized management of welding parameters
- Lower error rate through cross-functional welding task assignment
- Equal spot diameter due to in-line reaction when the weld is made
- Usage of pre-approved recipes ensures a reliable weld process



### 1. Create a weld recipe in your own lab (XLab):

- Instead of individual traditional weld schedule programming at the weld timer, just use proven recipes
- A wizard guides through the process to avoid wrong programming.
- Logging for traceability and quality assurance (QA)

### 2. Transfer data to systems worldwide (XPegasus Platinum+):

- Minimal effort required for commissioning and optimization
- Online access for process specialists
- No adjustment of process monitoring required

### 3. Compensate for local deviations (IQflex):

- Compatible with any clamp geometry (clamp compensation)
- Adaptive welding with monitoring starting from the first spot
- Simplified optimization through predefined parameter configurations within the welding recipe

#### Benefits:

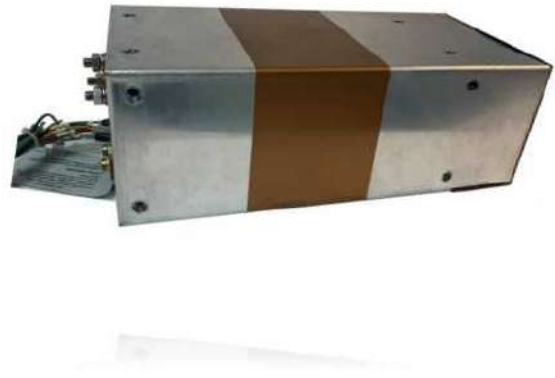
With an OPC UA interface in the XPegasus database, you can archive additional component-related test data, such as measurement data from ultrasonic testing, inspection cameras, etc. Additionally, you can use it to transfer selected archived data from XPegasus to the higher-level central database for further management according to your own IT strategy.

## Requirements

- Weld timers GeniusMFI and GeniusHWI are suitable for the IQflex technology - existing units can be upgraded.
- XPegasus Platinum user interface
- XLab software for creating welding recipes in the laboratory (optional)
- XPegasus Platinum+ software for centralized management of multiple data servers (optional)



## 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

<b>Cable for feeding the welding case</b>			
Article number	Cable	Length	Cross section
38697	Primary cable to the weld enclosure	3m	4mm <sup>2</sup>
49904	Primary cable to the weld enclosure	3m	16mm <sup>2</sup>
51110	Primary cable to the weld enclosure	3m	25mm <sup>2</sup>

<b>Primary cable for connecting the inverter to the MF transformer</b>			
Article number	Cable	Length	Cross section
44403	Primary cable to the weld transformer	1,5m	4mm <sup>2</sup>
41965	Primary cable to the weld transformer	2,5m	16mm <sup>2</sup>
4xxxx	Primary cable to the weld transformer	1,5m	25mm <sup>2</sup>
49906	Primary cable to the weld transformer	2,5m	25mm <sup>2</sup>
51112	Primary cable to the weld transformer	2,5m	25mm <sup>2</sup>

## 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 contact	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

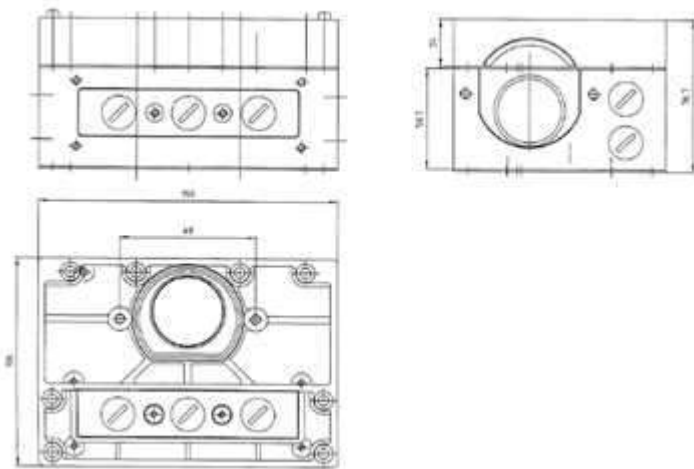


Fig. 4-1 Connection housing 16265

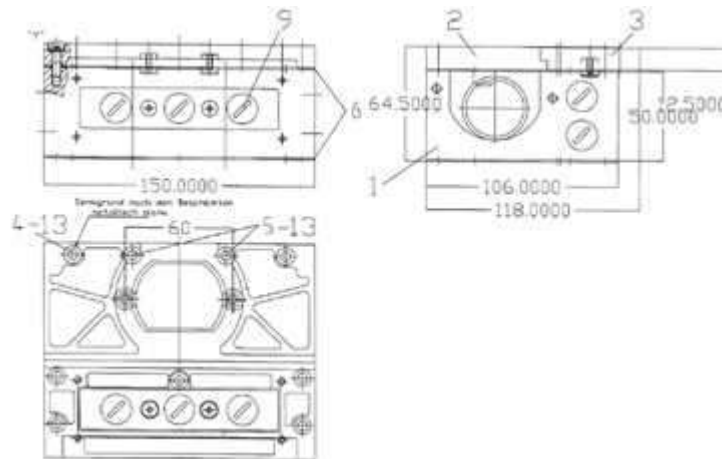


Fig. 4-2 Connection housing 16266

## 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. 5-1 Representation of SK-GeniusMFI top mounted robot cabinet

### 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 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. 5-2 Top mounted robot cabinet, interior view



Fig. 5-3 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.

## Wall-mounted cabinets

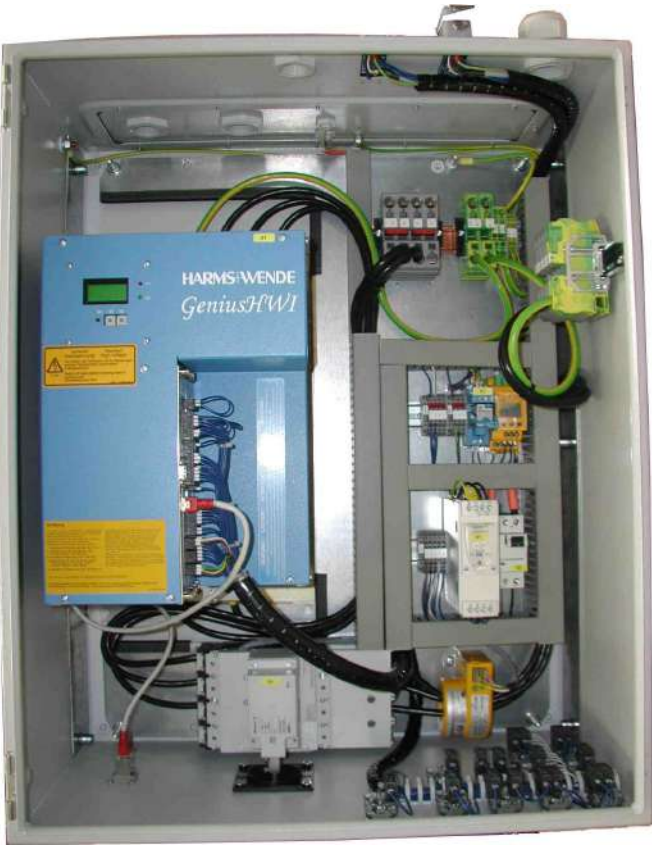


Fig. 5-4 Wall-mounted spot welding system, interior view



Fig. 5-5 Wall-mounted spot welding system, operating elements



Fig. 5-6 Wall-mounted spot welding system, connections

## Description

Manually guided electrode holders and welding systems developed specifically for this can be found in automotive engineering around the world. Whether for manual production of series production bodies or the use of manually guided welding tools in prototype engineering, Harms & Wende HPA manual spot welding systems offer the right solution. The combination of a powerful Genius inverter, the event controlled IQR process control system and a bespoke control cabinet with integrated operating elements is ideal for these applications. The manual spot welding systems with Genius inverter can be supplier pre-parameterised for a number of welding tasks; correspondingly coded connectors enable error-free assembly. This enables fast commissioning with minimal effort – "welding out of the box".

The HPA wall-mounted spot welding system from Harms & Wende is based on the powerful GeniusMFI series inverters. The requirements on a manually guided welding system are met thanks to an intelligent housing design. Signal lamps and buttons integrated into the housing floor or door quickly and reliably indicate the current status of the system to the operator. The operating elements enable the uncomplicated selection of important functions such as electrode management and milling cutter control. To save valuable space in the production shop, wall mounting with operating elements integrated into the floor is appropriate for HPA manual welding systems.

## Multi-gun systems for interchangeable tools



Fig. 5-7 One cabinet with a central switching PCB

### Description

If the use of many different electrode holders is necessary but the space available for the control and power electronics is limited, the use of a multi-gun system with MTS is appropriate. The Multi Tool System enables the connection of a maximum of two electrode holders and the welding transformers, pressure valves and tool memory PCBs (WPS1) assigned to them to a welding control system.

The MTS can be installed in almost any conventional welding case to save space. The use of several gun changeover PCBs therefore enables a total of up to four electrode holders to be operated on one inverter. Vehicle prototype construction is a typical application. A large variety of welding tools is required for this. The use of MTS enables inverter technology investment costs to be reduced without limiting this variety.



Gun changeover PCB	Function scope
Outputs / actuation	Solenoid valve, proportional valve, output contactor
Dimensions	
Connection types	Serial communication with the tool memory
Switching types / main switch	
Fieldbus / variants	
Overall weight	

## Floor-standing cabinets



Fig. 5-9 Control cabinet with master/slave



Fig. 5-10 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. 5-11 Welding hollow sections

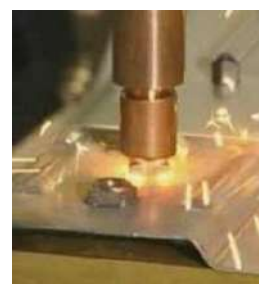


Fig. 5-12 Welding nuts

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
Terminal strip for connections	All connections routed via terminals as an alternative to direct application to the welding control system and the power unit
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	Service socket
Indicator lamps and buttons	Error, error reset





## 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. 6-1 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

## Current and force measuring device TE 1700C

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

## 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. 6-2 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, max. 1200 daN
TE1600 multi with Rogowski belt and force measuring probe	Portable current / force measuring device Optional measurement of current (1635) and force (1675)

Extensions	Description
Current measuring belt 1635	Rogowski belt for TE1600, 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 Current	19662	Combinable current, time and force measuring device: Current measuring device version including:- TE1635 Current measuring belt, diameter approx. 160 mm, 150 mV/kA L= 2000mm- Calibration
TE 1600 Force	19663	Combinable current, time and force measuring instrument:Version force measuring instrument including:- TE1675 force transducer for small electrode spacing min. 10 mm Measuring range up to 1.200 daN- Calibration
TE 1600 Current + Force	25420	Combinable current, time and force measuring device Current and force measuring device version including:- TE1635 Current measuring belt, diameter approx. 160 mm, 150 mV/kA L= 2000mm- TE1673 Force measuring transducer for small electrode spacing min. 10 mm Measuring range up to 200 daN- Calibration
TE 1600 Current + Force	19664	Combinable current, time and force measuring device Current and force measuring device version including:- TE1635 Current measuring belt, diameter approx. 160 mm, 150 mV/kA L= 2000mm- TE1675 Force measuring transducer for small electrode spacing min. 10 mm Measuring range up to 1.200 daN- Calibration

## TE 1600 extension and spare parts:

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

## Distance measurement



Fig. 6-3 Distance sensor

Fig. 6-4 Measuring transducer



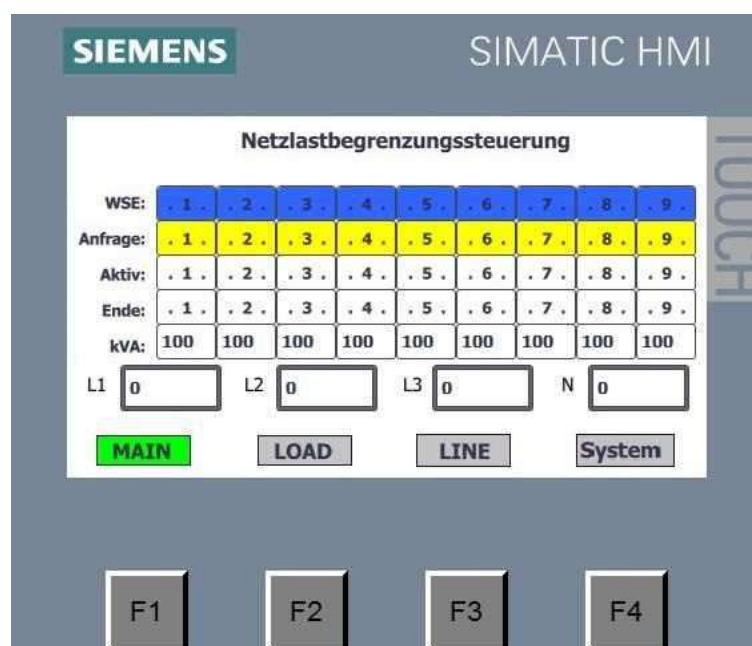
Fig. 6-5 Distance sensor 100 mm

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 With ball joint as link
29854	Measuring transducer MPS100	Measuring transducer for potentiometric sensors, 0-10 V, supply voltage 24 VDC
34314	Measuring transducer MPX101	Measuring transducer for potentiometric sensors, 0-10 V, supply voltage 24 VDC, adjustable range.

## Netzlastbegrenzungssteuerung

The mains load limitation control NBS-9 is available from 2022 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 SIMATIC HMI FLOAD NBS control system
- Cost-optimized installation possible (optimization: cable cross-sections, medium voltage transformer, fuses, ...)
- Symmetrical loading of the medium voltage transformer

## LVMU

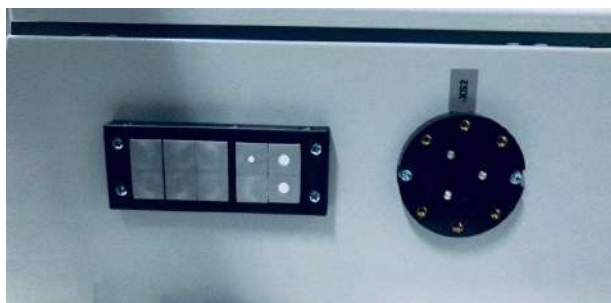
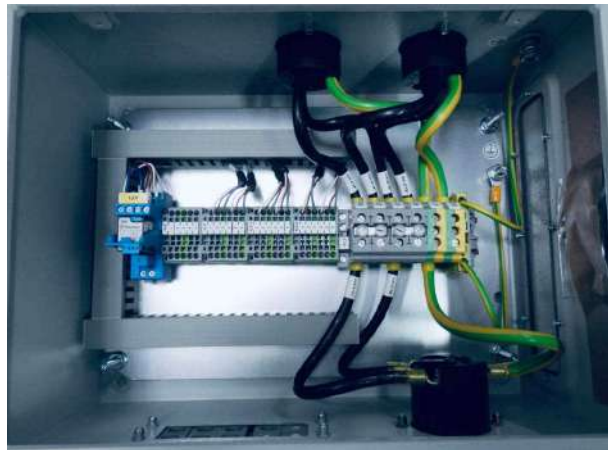


Fig. 6-6 LVMU power distribution and measurement signal switchover

### Description / application

The power distributor with measurement signal switching LVMU enables the use of multiple welding systems such as e.g. our standard robot add-on cabinets.

If several guns are used in stationary form or in combination with robot-guided guns, an LVMU can be used to route the system output via a multi-contact or cable duct to the welding tools, thus saving a further system.

If there are 3 welding spots, the LVMU can also be operated in a cascade.

An actuation signal from the standard Genius firmware in combination with the specifically appropriate I/O profiles is available for operation with an LVMU.

If several LVMUs are used, the signal must be generated from the PLC or robot process program.

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

## HWC-ETH module



Fig. 6-7 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 X<sup>P</sup>egasus 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 (X Pegasus 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

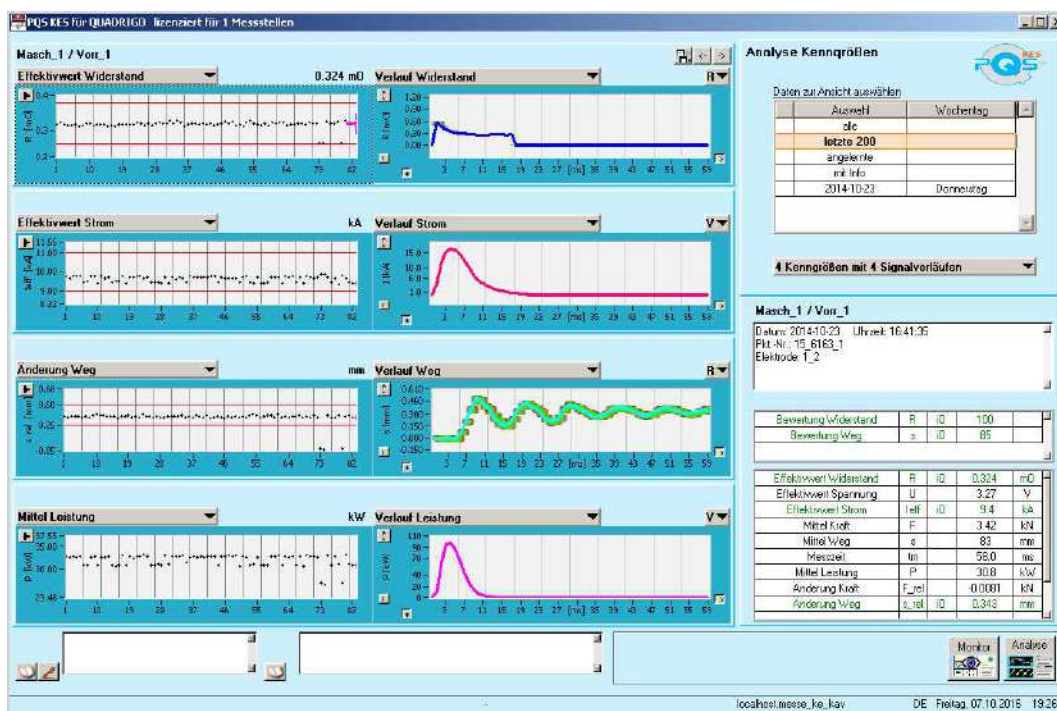


Fig. 6-8 PQS-Res software parameter analysis window

## QUADRIGO-Master



Fig. 6-9 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. 6-10 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 QUADRIGO 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	
<ul style="list-style-type: none"> <li>• Resistance welding</li> <li>• General welding technology</li> </ul>	
Device technology	
<ul style="list-style-type: none"> <li>• Components of the welding technology used</li> </ul>	
Operating software	
<ul style="list-style-type: none"> <li>• System messages</li> <li>• Behaviour in the event of a fault</li> <li>• Who can help me?</li> </ul>	
Duration	3 days
Place	Harms &Wende GmbH & Co. KG Großmoorkehre 9 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	
<ul style="list-style-type: none"> <li>• Resistance welding</li> <li>• General welding technology</li> <li>• General parameterisation</li> </ul>	
Device technology	
<ul style="list-style-type: none"> <li>• Components of the welding technology used</li> <li>• Behaviour of the control system</li> </ul>	
Operating software	
<ul style="list-style-type: none"> <li>• Basic parameters</li> <li>• Module configuration</li> <li>• Data backup</li> <li>• Inputs/outputs (diagnosis)</li> <li>• System messages</li> <li>• Behaviour in the event of a fault</li> <li>• Who can help me?</li> </ul>	
Duration	2 days
Place	Harms &Wende GmbH & Co. KG Großmoorkehre 9 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	
<ul style="list-style-type: none"> <li>• Resistance welding</li> <li>• General welding technology</li> <li>• General parameterisation</li> </ul>	
Device technology	
<ul style="list-style-type: none"> <li>• Components of the welding technology used</li> <li>• Behaviour of the control system</li> </ul>	
Operating software	
<ul style="list-style-type: none"> <li>• Basic parameters</li> <li>• Module configuration</li> <li>• Data backup</li> <li>• Inputs/outputs (diagnosis)</li> <li>• System messages</li> <li>• Behaviour in the event of a fault</li> <li>• Who can help me?</li> </ul>	
Duration	4 days
Place	Harms &Wende GmbH & Co. KG Großmoorkehre 9 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	
<ul style="list-style-type: none"> <li>• Resistance welding</li> <li>• General welding technology</li> <li>• General parameterisation</li> </ul>	
Device technology	
<ul style="list-style-type: none"> <li>• Components of the welding technology used</li> <li>• Design, function, components, communication with the PC / device</li> <li>• Communication with the machine</li> <li>• Replacement parts, installation/removal</li> <li>• Design and connections</li> <li>• Software update</li> </ul>	
Operating software	
<ul style="list-style-type: none"> <li>• Basic parameters</li> <li>• System messages</li> <li>• Who can help me?</li> </ul>	
Duration	2 days
Place	Harms &Wende GmbH & Co. KG Großmoorkehre 9 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	
<ul style="list-style-type: none"> <li>• Resistance welding</li> <li>• General welding technology</li> <li>• General parameterisation</li> </ul>	
Device technology	
<ul style="list-style-type: none"> <li>• Components of the welding technology used</li> <li>• Device overview</li> <li>• Design, function, components, communication with the PC / device</li> <li>• Communication with the machine</li> <li>• Replacement parts, installation/removal</li> <li>• Design and connections</li> <li>• Software update</li> </ul>	
Operating software	
<ul style="list-style-type: none"> <li>• Basic parameters</li> <li>• Module configuration</li> <li>• Data backup</li> <li>• Inputs/outputs (diagnosis)</li> <li>• Error messages</li> <li>• Behaviour in the event of a fault</li> <li>• Who can help me?</li> </ul>	
Duration	4 days
Place	Harms &Wende GmbH & Co. KG Großmoorkehre 9 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	
<ul style="list-style-type: none"> <li>• Resistance welding</li> <li>• General welding technology</li> <li>• General parameterisation</li> </ul>	
Device technology	
<ul style="list-style-type: none"> <li>• Components of the welding technology used</li> <li>• Device overview</li> <li>• Design, function, components, communication with the PC / device</li> <li>• Communication with the machine</li> <li>• Replacement parts, installation/removal</li> <li>• Design and connections</li> <li>• Software update</li> </ul>	
Operating software	
<ul style="list-style-type: none"> <li>• Basic parameters</li> <li>• Module configuration</li> <li>• Data backup</li> <li>• Inputs/outputs (diagnosis)</li> <li>• System messages</li> <li>• Behaviour in the event of a fault</li> <li>• Who can help me?</li> </ul>	
Duration	4 days
Place	Harms &Wende GmbH & Co. KG Großmoorkehre 9 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
- SinusHWI,
- SlaveHWI
- MFP

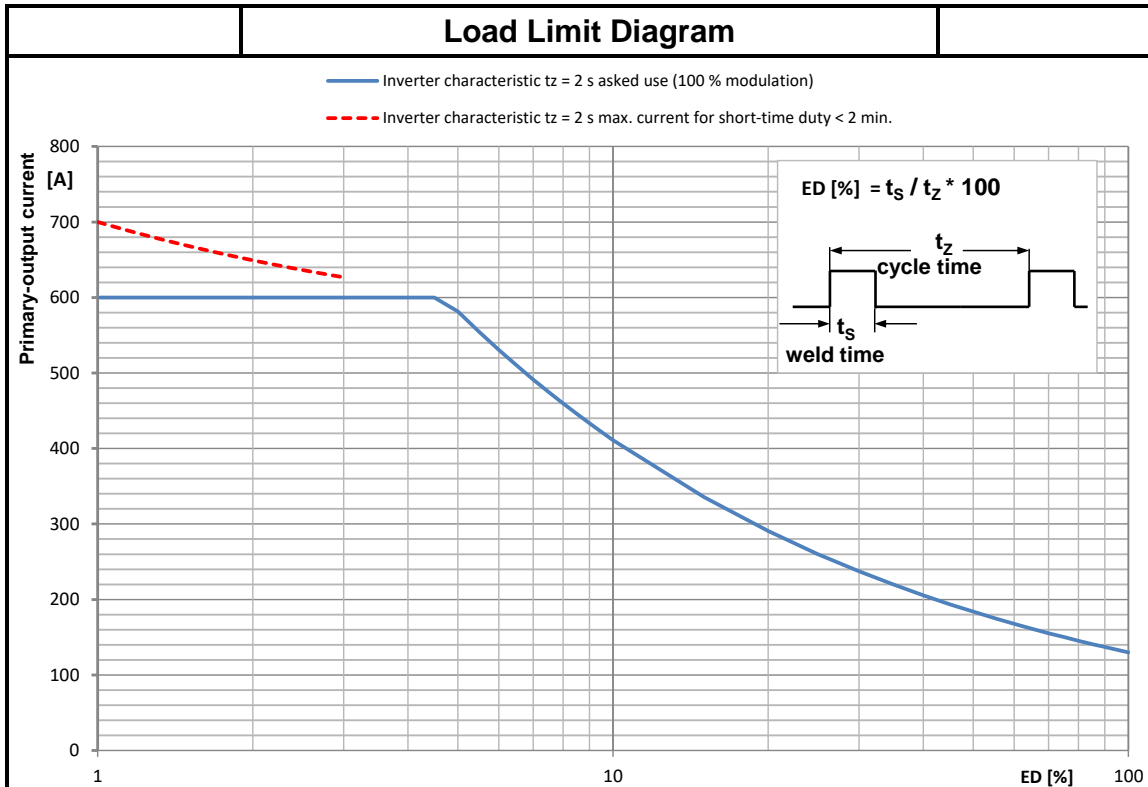
Not all output classes are available in the device profiles.

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 MFI408L

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

### Technical data

Designation	MFI408L	
Cooling medium	Air	
Line voltage range	3 ph, -15 %, +20 %	400 V - 480 V
Line voltage range		
Output voltage	500 V - 600 V	
Output voltage		
Rated output	20 % ED <sup>2)</sup>	146 kVA
Primary output current	20 % ED <sup>1)</sup>	291 A
Primary output current	100 % ED <sup>1)</sup>	130 A
Max. primay output current	[10 ms]	700 A
Main nominal current (max. thermal continuous current) <sup>3)</sup>		92 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	

<sup>1)</sup> Peak current is specified.

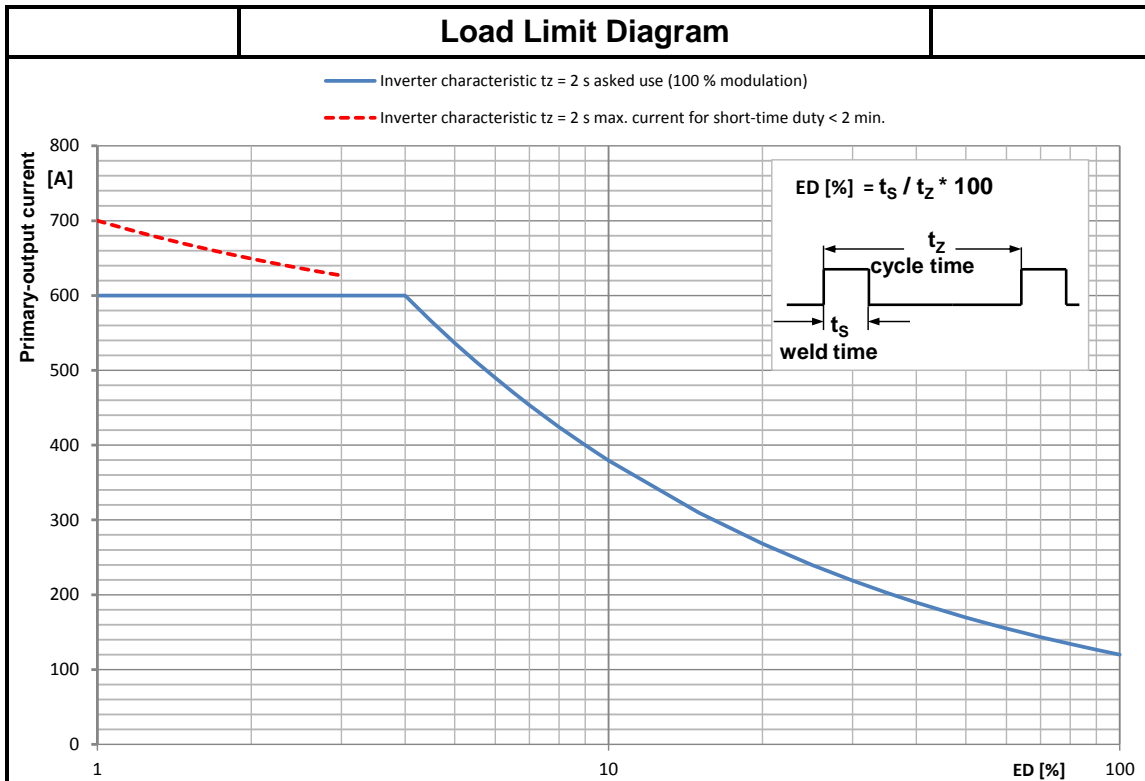
<sup>2)</sup> The rated output at 500 V mains voltage is specified.

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

	DATUM	GEZEICHNET	GEPRÜFT	DRAWINGNUMBER	41171-03en	SHEET	1
	NAME	Reichardt	A.Hoops				
STATUS:				TITLE	GeniusMFI408L	SHEETS	1

Limit value chart MFI708L

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

Technical data

Designation		MFI708L
Cooling medium	Air	
Line voltage range	3 ph, N, -15 %, +20 %	690 V
Line voltage range		
Output voltage		500 V
Output voltage		
Rated output	20 % ED <sup>2)</sup>	134 kVA
Primary output current	20 % ED <sup>1)</sup>	268 A
Primary output current	100 % ED <sup>1)</sup>	120 A
Max. primay output current	[10 ms]	700 A
Main nominal current (max. thermal continuous current) <sup>3)</sup>		85 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	

<sup>1)</sup> Peak current is specified.

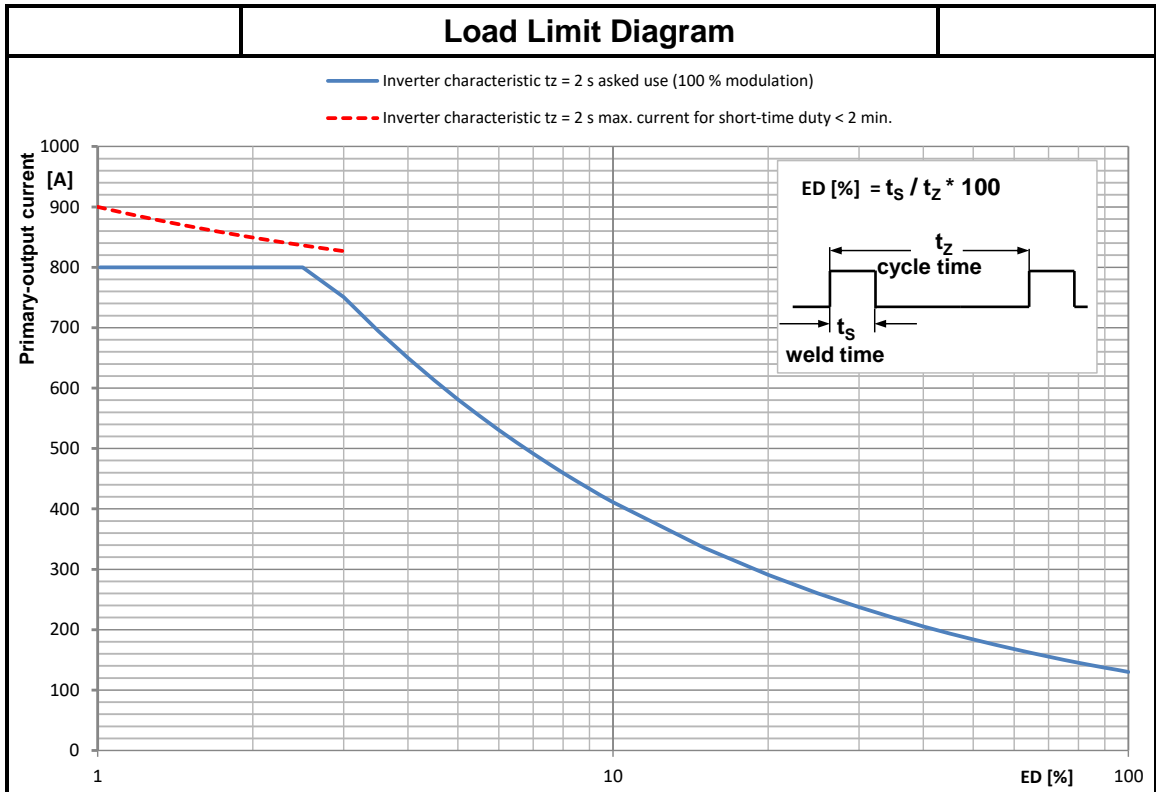
<sup>2)</sup> The rated output at 500 V mains voltage is specified.

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

	GEZEICHNET	GEPRÜFT	DRAWINGNUMBER	41205-01en	SHEET	1
	DATUM	2017-07-11				
	NAME	Reichardt	Erdmann	TITLE	GeniusMFI708L	SHEETS
STATUS:						

# Limit value chart MFI410L

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

#### Technical data

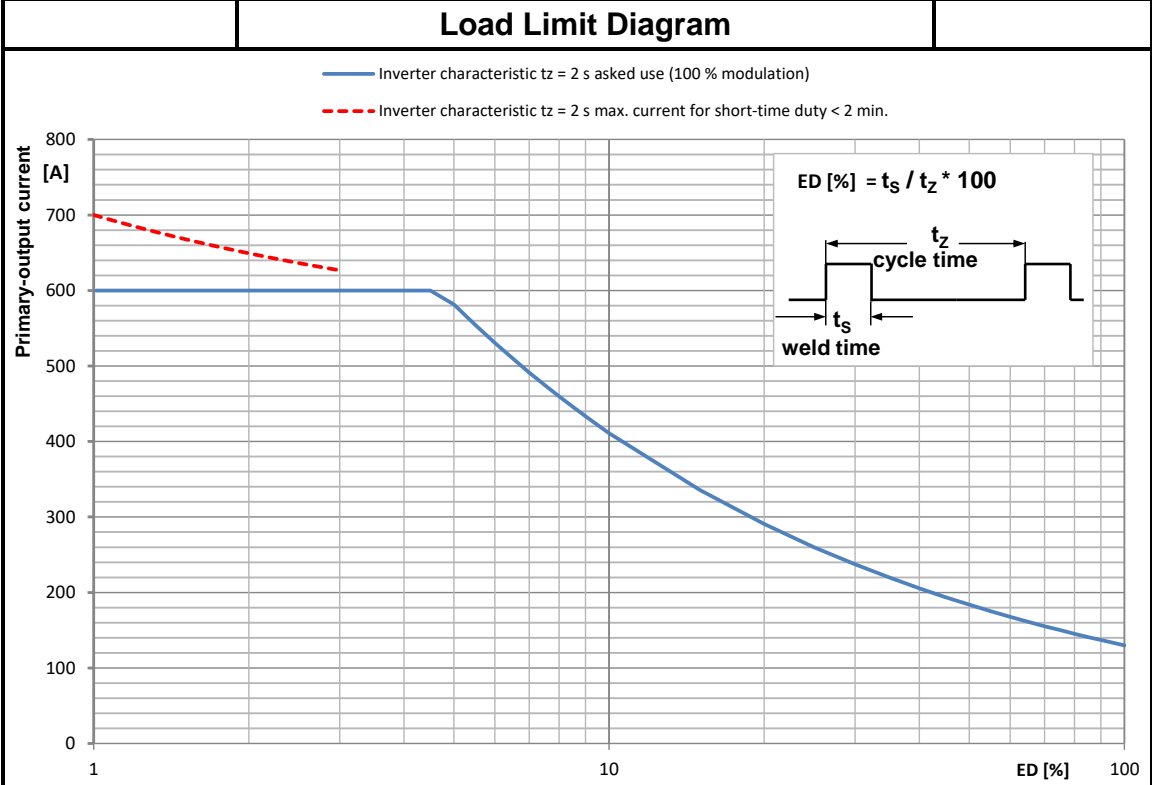
Designation	MFI410L	
Cooling medium	Air	
Line voltage range	3 ph, -15 %, +20 %	400 V - 480 V
Line voltage range		
Output voltage	500 V - 600 V	
Output voltage		
Rated output	20 % ED <sup>2)</sup>	146 kVA
Primary output current	20 % ED <sup>1)</sup>	291 A
Primary output current	100 % ED <sup>1)</sup>	130 A
Max. primay output current	[10 ms]	900 A
Main nominal current (max. thermal continuous current) <sup>3)</sup>		92 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	

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

 HARMS WENDE	DATUM	GEZEICHNET	GEPRÜFT	DRAWINGNUMBER <b>41172-03en</b>	SHEET <b>1</b>
		2021-04-20	2021-04-20		
	NAME	Reichardt	A.Hoops	TITLE <b>GeniusMFI410L</b>	SHEETS <b>1</b>
	STATUS:				

**Limit value chart HFIx08L**

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

**Technical data**

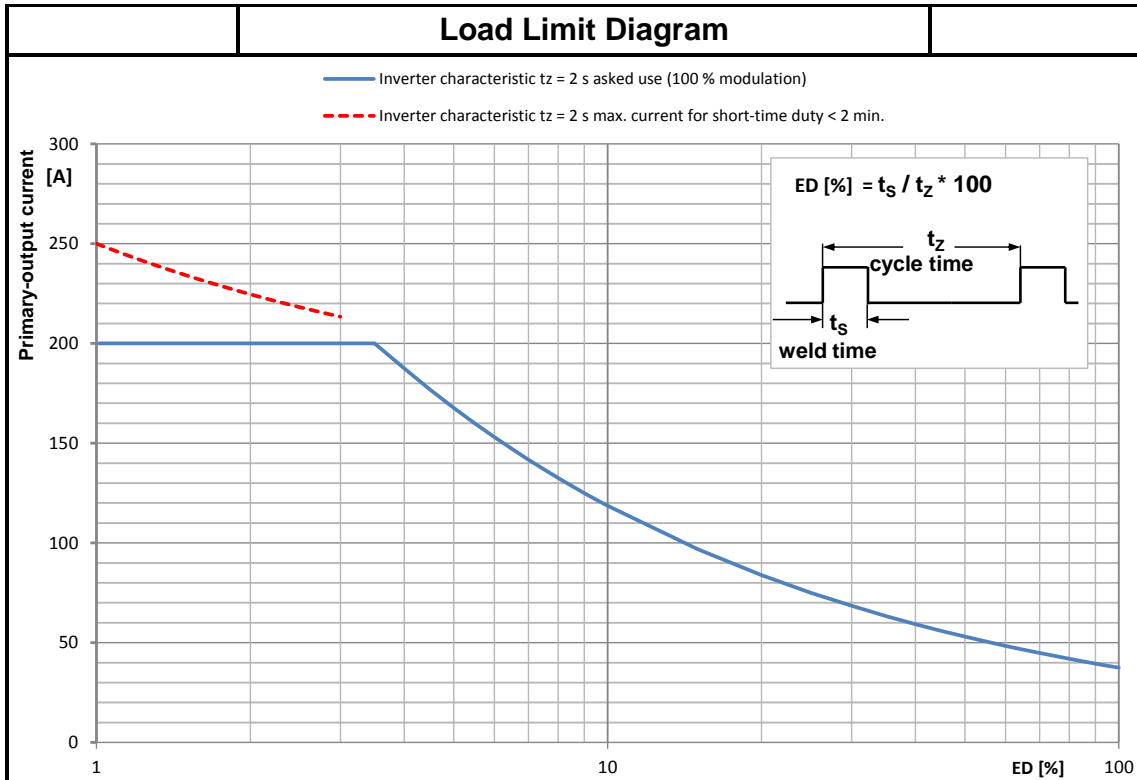
Designation	HFI408L	
Cooling medium	Air	
Line voltage range	3 ph, -15 %, +20 %	400 V - 480 V
Line voltage range		
Output voltage	500 V - 600 V	
Output voltage		
Rated output	20 % ED <sup>2)</sup>	146 kVA
Primary output current	20 % ED <sup>1)</sup>	291 A
Primary output current	100 % ED <sup>1)</sup>	130 A
Max. primay output current	[10 ms]	700 A
Main nominal current (max. thermal continuous current) <sup>3)</sup>		92 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	

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

	GEZEICHNET	GEPRÜFT	DRAWINGNUMBER	41171-03en	SHEET	1	
	DATUM	2021-04-20					2021-04-20
	NAME	Reichardt	A.Hoops	TITLE	GeniusHFI408L	SHEETS	1
	STATUS:						

# Limit value chart x03L

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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 <sup>2)</sup>	42 kVA	
Primary output current	20 % ED <sup>1)</sup>	84 A	
Primary output current	100 % ED <sup>1)</sup>	38 A	
Max. primay output current	[10 ms]	250 A	
Main nominal current (max. thermal continuous current) <sup>3)</sup>		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	

<sup>1)</sup> Peak current is specified.

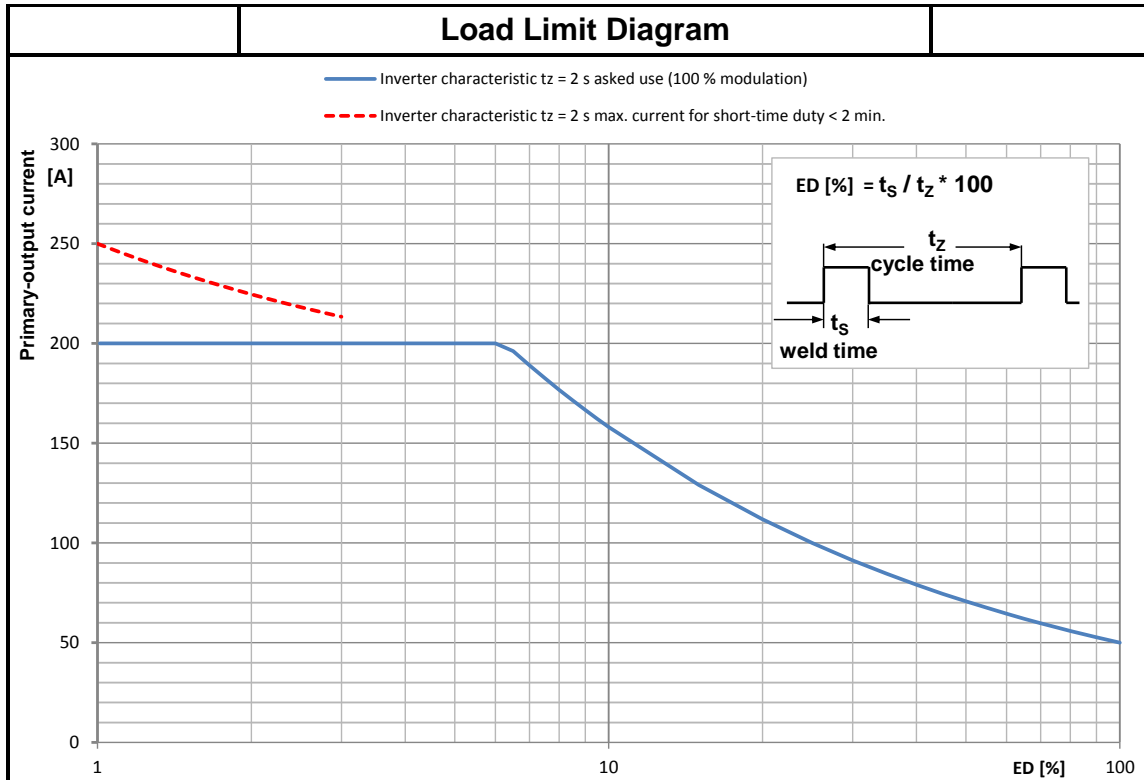
<sup>2)</sup> The rated output at 500 V mains voltage is specified.

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

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

Limit value chart x03W

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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 <sup>2)</sup>	56 kVA	
Primary output current	20 % ED <sup>1)</sup>	112 A	
Primary output current	100 % ED <sup>1)</sup>	50 A	
Max. primay output current	[10 ms]	250 A	
Main nominal current (max. thermal continuous current) <sup>3)</sup>		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	

<sup>1)</sup> Peak current is specified.

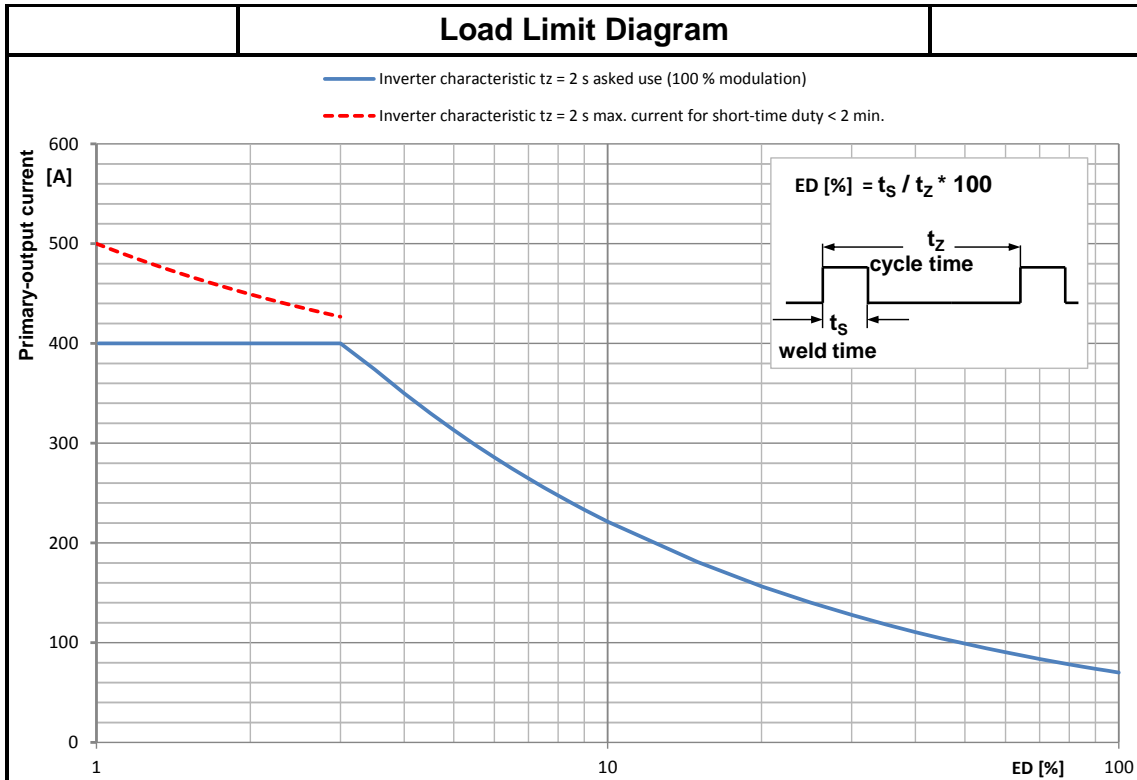
<sup>2)</sup> The rated output at 500 V mains voltage is specified.

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

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

# Limit value chart x06L

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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 <sup>2)</sup>	79 kVA	
Primary output current	20 % ED <sup>1)</sup>	157 A	
Primary output current	100 % ED <sup>1)</sup>	70 A	
Max. primay output current	[10 ms]	500 A	
Main nominal current (max. thermal continuous current) <sup>3)</sup>		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	

<sup>1)</sup> Peak current is specified.

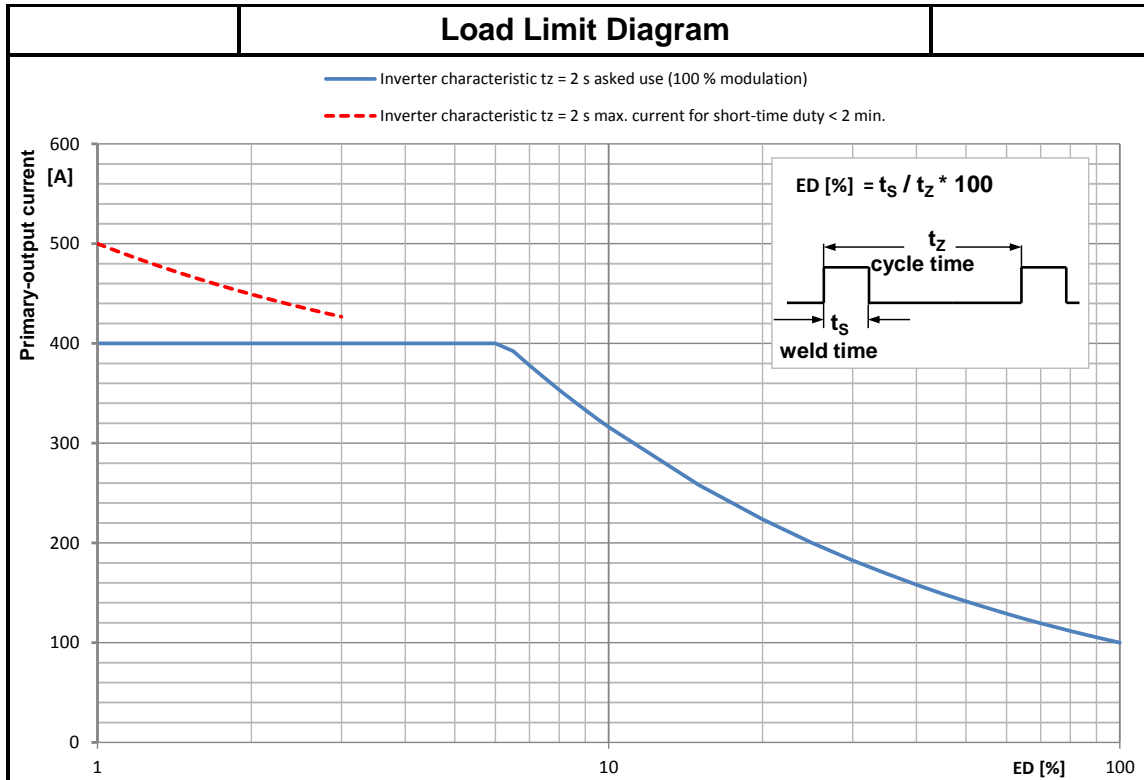
<sup>2)</sup> The rated output at 500 V mains voltage is specified.

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

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

Limit value chart x06W

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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 <sup>2)</sup>	112 kVA	
Primary output current	20 % ED <sup>1)</sup>	224 A	
Primary output current	100 % ED <sup>1)</sup>	100 A	
Max. primay output current	[10 ms]	500 A	
Main nominal current (max. thermal continuous current) <sup>3)</sup>		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	

<sup>1)</sup> Peak current is specified.

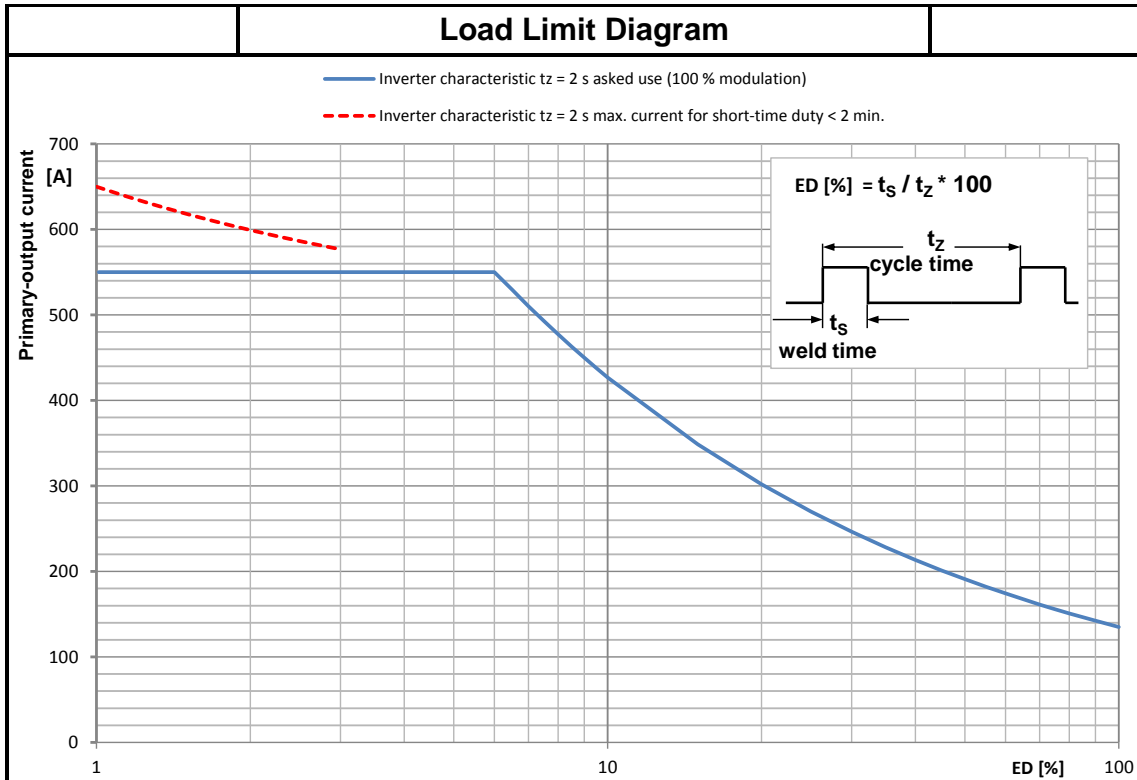
<sup>2)</sup> The rated output at 500 V mains voltage is specified.

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

	GEZEICHNET	GEPRÜFT	DRAWINGNUMBER	41179-01en	SHEET	1	
	DATUM	2017-07-11					2017-07-13
	NAME	Reichardt	Erdmann	TITLE	HWI2806W / Genius-, Sinius-, AnalogHWI x06W, MFPx06W	SHEETS	1
	STATUS:						

# Limit value chart x08L

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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 <sup>2)</sup>	151 kVA	
Primary output current	20 % ED <sup>1)</sup>	302 A	
Primary output current	100 % ED <sup>1)</sup>	135 A	
Max. primay output current	[10 ms]	650 A	
Main nominal current (max. thermal continuous current) <sup>3)</sup>		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	

<sup>1)</sup> Peak current is specified.

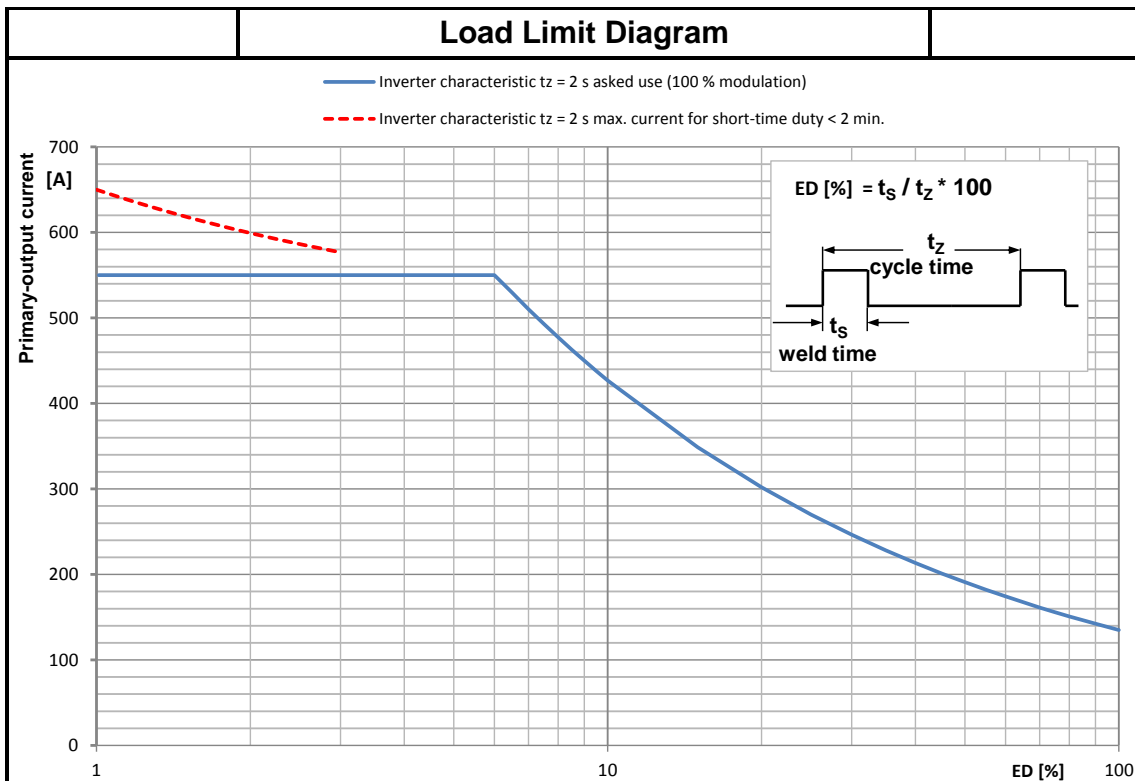
<sup>2)</sup> The rated output at 500 V mains voltage is specified.

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

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

Limit value chart x08W

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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 <sup>2)</sup>	151 kVA	
Primary output current	20 % ED <sup>1)</sup>	302 A	
Primary output current	100 % ED <sup>1)</sup>	135 A	
Max. primay output current	[10 ms]	650 A	
Main nominal current (max. thermal continuous current) <sup>3)</sup>		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	

<sup>1)</sup> Peak current is specified.

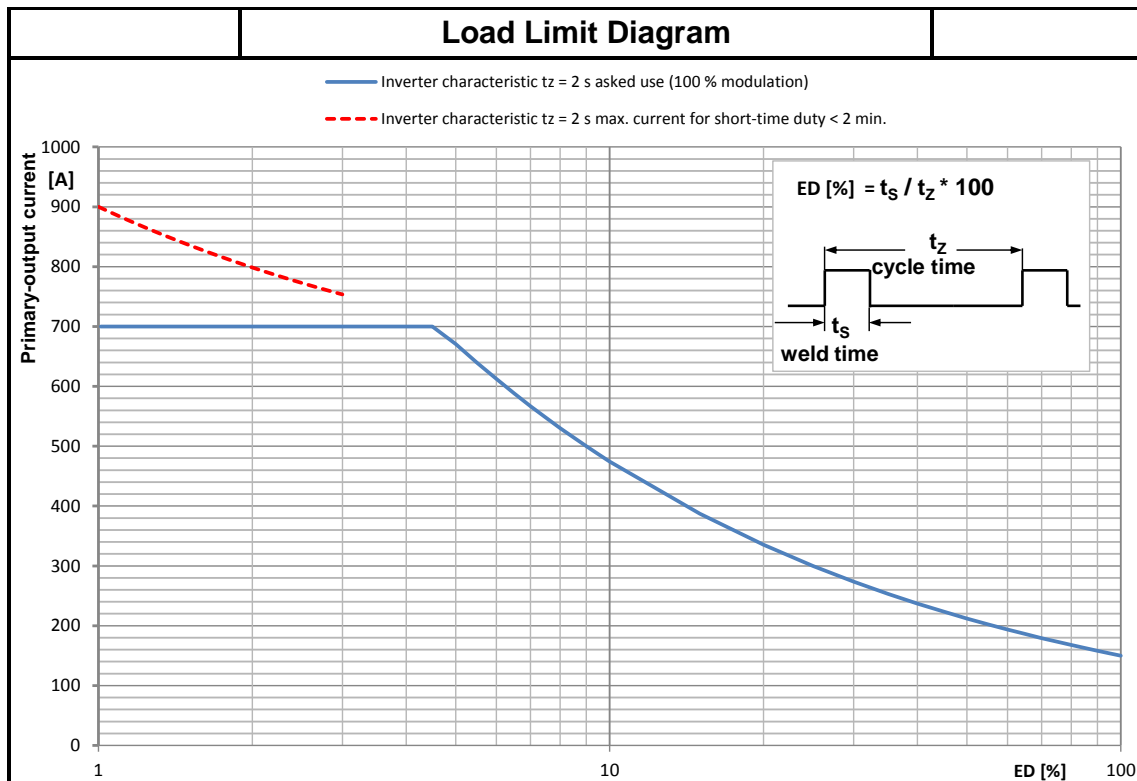
<sup>2)</sup> The rated output at 500 V mains voltage is specified.

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

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

# Limit value chart x13L

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**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 <sup>2)</sup>	168 kVA	
Primary output current	20 % ED <sup>1)</sup>	335 A	
Primary output current	100 % ED <sup>1)</sup>	150 A	
Max. primay output current	[10 ms]	900 A	
Main nominal current (max. thermal continuous current) <sup>3)</sup>		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	

<sup>1)</sup> Peak current is specified.

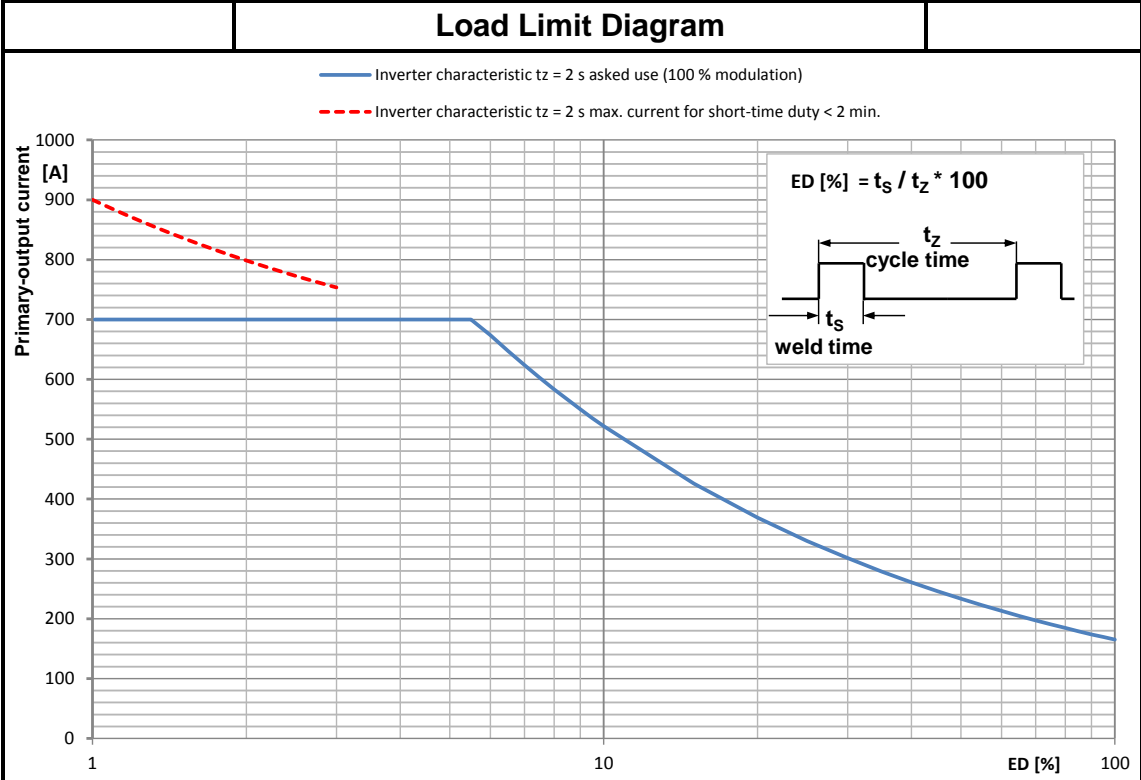
<sup>2)</sup> The rated output at 500 V mains voltage is specified.

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

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

**Limit value chart x13W**

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

**Technical data**

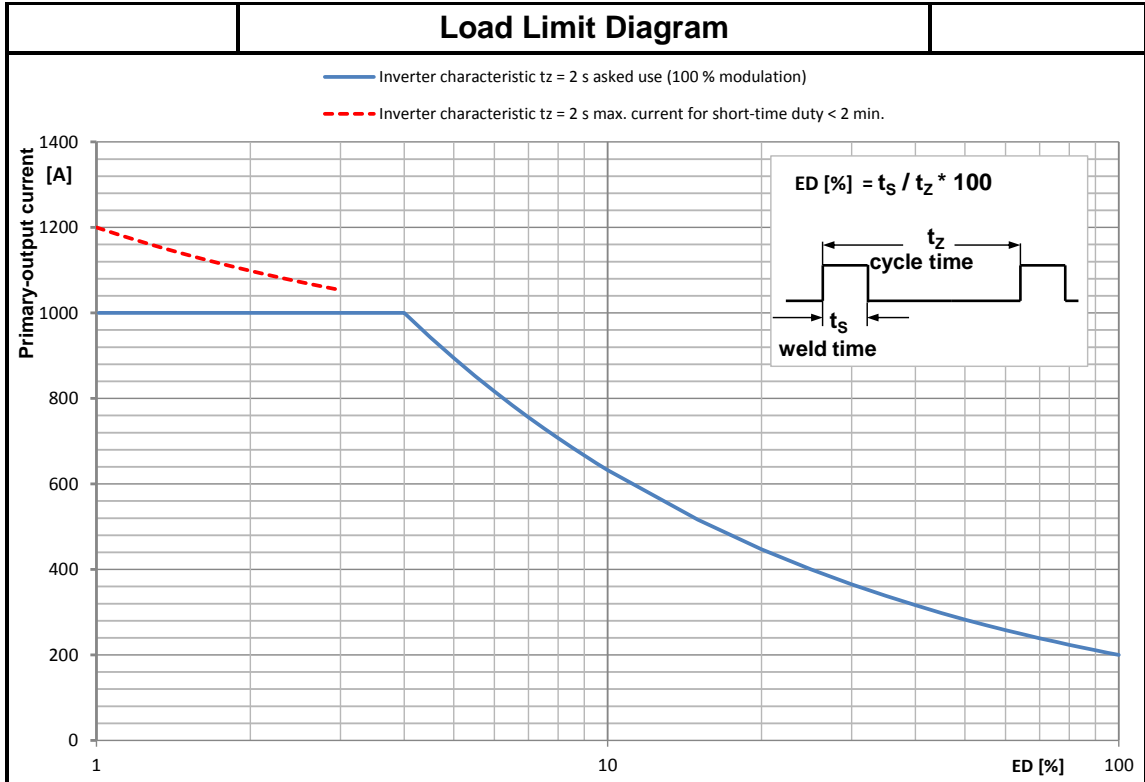
Designation		HWI413W	HWI513W
Cooling medium		Water	
Line voltage range	3 ph, -15 %, +20 %	400 / 440 V	
Line voltage range	3 ph, -15 % +10 %		480 V
Output voltage		500 / 550 V	
Output voltage			600 V
Rated output	20 % ED <sup>2)</sup>	185 kVA	
Primary output current	20 % ED <sup>1)</sup>	369 A	
Primary output current	100 % ED <sup>1)</sup>	165 A	
Max. primay output current	[10 ms]	900 A	
Main nominal current (max. thermal continuous current) <sup>3)</sup>		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	

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

	GEZEICHNET	GEPRÜFT	DRAWINGNUMBER	<b>41183-01en</b>	SHEET <b>1</b>	
	DATUM	2017-07-11				2017-07-13
	NAME	Reichardt	Erdmann	TITLE	<b>HWI2813W / Genius-, Sinius-, AnalogHWI13W, MFPx13W</b>	SHEETS <b>1</b>
	STATUS:					

# Limit value chart x16L

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

**Technical data**

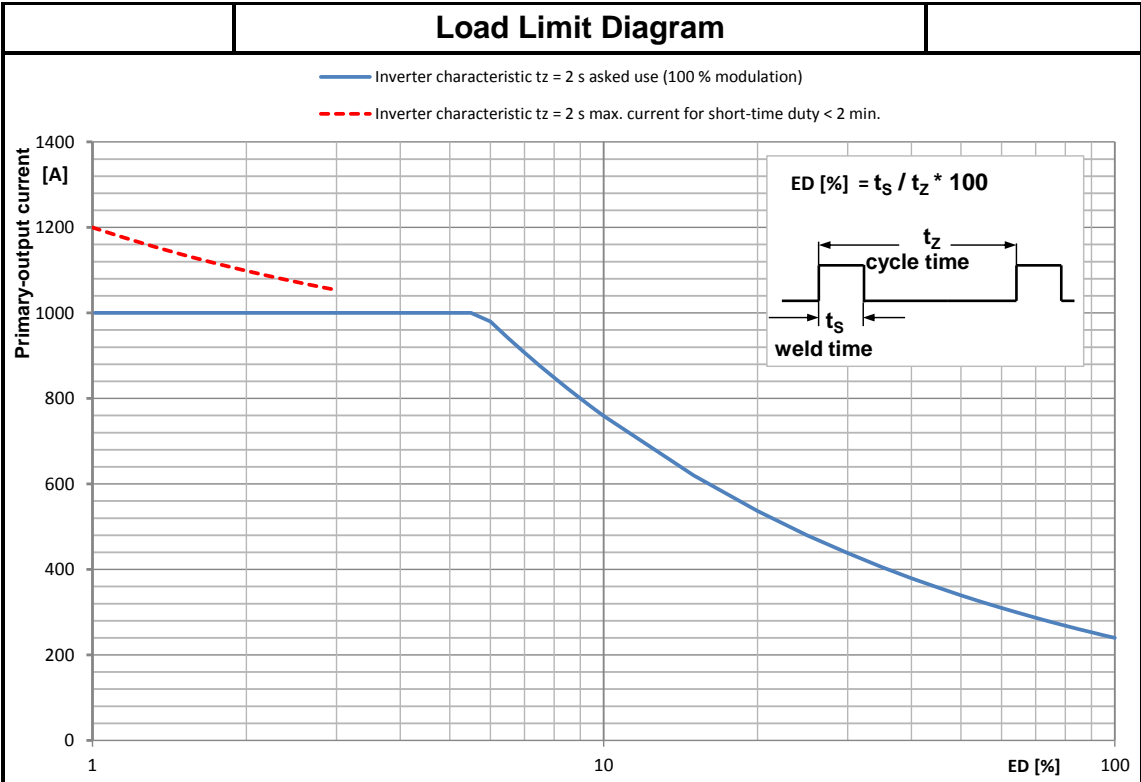
Designation		HWI416L	HWI516L
Cooling medium		Air	
Line voltage range	3 ph, -15 %, +20 %	400 / 440 V	
Line voltage range	3 ph, -15 % +10 %		480 V
Output voltage		500 / 550 V	
Output voltage			600 V
Rated output	20 % ED <sup>2)</sup>	224 kVA	
Primary output current	20 % ED <sup>1)</sup>	447 A	
Primary output current	100 % ED <sup>1)</sup>	200 A	
Max. primay output current	[10 ms]	1200 A	
Main nominal current (max. thermal continuous current) <sup>3)</sup>		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	DRAWINGNUMBER <b>41187-01en</b>	SHEET <b>1</b>
	DATUM 2017-07-11	2017-07-13		
	NAME Reichardt	Erdmann	TITLE <b>HWI2816L / Genius-, Sinius-, Slave-, AnalogHWIx16L, MFPx16L</b>	SHEETS <b>1</b>
	STATUS:			

**Limit value chart x16W**

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

**Technical data**

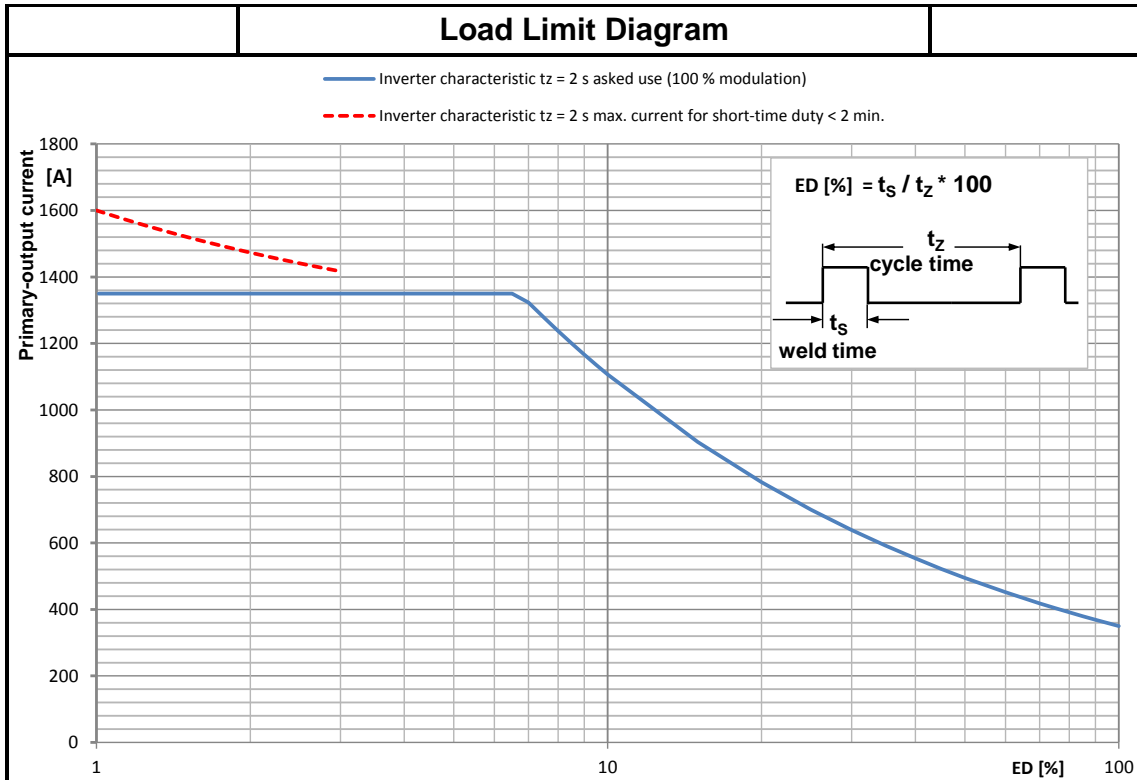
Designation		HWI416W	HWI516W
Cooling medium		Water	
Line voltage range	3 ph, -15 %, +20 %	400 / 440 V	
Line voltage range	3 ph, -15 % +10 %		480 V
Output voltage		500 / 550 V	
Output voltage			600 V
Rated output	20 % ED <sup>2)</sup>	269 kVA	
Primary output current	20 % ED <sup>1)</sup>	537 A	
Primary output current	100 % ED <sup>1)</sup>	240 A	
Max. primay output current	[10 ms]	1200 A	
Main nominal current (max. thermal continuous current) <sup>3)</sup>		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	

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

	GEZEICHNET	GEPRÜFT	DRAWINGNUMBER	41188-01en	SHEET	1	
	DATUM	2017-07-11					2017-07-13
	NAME	Reichardt	Erdmann	TITLE	HWI2816W / Genius-, Sinius-, Slave-, AnalogHWI16W, MFPx16W	SHEETS	1
	STATUS:						

# Limit value chart x24W

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**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 <sup>2)</sup>	392 kVA	
Primary output current	20 % ED <sup>1)</sup>	783 A	
Primary output current	100 % ED <sup>1)</sup>	350 A	
Max. primay output current	[10 ms]	1600 A	
Main nominal current (max. thermal continuous current) <sup>3)</sup>		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		

<sup>1)</sup> Peak current is specified.

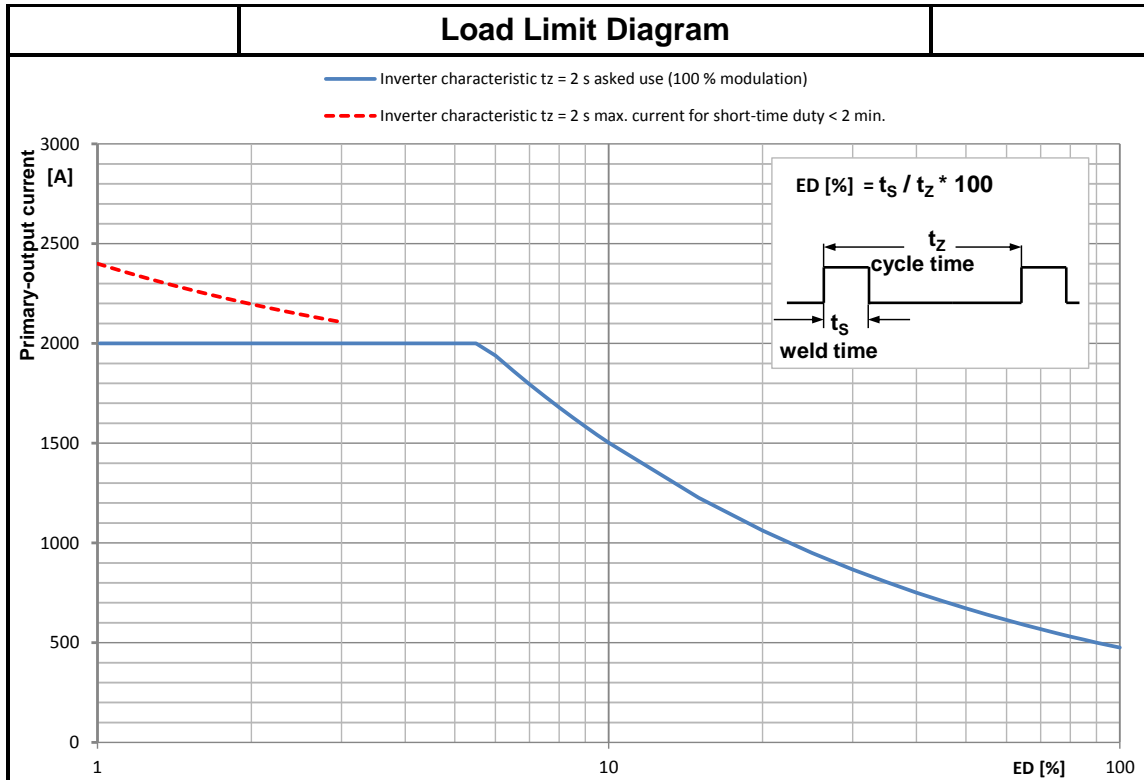
<sup>2)</sup> The rated output at 500 V mains voltage is specified.

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

	GEZEICHNET	GEPRÜFT	DRAWINGNUMBER	41190-01en	SHEET	1
	DATUM	2017-07-11				
	NAME	Reichardt	Erdmann		SHEETS	1
	STATUS:			TITLE		

Limit value chart x36W

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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 <sup>2)</sup>	531 kVA	
Primary output current	20 % ED <sup>1)</sup>	1062 A	
Primary output current	100 % ED <sup>1)</sup>	475 A	
Max. primay output current	[10 ms]	2400 A	
Main nominal current (max. thermal continuous current) <sup>3)</sup>		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	

<sup>1)</sup> Peak current is specified.

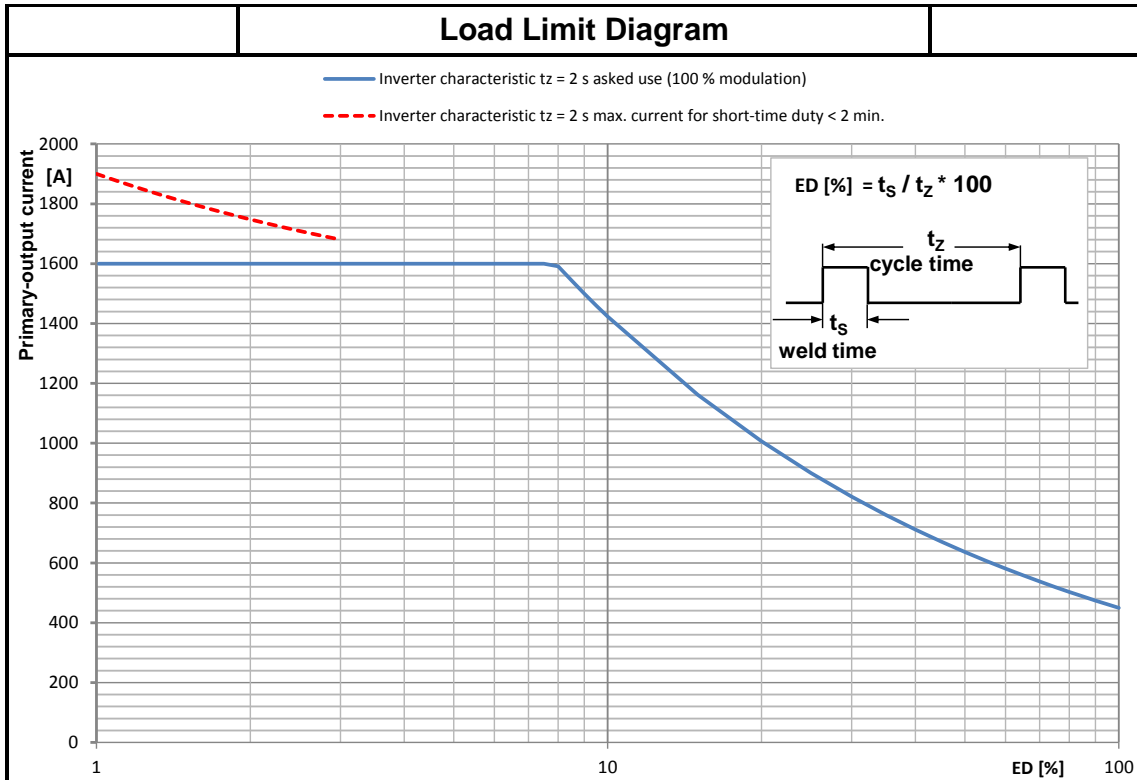
<sup>2)</sup> The rated output at 500 V mains voltage is specified.

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

	GEZEICHNET	GEPRÜFT	DRAWINGNUMBER	41192-01en	SHEET	1	
	DATUM	2017-07-11					2017-07-13
	NAME	Reichardt	Erdmann	TITLE	HWI2836W, Genius-, Sinius-, Slave-, AnalogHWI36W, MFPx36W	SHEETS	1
	STATUS:						

# Limit value chart 2x24W

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**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 <sup>2)</sup>	503 kVA	
Primary output current	20 % ED <sup>1)</sup>	1006 A	
Primary output current	100 % ED <sup>1)</sup>	450 A	
Max. primay output current	[10 ms]	1900 A	
Main nominal current (max. thermal continuous current) <sup>3)</sup>		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	

<sup>1)</sup> Peak current is specified.

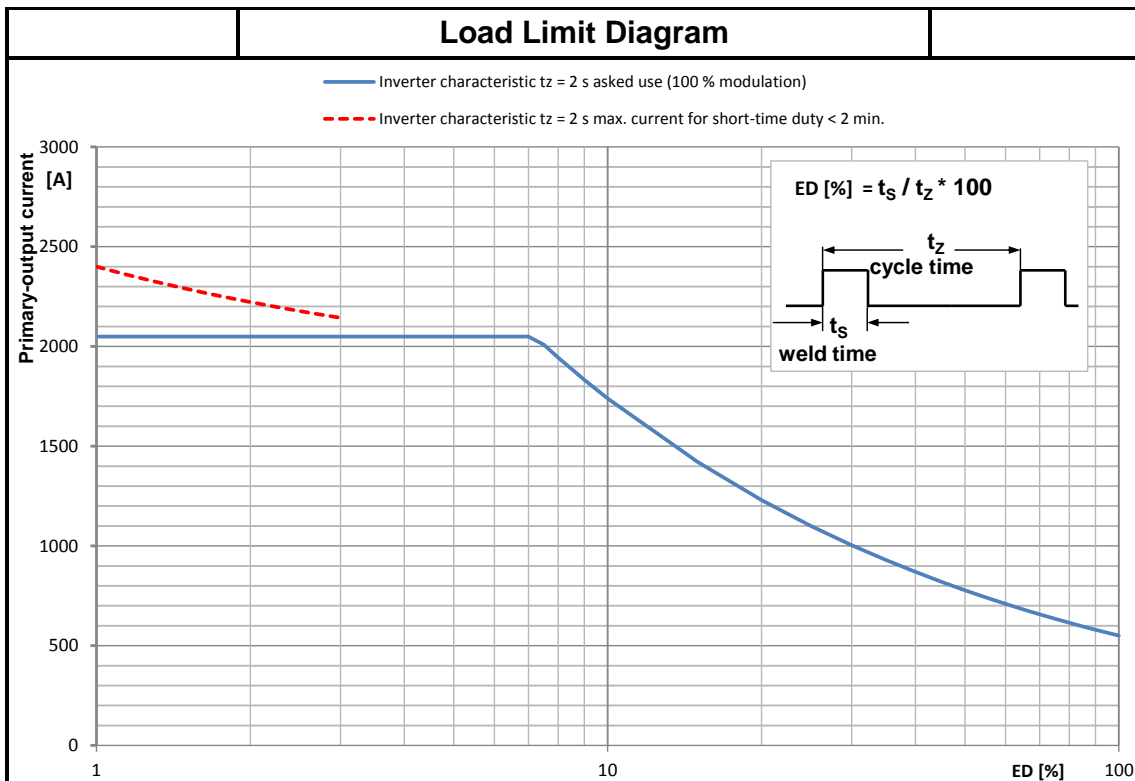
<sup>2)</sup> The rated output at 500 V mains voltage is specified.

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

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

Limit value chart 2x32W

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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 <sup>2)</sup>	615 kVA	
Primary output current	20 % ED <sup>1)</sup>	1230 A	
Primary output current	100 % ED <sup>1)</sup>	550 A	
Max. primay output current	[10 ms]	2400 A	
Main nominal current (max. thermal continuous current) <sup>3)</sup>		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	

<sup>1)</sup> Peak current is specified.

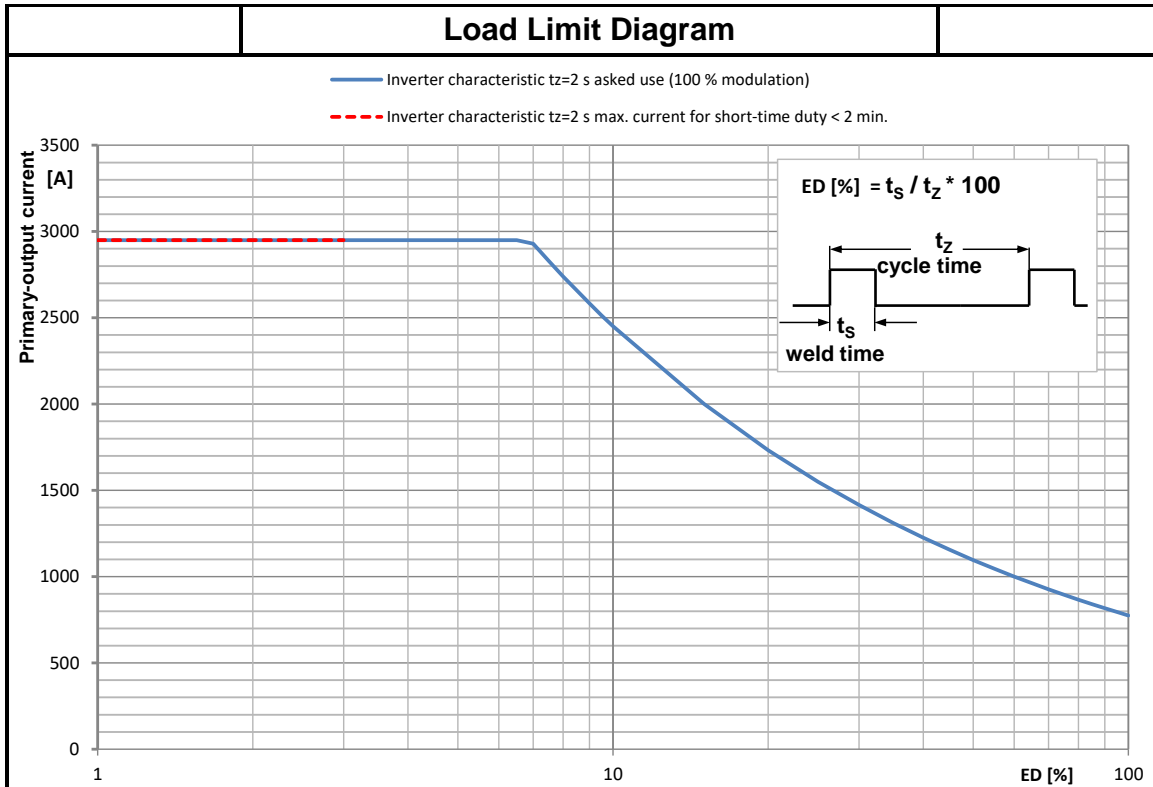
<sup>2)</sup> The rated output at 500 V mains voltage is specified.

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

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

# Limit value chart 3x40W

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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 <sup>2)</sup>	867 kVA	
Primary output current	20 % ED <sup>1)</sup>	1733 A	
Primary output current	100 % ED <sup>1)</sup>	775 A	
Max. primay output current	[10 ms]	2950 A	
Main nominal current (max. thermal continuous current) <sup>3)</sup>		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	

<sup>1)</sup> Peak current is specified.

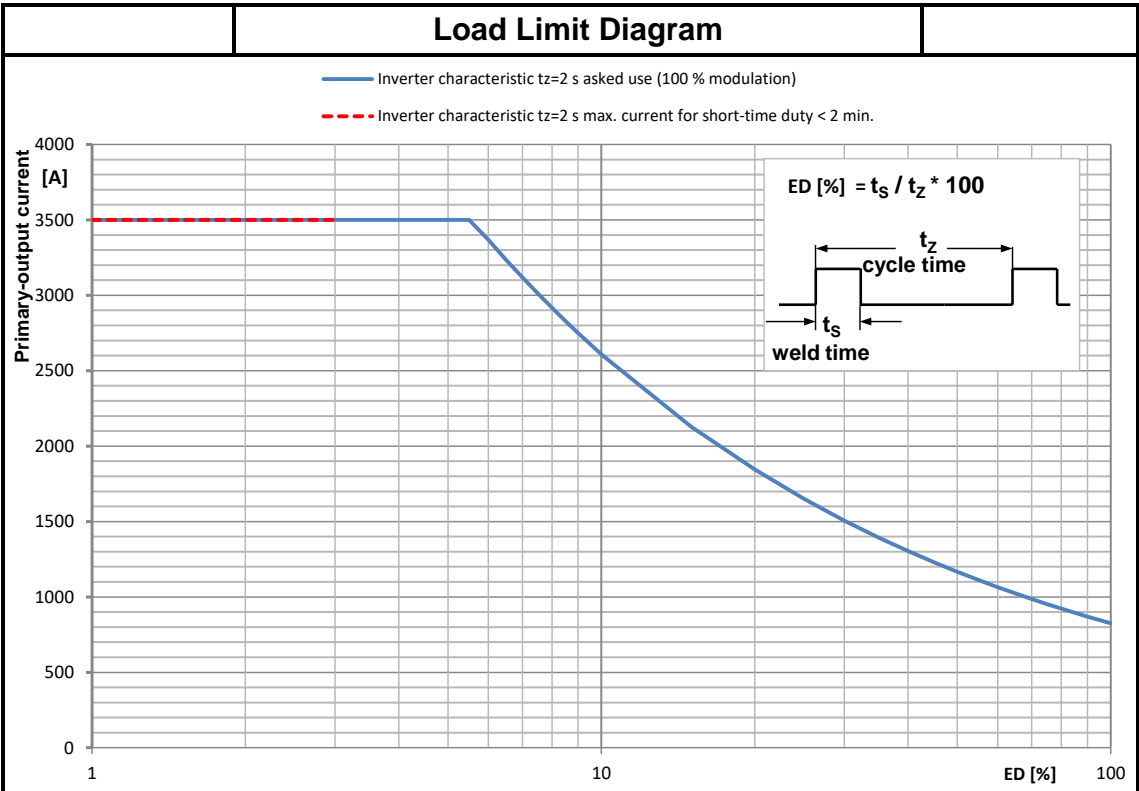
<sup>2)</sup> The rated output at 500 V mains voltage is specified.

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

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

**Limit value chart 3x45W**

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

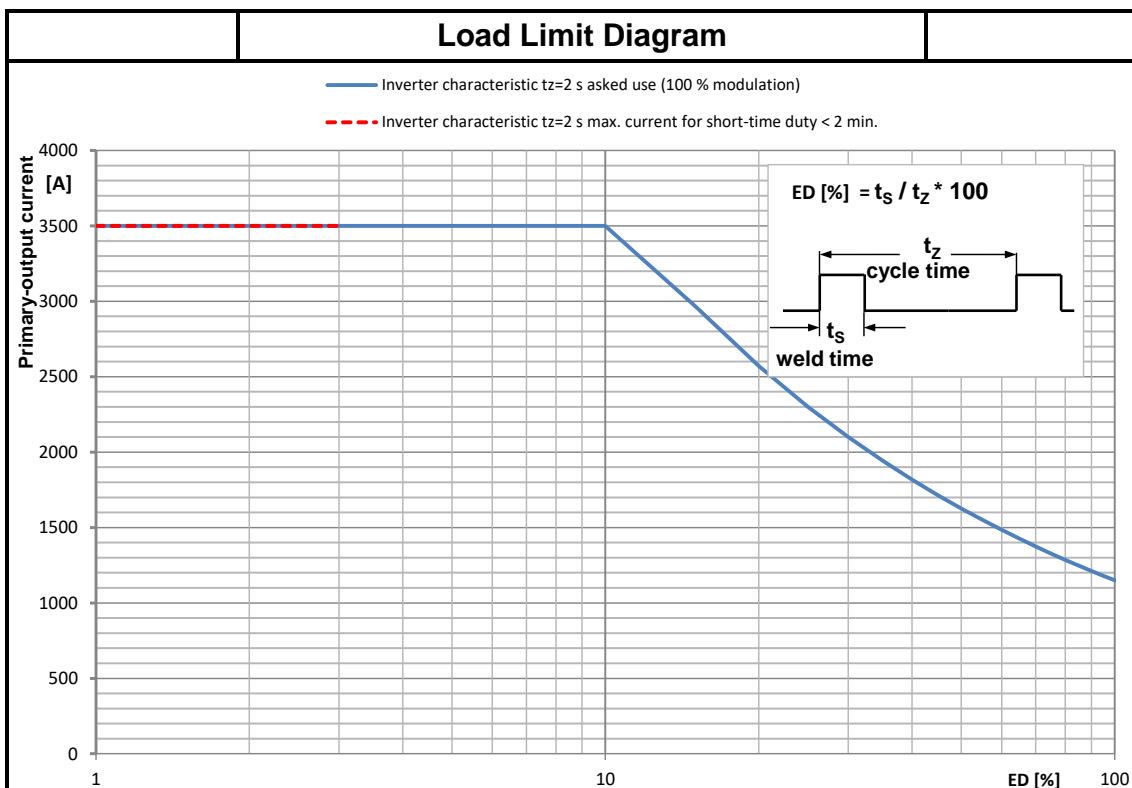
**Technical data**

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 <sup>2)</sup>	923 kVA	
Primary output current	20 % ED <sup>1)</sup>	1845 A	
Primary output current	100 % ED <sup>1)</sup>	825 A	
Max. primay output current	[10 ms]	3500 A	
Main nominal current (max. thermal continuous current) <sup>3)</sup>		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	

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

	GEZEICHNET	GEPRÜFT	DRAWINGNUMBER	41196-02en	SHEET	1	
	DATUM	2019-10-24					2019-10-24
	NAME	Reichardt	Hoops	TITLE	HWI2545W, Genius-, Sinius-, Slave-, Analog HWI3x45W	SHEETS	1
	STATUS:						

# Limit value chart 3x60W



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 <sup>2)</sup>	1286 kVA	
Primary output current	20 % ED <sup>1)</sup>	2571 A	
Primary output current	100 % ED <sup>1)</sup>	1150 A	
Max. primay output current	[10 ms]	3500 A	
Main nominal current (max. thermal continuous current) <sup>3)</sup>		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	

<sup>1)</sup> Peak current is specified.

<sup>2)</sup> The rated output at 500 V mains voltage is specified.

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

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

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