

/ Perfect Welding / Solar Energy / Perfect Charging



**THE PERFECT JOINT IS POSSIBLE.  
NOW THAT THE INTELLIGENT  
REVOLUTION IS COMPLETE WITH  
TPS/i ROBOTICS.**

# THE PERFECT JOINT SINCE 1945

/ Fronius has been developing innovative complete solutions for arc welding since 1945. Day-in, day-out, we're working at full power on our vision: to decode the "DNA of the arc". Our goal is to produce the perfect joint. But this also means throwing tried-and-tested things overboard, and starting over and over again. We don't take any chances either; every little detail is analysed, and all system components are tested thoroughly. It is with this knowledge that we create the technological revolutions that have made Fronius the global technology leader and Europe's market leader in welding technology.



# THE INTELLIGENT REVOLUTION

/ The TPS/i for manual welding was the Intelligent Revolution of 2013/2014. Thanks to this innovative technology, environmental influences and other sources of error are radically reduced. The result is a completely new welding experience with indisputable benefits in terms of quality and uniformity.

At the same time we have optimised this technology with all the features that meet the specific challenges of robotic welding - the Intelligent Revolution is in production. All this leads to the highest weld seam quality, lower reject rates, energy efficiency and easy maintenance, all of which keep downtimes to a minimum.



# TPS/i WELDING PACKAGES

/ Thanks to the modular design of the TPS/i and the Welding Packages, it is possible to create tailored solutions quickly and efficiently. The TPS/i can be configured differently to suit the customer's needs. WP Standard and WP Pulse are available as standard, which can then be upgraded to LSC, PMC and/or CMT if required.

## WELDING PACKAGE STANDARD

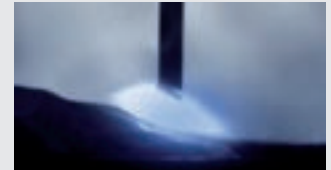
/ The "Standard" process ensures the usual level of Fronius top quality and is optimised for the most common material and shielding gas combinations.

## WELDING PACKAGE LSC

/ The LSC process is a further development of the Standard process and is characterised by less spatter and increased arc stability. The "penetration stabilizer" assistance system ensures uniform penetration even during out-of-position welding.

## WELDING PACKAGE CMT

/ The CMT process is a highly dynamic welding process with an extremely stable arc and the smallest amount of spattering.



### CUSTOMER BENEFITS

- / Less spattering (less rework)
- / Optimal weld seam appearance
- / Higher welding speed (cost effectiveness)

### APPLICATION AREAS

- / Light-gauge sheet welding
- / Optimised for root passes
- / 100% CO<sub>2</sub>
- / Vertical-up welds

### CUSTOMER BENEFITS

- / Faster welding
- / Even less spatter
- / More cost-effective
- / Extremely easy parameter setting

### APPLICATION AREAS

- / Joint welding (CrNi applications, exhaust welding, food industry)
- / Rapid prototyping
- / Brazing, particularly where there are high demands in terms of heat input and process stability
- / Special connections are possible, such as copper, zinc, and steel-aluminium

## CMT MIX

/ This mixed process is a feature of CMT and provides a more controlled and higher heat input for aluminium and CrNi through defined pulse cycles.

### APPLICATION AREAS

- / Especially for aluminium applications
- / CrNi applications

## WELDING PACKAGE **PULSE**

/ The “Pulse” process enables the user to weld using a pulsed arc and impresses due to its outstanding quality. In addition, it is optimised for the most common material and shielding gas combinations.

## WELDING PACKAGE **PMC**

/ The PMC process is a further development of the Pulse process and is characterised by increased welding speeds and lower heat input. The “penetration stabilizer” and “arc length stabilizer” assistance systems ensure constant penetration and high welding speeds.



### CUSTOMER BENEFITS

- / Higher welding speed, cost effectiveness
- / Lower heat input
- / Uniform penetration
- / Optimal weld seam appearance
- / Low risk of undercutting through use of new stabilizers
- / Easy parameter finding (assistance systems)

### APPLICATION AREAS

- / All material thicknesses; this process can be used in a customised manner and for application-specific requirements thanks to the stabilizers

## **PMC MIX**

/ This process is a feature of the PMC process, which assists the welder during positional welding.

### ADDITIONAL APPLICATION AREAS

- / Medium to thick materials for steel and CrNi
- / Faster vertical-up and positional welding

## **PMC MIX DRIVE**

/ This process is a feature of the PMC process, which enables a lower heat input in conjunction with the WF 25i Robacta Drive.

### CUSTOMER BENEFITS

- / Optimal weld seam appearance
- / Good gap-bridging ability

### ADDITIONAL APPLICATION AREAS

- / For visible weld seams, especially when welding aluminium
- / For joining heavy and light-gauge sheets

## THE INTELLIGENT REVOLUTION IS IN PRODUCTION

# TPS/i ROBOTICS

/ TPS/i Robotics is a milestone for automated welding production. The starting point for our development was the analysis of the specific challenges of robotic welding. Our goal was not isolated detail improvements, but a systematic approach that combined the intuition and intelligence of a human with the productivity of a machine.

## EFFICIENCY

/ Efficiency is a prerequisite for commercial success. And this is just one area where TPS/i Robotics is setting new standards. Program setup, welding speed and maintenance provide the highest levels of competitiveness and profitability in modern series production.



## RELIABILITY

/ Progress is an ongoing process. With TPS/i Robotics, our customers are kept constantly up-to-date with the latest technology - even in the future. The modular system design, the ability to update our software and the constant development of our processes are the best guarantees for future-proof production.



## QUALITY

/ Fronius welding systems have always been the industry standard for the ultimate in quality. Our mission is to decode the arc, with the goal of producing seemingly impossible joints between materials. In addition to a range of functions that improve the arc, TPS/i Robotics ensures complete process documentation.







# QUALITY

/ We have been the global technology leader in welding technology for years - a position that we were able to reach through continuous research and development. Our goal: the perfect arc for every application. Our mission: to decode the “DNA of the arc”. This means that we can guarantee our customers weld seams of uncompromising quality.

/ The high-speed architecture of our system enables us to conduct a faster and more precise analysis of the arc, which we can then better control. The result is a low-spatter dip transfer arc plus a faster and more reliable pulsed arc.

/ The Fronius assistance systems: the arc length stabiliser and the penetration stabiliser ensure uniform penetration and a consistently short arc, and thus high welding speeds. In summary, welding processes that are more stable, faster and cleaner. Attributes that no other power source even comes close to matching.

## PENETRATION STABILISER

/ Due to the intelligent wire control, the current and penetration remain constant if the stick out changes. The arc becomes dramatically more stable, and the penetration is much more constant.

## ARC LENGTH STABILISER

/ The arc length stabilizer maintains a consistently short arc, which allows higher welding speeds to be achieved.

### WITHOUT PENETRATION STABILISER



/ Stick-out 15 mm  
 $V_{wire} = 10 \text{ m/min}$   
 $I: 300 - 250 \text{ A}$   
 Steel 6 mm



/ Stick-out 30 mm  
 $V_{wire} = 10 \text{ m/min}$   
 $I: 300 - 250 \text{ A}$   
 Steel 6 mm

### WITH PENETRATION STABILISER



/ Stick-out 15 mm  
 $V_{wire} = 10 - 13 \text{ m/min}$   
 $I: 300 \text{ A}$   
 Steel 6 mm



/ Stick-out 30 mm  
 $V_{wire} = 10 - 13 \text{ m/min}$   
 $I: 300 \text{ A}$   
 Steel 6 mm



/ Video: comparison with and without arc length stabilizer



# EFFICIENCY

/ The optimisation of system productivity can be implemented at various stages: in process preparation, in process speed and ultimately in process finalisation, by avoiding errors. On the one hand unproductive periods are thereby reduced, on the other the production process is accelerated.

/ Programming a new process, converting the system or switching between various process steps can be very time-consuming. TPS/i Robotics has numerous improvements when it comes to setup, maintenance, control and conversion, meaning that costly downtimes are kept to a minimum.

/ The perfect interaction of the processes (LSC, PMC and CMT) with the intelligent penetration and arc length stabilisers results in faster and higher quality production, along with reduced rejection rates.

/ Simply put, TPS/i Robotics is therefore the most efficient welding system for automated production.

## SHORTER CYCLE TIMES

- / Quickest robot communication
- / Increased welding speeds

## ENHANCED QUALITY IN PRODUCTION

- / Less welding spatter – less rework
- / Constant penetration

## REDUCED SETUP TIMES

- / TeachMode - shortens the time required for component programming
- / Comfort Wire - allows easy and precise wire threading down to the work piece



# RELIABILITY

/ For Fronius, reliability is not just about protecting the system against physical damage, which is always ensured via thorough tests and the use of high quality materials. Our focus is more on what really counts in industrial operations: the reliability of production, even in the future. In the context of series production by robots, there are three reliability-related parameters:

## WELDING PERFORMANCE

/ We are constantly developing welding processes, functions and characteristics to be even better. The TPS/i can always be brought up-to-date using standardised data interfaces and adapted to any new challenge.

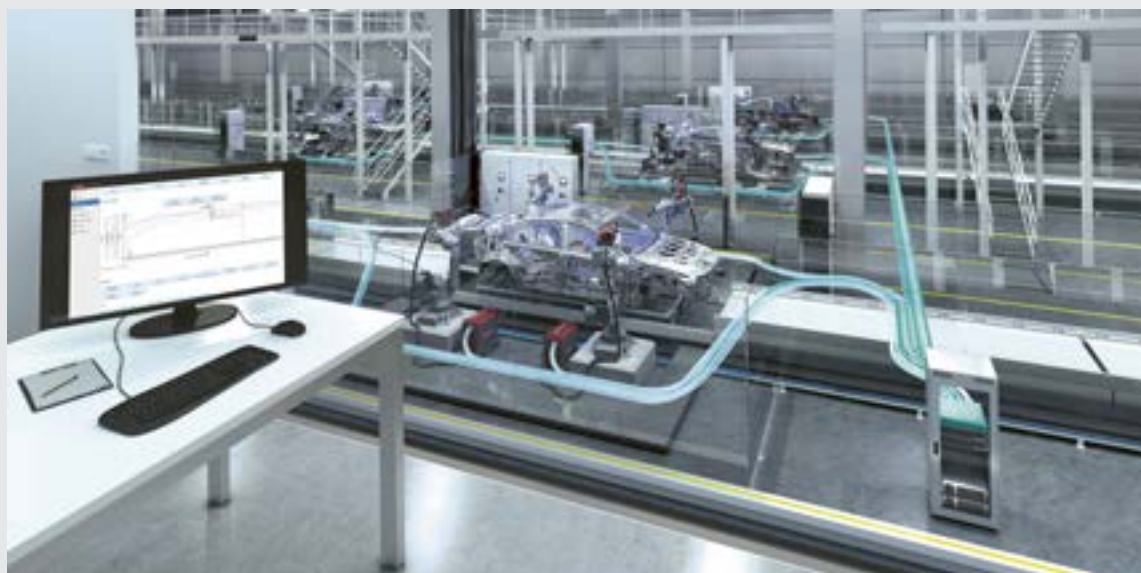
## DATAMANAGEMENT

/ WeldCube easily networks together every power source in the production line and collects and documents all relevant data. Intelligent evaluation means that future optimisation potentials can be recognised and used.

## CONNECTION

/ Customers can always reach Fronius via Remote Support. A data connection can be established at any time, which enables Fronius experts to diagnose and optimise the system remotely and without delay.

/ Through this we can achieve maximum reliability with TPS/i Robotics: reliability in the welding process, in production and in documentation.



## **INTELLIGENCE FROM THE POWER SOURCE TO THE TORCH BODY**

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/ The system always recognises which components are connected at any point in time, and warns of any incompatibilities.

## **ASSISTANCE SYSTEMS**

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### **ARC LENGTH STABILISER**

/ The arc length stabiliser maintains a consistently short arc, which allows higher welding speeds to be achieved.

### **PENETRATION STABILISER**

/ Due to the intelligent wire control, the current and penetration remain constant if the stick out changes. The arc becomes dramatically more stable, and the penetration is much more constant.

## **EASILY UPGRADED**

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/ The TPS/i can be upgraded quickly and easily with any of the Welding Packages (LSC, PMC, CMT and future releases), meaning that it is future-proof.

# **HIGHL**

## **FOR UNIVERSAL USE**

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/ The TPS/i can be used in robot and manual applications alike.

## **SUSTAINABILITY**

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/ All the system components make their contribution to the intelligent use of energy. Whether it's the improved water cooling system, the reduced power consumption or the long service life of all the components; all these features make the TPS/i a powerful yet energy-efficient welding system.

## **DATAMANAGEMENT**

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/ A central server unit networks and monitors every power source used in a production operation. Any existing documentation requirements are thereby met and the component-based evaluation of the process data allows any potential for optimisation in the production line to be exploited.

## **COMPATIBILITY WITH ROBOTS**

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/ The TPS/i communicates quickly and easily with robots from various manufacturers. Quick integration of the welding system through robot-specific attachments.

# **HIGHLIGHTS**

## **UPDATE**

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/ A central system update of every component ensures that the software of each individual component in the system is always kept right up to date. The update can be performed without any additional hardware or software.

## **ADAPTABLE PROCESSES**

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/ Welding processes and characteristics can be individually adapted and enhanced. The TPS/i is ready for the welding tasks of tomorrow.

## **THE UNIVERSAL GENIUS FOR ALL APPLICATIONS**

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/ The TPS/i can be used to weld all materials. Regardless of whether it's employed on aluminium, CrNi or steel, the TPS/i ensures the perfect joint.

## PUSHPULL

/ The PushPull system is equipped with two perfectly synchronised wirefeeders that ensure extremely precise wirefeeding. This is a prerequisite for high process stability, especially when long wire-feed distances and soft filler metals are involved.

WELDING PACKAGE **STANDARD**

WELDING PACKAGE **LSC**

WELDING PACKAGE **CMT**

/ CMT MIX

WELDING PACKAGE **PULSE**

WELDING PACKAGE **PMC**

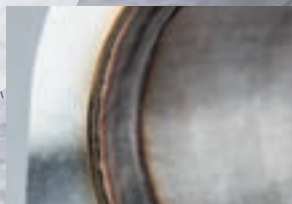
/ PMC MIX

/ PMC MIX DRIVE

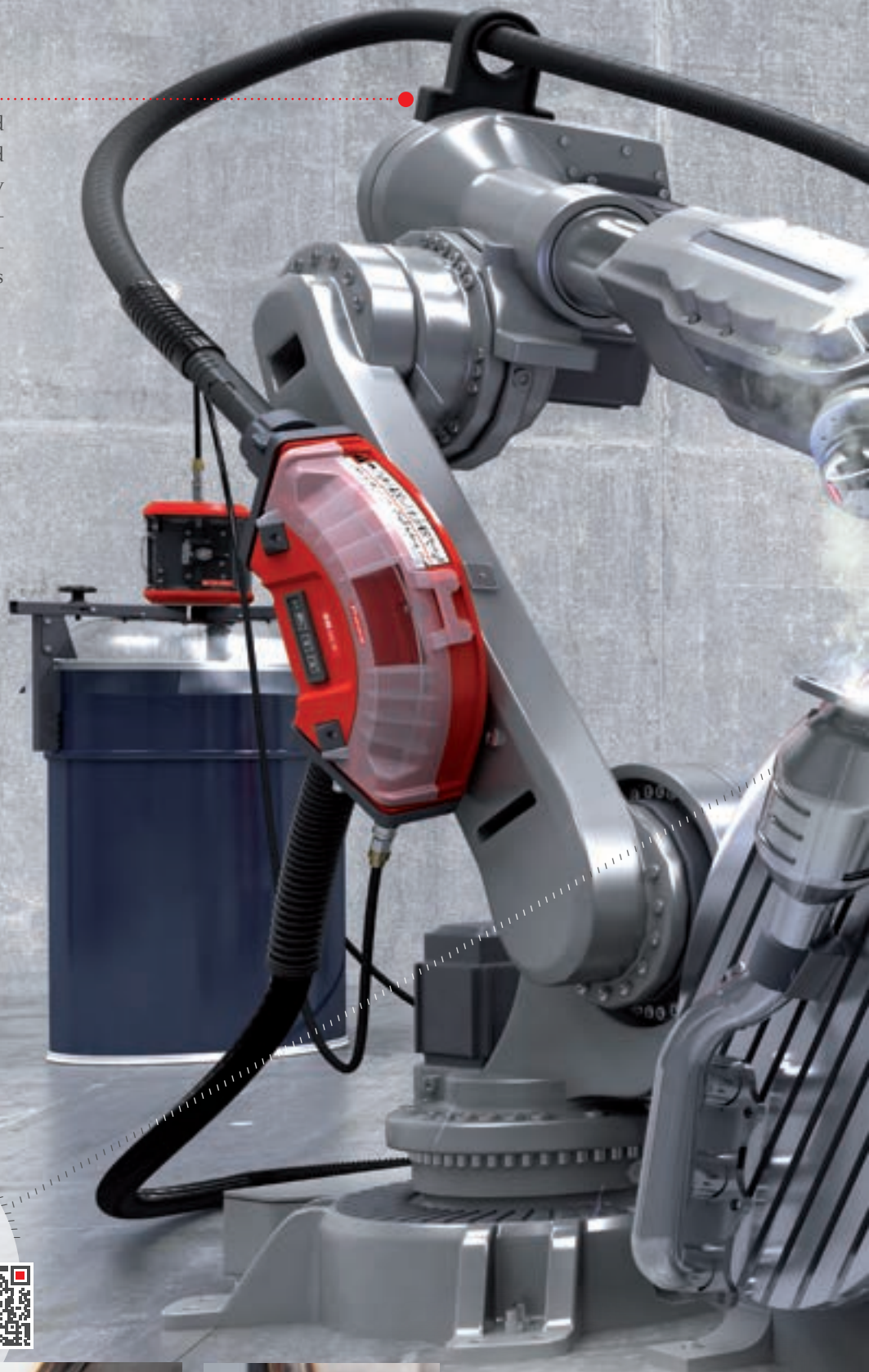
### FLANGE – EXHAUST SYSTEMS

/ Process: CMT

/ The focus here lies on the practically spatter-free welding process at a high welding speed and with high-quality results.



Base material: Chrome  
Material thickness: 10 mm (flange) / 1 mm (pipe)  
Filler material: CrNi 19 12 3 Ø: 1 mm  
Gas: Ar+2,5% CO<sub>2</sub>  
Vs: 150 cm/min  
Vd: 12,7 m/min  
Current: 208 A  
Voltage: 18,4 V





# FRONIUS SYSTEM SOLUTIONS

## FOR THE MOST DEMANDING REQUIREMENTS

/ In welding technology, demands on quality, speed, precision and efficiency continue to increase across all industries. A customised welding system that is perfectly tailored to the respective requirements is the key to a high level of productivity and to optimum, 100% reproducible welding results. This not only requires innovative technologies, but also high-quality, long-lasting components that work in perfect harmony with each other. The TPS/i is available in different power categories – TPS 320i / TPS 400i / TPS 500i / TPS 600i (320-600 A).

### WELDCUBE DATAMANAGEMENT ALL INCLUSIVE

/ The WeldCube full package solution contains hardware, software and defined service packages. This extremely flexible data documentation solution from Fronius ensures your industrial series production is as future-proof as possible.



HARDWARE

WELDCUBE  
PACKAGE



SOFTWARE



SERVICES

Base material: Steel  
Material thickness: 2 mm  
Filler material: Steel ER 70 S6 Ø: 1 mm  
Gas: Ar +18% CO<sub>2</sub>  
Vs: 180 cm/min  
Vd: 17 m/min  
Current: 260 A  
Voltage: 28 V



### TRANSVERSE CONTROL ARMS

/ Process: PMC

/ The focus here lies on higher levels of productivity, as high speeds with constant penetration and consistent quality are achieved.

## PUSH

/ The Push system is characterised by its easy handling and minimal maintenance requirements. This system is usually used for standard applications (e.g. CrNi and steel) where consistent quality and high system availability are a must. The assistance systems of the LSC & PMC processes achieve outstanding welding results.

WELDING PACKAGE **STANDARD**

WELDING PACKAGE **LSC**

WELDING PACKAGE **PULSE**

WELDING PACKAGE **PMC**

/ PMC MIX

## POWERDRIVE

/ The PowerDrive system is an alternative to the PushPull system. It only uses one wirefeeder, namely the WF 25i RD, which is placed at the very end of the robot arm and ensures reliable and constant wire-feeding. This dynamic wirefeeding feature enables the PMC Mix Drive process to be used, which makes its mark in aluminium applications in particular.

WELDING PACKAGE **STANDARD**

WELDING PACKAGE **PMC**

WELDING PACKAGE **LSC**

/ PMC MIX

/ PMC MIX DRIVE

WELDING PACKAGE **PULSE**



### BICYCLE FRAMES

/ Process: PMC Mix Drive

/ The focus here lies on the interplay between the optimal weld seam appearance and welding speed while maintaining consistent quality.

Base material: AlMg3  
 Material thickness: 1,5 – 3 mm  
 Filler material: AlSi5 Ø: 1,2 mm  
 Gas: 100% Ar  
 Vs: 30 cm/min  
 Vd: 5 m/min  
 Current: 115 A  
 Voltage: 18 V



# THREE BUSINESS UNITS, ONE GOAL: TO SET THE STANDARD THROUGH TECHNOLOGICAL ADVANCEMENT.

What began in 1945 as a one-man operation now sets technological standards in the fields of welding technology, photovoltaics and battery charging. Today, the company has around 4,760 employees worldwide and 1,253 patents for product development show the innovative spirit within the company. Sustainable development means for us to implement environmentally relevant and social aspects equally with economic factors. Our goal has remained constant throughout: to be the innovation leader.

## PERFECT WELDING

Our mission is Perfect Welding; a task we have approached with passion and skill for decades in order that our customers can join materials with the perfect weld seam. With our outstanding technologies and services and together with our customer's applications, not only do we solve their specific welding technology problems, but we also make a substantial contribution to increasing their productivity.

## SOLAR ENERGY

Our mission is to achieve 24 hours of sun. Day after day we are hard at work turning this vision of a future in which 100% of the world's energy needs are covered by renewable sources into a reality. We are therefore concentrating on solutions to intelligently, efficiently and economically generate, store, distribute and consume solar energy.

## PERFECT CHARGING

As know-how leaders in the world of battery charging, we deliver exceptional solutions to create the maximum benefit for our customers. For the intralogistics sector, we are committed to energy flow optimisation for electric forklift trucks and are constantly striving for the next innovation. Our powerful charging systems for vehicle workshops guarantee safe and reliable processes.

Further information about all Fronius products and our global sales partners and representatives can be found at [www.fronius.com](http://www.fronius.com)

**Fronius India Private Limited**  
GAT no 312, Nanekarwadi  
Chakan, Taluka - Khed District  
Pune 410501  
India  
Telephone + 91 98 20 60 52 07  
[sales.india@fronius.com](mailto:sales.india@fronius.com)  
[www.fronius.in](http://www.fronius.in)

**Fronius (Thailand) Ltd.**  
Pinthong Industrial Estate I  
789/193 Moo 1, Sriracha,  
Chonburi 20230  
Building: P17/B1  
Thailand  
Telephone +66 (033) 047421  
[sales.Thailand@fronius.com](mailto:sales.Thailand@fronius.com)  
[www.fronius.co.th](http://www.fronius.co.th)

**Fronius Middle East FZE**  
P.O. Box: 263241  
Jebel Ali / JAFZA ONE BUILDING  
Dubai / U.A.E  
Telephone +971 (0) 56 499 8224  
[contact.middleeast@fronius.com](mailto:contact.middleeast@fronius.com)  
[www.fronius.ae/pw](http://www.fronius.ae/pw)

**Fronius Canada Ltd.**  
2875 Argentia Road, Units 4,5 & 6  
Mississauga, ON L5N 8G6  
Canada  
Telephone +1 905 288-2100  
Fax +1 905 288-2101  
[sales.canada@fronius.com](mailto:sales.canada@fronius.com)  
[www.fronius.ca](http://www.fronius.ca)

**Fronius USA LLC**  
6797 Fronius Drive  
Portage, IN 46368  
USA  
Telephone +1 877 FRONIUS  
[sales.usa@fronius.com](mailto:sales.usa@fronius.com)  
[www.fronius-usa.com](http://www.fronius-usa.com)

**Fronius UK Limited**  
Maidstone Road, Kingston  
Milton Keynes, MK10 0BD  
United Kingdom  
Telephone +44 1908 512 300  
Fax +44 1908 512 329  
[info-uk@fronius.com](mailto:info-uk@fronius.com)  
[www.fronius.co.uk](http://www.fronius.co.uk)

**Fronius International GmbH**  
Froniusplatz 1  
4600 Wels  
Austria  
Telephone +43 7242 241-0  
Fax +43 7242 241-953940  
[sales@fronius.com](mailto:sales@fronius.com)  
[www.fronius.com](http://www.fronius.com)