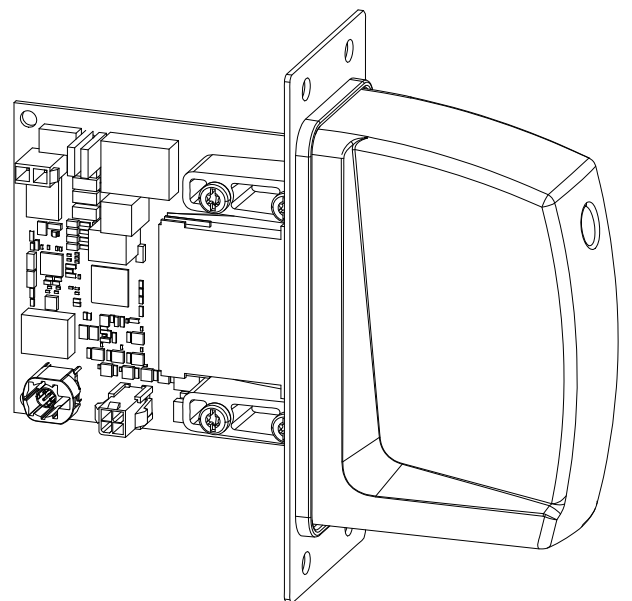


Operating Instructions

RI FB/i IGM V1.0
RI MOD/i CC EtherCAT
RI MOD/i CC DeviceNet



EN-US | Operating instructions



42,0426,0236,EA

023-12062025

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General

Safety



WARNING!

Danger from incorrect operation and work that is not carried out properly.

This can result in serious personal injury and damage to property.

- ▶ All the work and functions described in this document must only be carried out by technically trained and qualified personnel.
- ▶ Read and understand this document in full.
- ▶ Read and understand all safety rules and user documentation for this equipment and all system components.



WARNING!

Danger from electrical current.

This can result in serious personal injury and damage to property.

- ▶ Before starting work, switch off all the devices and components involved and disconnect them from the grid.
- ▶ Secure all devices and components involved so they cannot be switched back on.



WARNING!

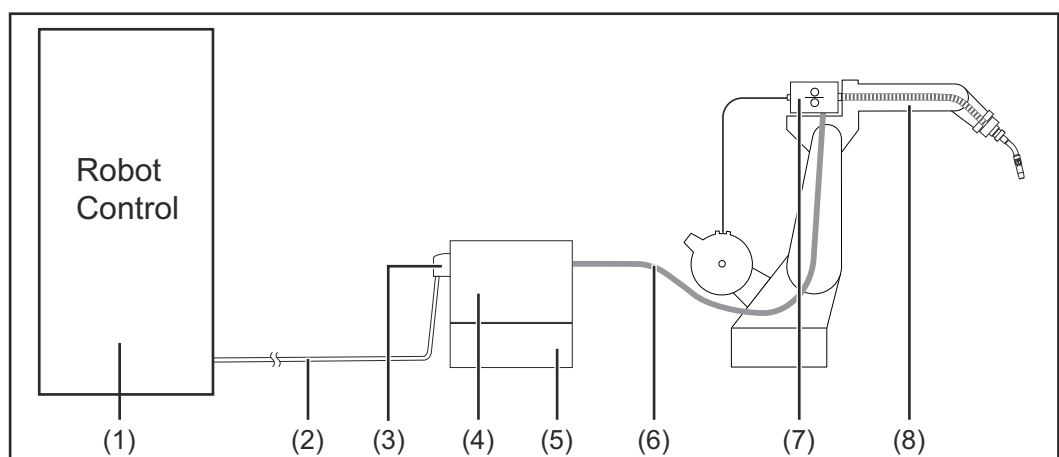
Danger from unplanned signal transmission.

This can result in serious personal injury and damage to property.

- ▶ Do not transfer safety signals via the interface.

Device Concept

The robot interface serves as an interface between the welding machine and standardized bus modules supporting a wide range of communication protocols. Fronius may factory-fit the robot interface in the welding machine but it can also be retrofitted by appropriately trained and qualified personnel.



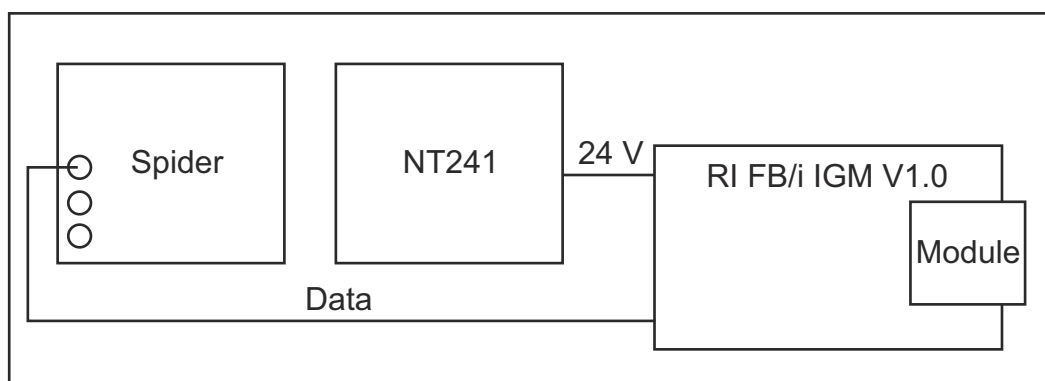
(1) Robot control system

(2) SpeedNet data cable

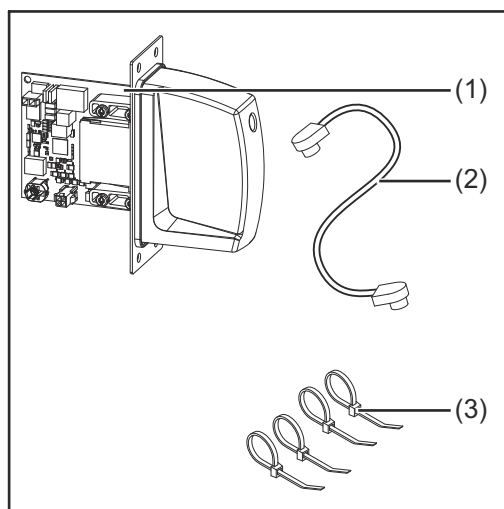
(3) Robot interface

- | | |
|-----|--------------------------|
| (4) | Welding machine |
| (5) | Cooling unit |
| (6) | Interconnecting hosepack |
| (7) | Wirefeeder |
| (8) | Robot |

Block Diagram



Scope of Supply



- | | |
|-----|--|
| (1) | RI FB/i IGM V1.0 |
| (2) | Data cable
4-pin |
| (3) | Cable ties |
| (4) | These Operating Instructions
(not pictured) |

Required Tools and Materials

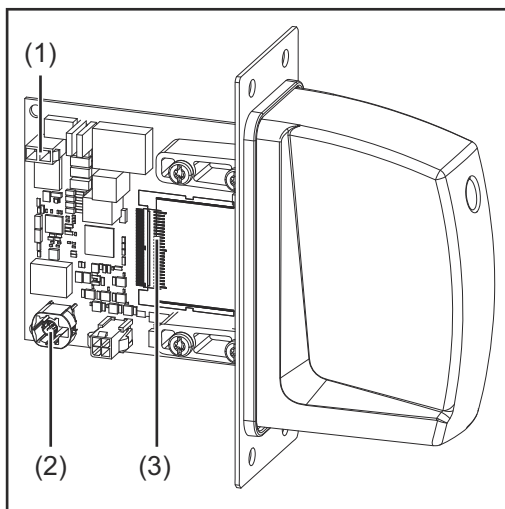
- Screwdriver TX8
- Screwdriver TX20
- Screwdriver TX25
- Diagonal cutting pliers

Installation Requirements

The robot interface may only be installed in the designated opening on the rear of the welding machine.

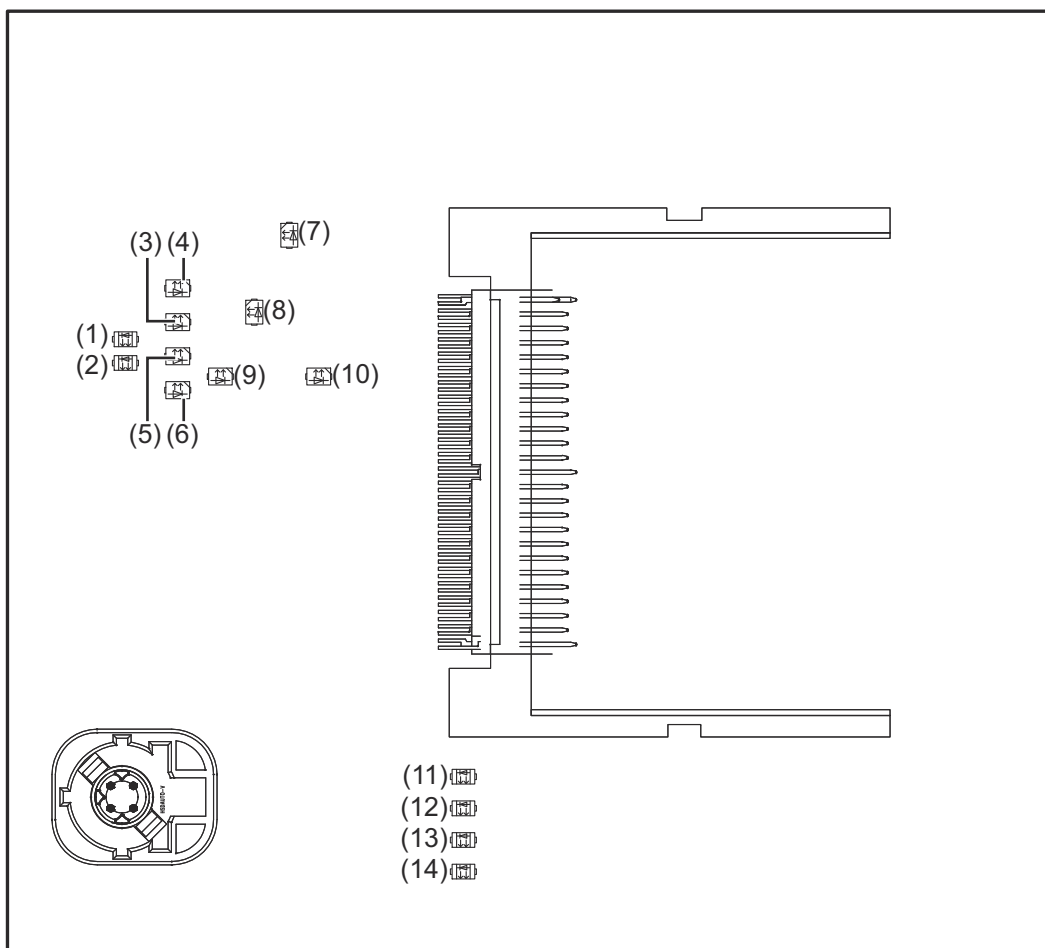
Connection Sockets and Indicators on the Robot Interface

Connections on the Robot Interface



- (1) Power supply connection
2-pin
- (2) SpeedNet data cable connection
4-pin
- (3) Bus module connection

LEDs on Robot Interface PCB



(1)	ETH1 LED	Green	For diagnosing the network connection. For details, see section below titled "LEDs for Network Connection Diagnosis"
(2)	ETH2 LED	Orange	
(3)	LED 3	Green	No function
(4)	LED 4	Green	
(5)	LED 5	Green	<ul style="list-style-type: none"> - Flashes at 4 Hz = No SpeedNet connection - Flashes at 20 Hz = Establishing SpeedNet connection - Flashes at 1 Hz = SpeedNet connection established
(6)	LED 6	Red	Lights up when an internal error occurs. Remedy: Restart the robot interface. If this does not resolve the issue, inform the service team.
(7)	+3V3 LED	Green	For diagnosing the power supply. For details, see section below titled "LEDs for Power Supply Diagnosis"
(8)	+24V LED	Green	
(9)	DIG OUT 2 LED	Green	Digital output 2. LED lights up when active
(10)	DIG OUT 1 LED	Green	Digital output 1. LED lights up when active
(11)	LED 11	Green	No function
(12)	LED 12	Green	
(13)	LED 13	Green	
(14)	LED 14	Green	

LEDs for Power Supply Diagnosis

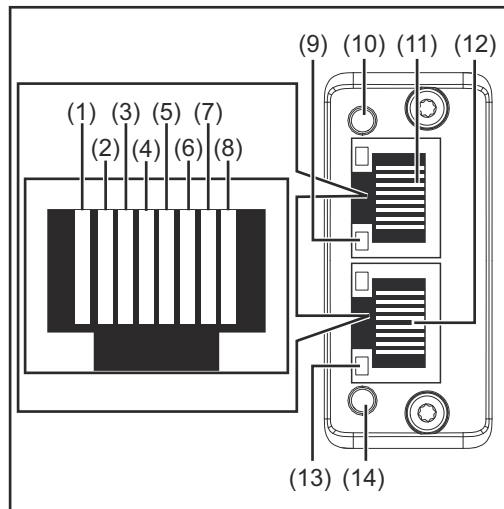
LED	Indicator	Meaning	Cause
+24V	Off	No supply voltage available for interface	<ul style="list-style-type: none"> - Robot interface power supply not established - Power supply cable faulty
	Lights up	24 VDC supply voltage present on robot interface	
+3V3	Off	No operating voltage present on robot interface	<ul style="list-style-type: none"> - 24 VDC supply voltage not present - Robot interface power supply unit is faulty
	Lights up	3 VDC operating voltage present on robot interface	

LEDs for Network Connection Diagnosis

LED	Indicator	Meaning	Cause
ETH1	Off	No network connection	<ul style="list-style-type: none"> - No network connection established for interface - Network cable faulty
	Lights up	Network connection established	
	Flashes	Data transfer in progress	
ETH2	Off	Transmission speed 10 Mbit/s	
	Lights up	Transmission speed 100 Mbit/s	

Connections and Indicators on the Bus Module - EtherCAT

Connections and Indicators



(1)	TX+
(2)	TX-
(3)	RX+
(6)	RX-
(4), (5)	Not normally used; to ensure signal completeness, these pins must be interconnected and, after passing through a filter circuit, must terminate at the ground conductor (PE).
(7), (8)	Not normally used; to ensure signal completeness, these pins must be interconnected and, after passing through a filter circuit, must terminate at the ground conductor (PE).

(9)	Connection/Activity LED - EtherCAToutput
(10)	ERR LED (error)
(11)	EtherCAToutput
(12)	EtherCATinput
(13)	Connection/Activity LED - EtherCATinput
(14)	RUN LED (operation)

RUN LED (operation)

This indicates the status of the CoE communication.
(CoE = CANopen over EtherCAT)

Status	Meaning
Off	EtherCAT device in 'init' status (or no supply voltage)
Lights up green	EtherCAT device in 'operational' status
Flashes green	EtherCAT device in 'pre-operational' status
Flashes green (briefly)	EtherCAT device in 'safe-operational' status
Lights up red	If the Run LED and Error LED light up red, this indicates a serious event which places the interface in an exception state. ➡ Contact the service team

ERR LED (error)

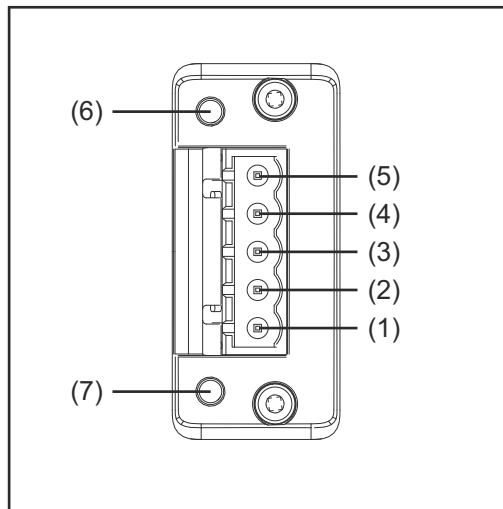
Status	Meaning
Off	No error (or no supply voltage)

ERR LED (error)	
Status	Meaning
Flashes red	Incorrect configuration The status change received from the master is not possible due to invalid register or object settings.
Flashes red (twice)	Application watchdog timeout Sync manager watchdog timeout
Lights up red	Application controller failure Anybus module in EXCEPTION

Connection/Activity LED	
Status	Meaning
Off	No connection (or no supply voltage)
Lights up green	Connection detected, no activity
Flickers green	Connection detected, activity present

Connections and Indicators on the Bus Module - DeviceNet

Connections and Indicators



Pin	Signal	Description
(1)	V -	Supply voltage
(2)	CAN_ L	CAN low bus line
(3)	SHIEL D	Cable shield
(4)	CAN_ H	CAN high bus line
(5)	V +	Supply voltage

Indicators

(6)	LED MS (Module Status)
(7)	LED NS (Network Status)

LED MS (Module Status)

Status	Meaning
Off	No supply voltage
Lights up green	Normal operation
Flashes green	Missing or incomplete configuration, commissioning required
Lights up red	Non-correctable error
Flashes red	Correctable error
Alternates between red and green	Self-test is running

LED NS (Network Status)

Status	Meaning
Off	Not online or no supply voltage
Lights up green	Online, one or more connections established
Flashes green	Online, no connections established
Lights up red	Critical connection error
Flashes red	Timeout for one or more of the connections
Alternates between red and green	Self-test is running

Technical Data EtherCAT

Environmental Conditions



CAUTION!

A risk is posed by prohibited environmental conditions.

This can result in severe damage to equipment.

- Only store and operate the device under the following environmental conditions.

Temperature range of ambient air:

- During operation: -10 °C to +40 °C (14 °F to 104 °F)
- During transport and storage: -20 °C to +55 °C (-4 °F to 131 °F)

Relative humidity:

- Up to 50% at 40 °C (104 °F)
- Up to 90% at 20 °C (68 °F)

Ambient air: free of dust, acids, corrosive gases or substances, etc.

Altitude above sea level: up to 2000 m (6500 ft).

Robot Interface Technical Data

Power supply	Internal (24 V)
Degree of protection	IP 23

Data Transfer Properties

Transfer technology:
EtherCAT

Medium:

When selecting the cable, plug, and terminating resistors, the IEC 61784-5-12 for the planning and installation of EtherCAT systems must be observed.

The EMC tests were carried out by the manufacturer with an original Beckhoff cable (ZK1090-9191-xxxx).

Transmission speed:

100 Mbit/s

Bus connection:

RJ45 Ethernet

Application layer:

CANopen

Configuration Parameters

In some robot control systems, it may be necessary to state the configuration parameters described here so that the bus module can communicate with the robot.

Parameters	Value	Description
Vendor ID	0000 02C1 _{hex} (705 _{dec})	Fronius International GmbH
Product Code	0001 0341 _{hex} (66369 _{dec})	Standard image
Device name	Fronius FB-IGM-1-O- EtherCAT	Fronius-FB-Inside-EtherCAT

Technical Data DeviceNet

Environmental Conditions



CAUTION!

A risk is posed by prohibited environmental conditions.

This can result in severe damage to equipment.

- Only store and operate the device under the following environmental conditions.

Temperature range of ambient air:

- During operation: -10 °C to +40 °C (14 °F to 104 °F)
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Ambient air: free of dust, acids, corrosive gases or substances, etc.

Altitude above sea level: up to 2000 m (6500 ft).

Robot Interface Technical Data

Power supply	Internal (24 V)
Degree of protection	IP 23

Data Transfer Properties

Network topology

Linear bus, bus termination on both ends (121 Ohm), stub cables are possible

Medium and maximum bus length

When selecting the cable, plug, and terminating resistors, the ODVA recommendation for the planning and installation of DeviceNet systems must be observed

Number of stations

Max. 64 participants

Transmission speed

500 kbit/s, 250 kbit/s, 125 kbit/s

Process data width

Can be configured in the robot interface
see following section "Configuration of robot interface"

Configuration Parameters

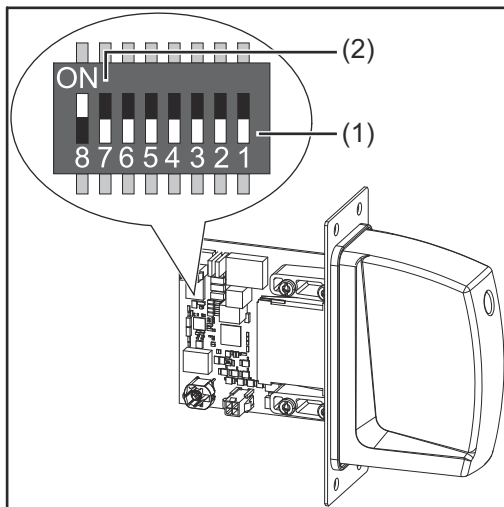
In some robot control systems, it may be necessary to state the configuration parameters described here so that the bus module can communicate with the robot.

Parameters	Value	Description
Vendor ID	0534 _{hex} (1332 _{dec})	Fronius International GmbH

Parameters	Value	Description
Device Type	000C _{hex} (12 _{dec})	Communication adapter
Product Code	0440 _{hex} (1088 _{dec})	Fronius FB IGM 1.0 DeviceNet
Product Name	Fronius FB-IGM-1-0-DeviceNet	

Configuring the Robot Interface - EtherCAT

Function of the Dip Switch on the Interface



The dip switch on the robot interface is used to set the process image (standard image).

Default setting for process image:
Positions 7 and 8 of DIP switch set to OFF (1) = standard image = IGM V1.0

NOTE!

Risk due to non-effective DIP switch setting.

This may result in malfunctions.

- Every time you change the DIP switch settings, re-start the interface afterwards. This is essential for the changes to take effect.
- Interface re-start = disconnect and reconnect the power supply or execute the corresponding function on the welding machine website (SmartManager).

Setting the Process Data Width

Dip switch								Configuration
8	7	6	5	4	3	2	1	
OFF	OFF	-	-	-	-	-	-	IGM image 832 Bit
OFF	ON	-	-	-	-	-	-	Fronius standard image 320 Bit
ON	OFF	-	-	-	-	-	-	Not used
ON	ON	-	-	-	-	-	-	Not used

The process data width defines the scope of the transferred data volume.

The kind of data volume that can be transferred depends on

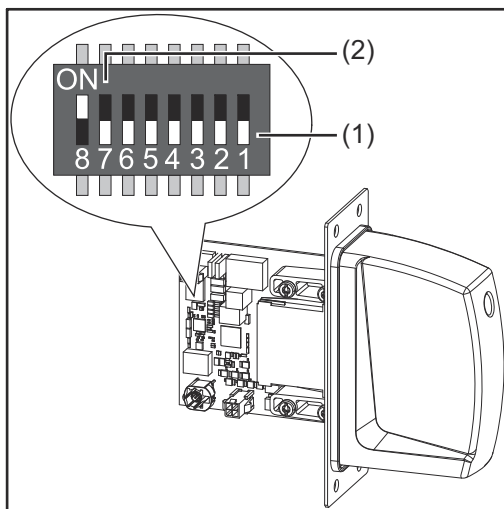
- the robot controls
- the number of welding machines
- the type of welding machines
 - "Intelligent Revolution"
 - "Digital Revolution" (Retro Fit)

**Assigning the
EtherCAT Ad-
dress**

The EtherCAT address is assigned by the master.

Configuring the Robot Interface - DeviceNet

Function of the Dip Switch on the Interface



The dip switch on the robot interface is used to configure:

- the process data width
- the node address

NOTE!

Risk due to non-effective DIP switch setting.

This may result in malfunctions.

- Every time you change the DIP switch settings, re-start the interface afterwards. This is essential for the changes to take effect.
- Interface re-start = disconnect and reconnect the power supply or execute the corresponding function on the power source website (SmartManager).

Setting the Process Data Width

Dip switch								Configuration
8	7	6	5	4	3	2	1	
OFF	OFF	-	-	-	-	-	-	Not used
OFF	ON	-	-	-	-	-	-	Fronius standard image 320 Bit
ON	OFF	-	-	-	-	-	-	Not used
ON	ON	-	-	-	-	-	-	Fronius Retro Fit image 96 Bit

The process data width defines the scope of the transferred data volume.

The kind of data volume that can be transferred depends on

- the robot controls
- the number of welding machines
- the type of welding machines
 - "Intelligent Revolution"
 - "Digital Revolution" (Retro Fit)

Set node address with dip switch (example)

Dip switch								Node address
8	7	6	5	4	3	2	1	
-	-	OFF	OFF	OFF	OFF	OFF	ON	1
-	-	OFF	OFF	OFF	OFF	ON	OFF	2
-	-	OFF	OFF	OFF	OFF	ON	ON	3
-	-	ON	ON	ON	ON	ON	OFF	62
-	-	ON	ON	ON	ON	ON	ON	63

The node address is set with positions 1 to 6 of the dip switch.
The configuration is carried out in binary format. This results in a configuration range of 1 to 63 in decimal format.

Configuring the Node Address

Upon delivery the configured node address is 0.

The node address can be configured in two ways:

- Node addresses in the range of 1 to 63 can be configured with the dip switch. In this case, a node address previously configured by a configuration tool is overwritten.
- For more information about the dip switch see [Function of the Dip Switch on the Interface](#) on page 19.

If configurations have already been made, the network configurations can be restored to factory settings in two ways:

- set all dip switches back to 0 and restart interface
or
- with the button **Restore factory settings** on the website of the welding machine (SmartManager)

The Website of the welding machine

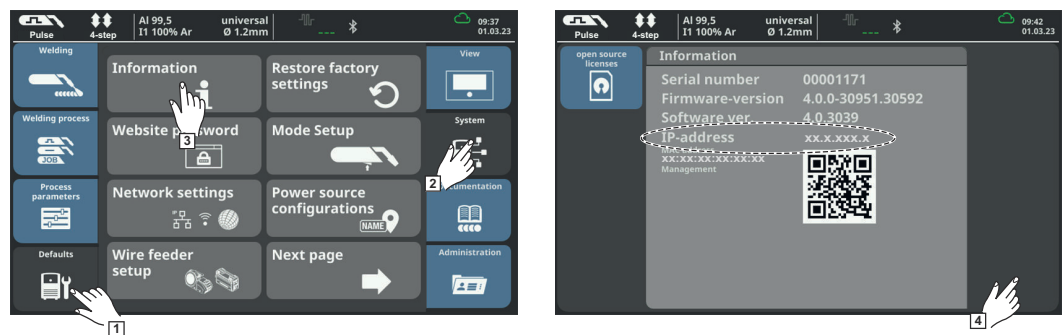
The welding machine has its own website, the SmartManager.

As soon as the welding machine has been integrated into a network, the SmartManager can be opened via the IP address of the welding machine.

Depending on the system configuration and software upgrades, the SmartManager may contain the following entries:

- Overview
- Update
- Screenshot
- Save and restore
- Function packages
- Job data
- Overview of characteristics
- **RI FB INSIDE/i**

Call up the welding machine SmartManager and log in



1 Presettings / System/Information ==> note down IP address of the welding machine

2 Enter the IP address into the search field of the browser

3 Enter username and password

Factory setting:
Username = admin
Password = admin

4 Confirm displayed message

The welding machine SmartManager is displayed.

Installing the Robot Interface

Safety

WARNING!

Danger from electrical current.

Serious personal injuries may result.

- ▶ Before starting work, switch off all the devices and components involved and disconnect them from the grid.
- ▶ Secure all devices and components involved so they cannot be switched back on.
- ▶ After opening the device, use a suitable measuring instrument to check that electrically charged components (such as capacitors) have been discharged.

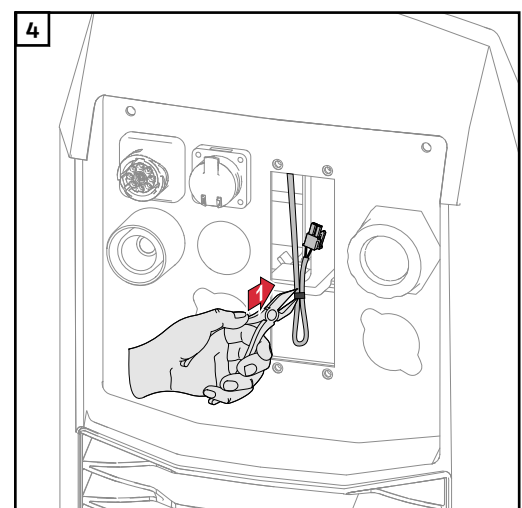
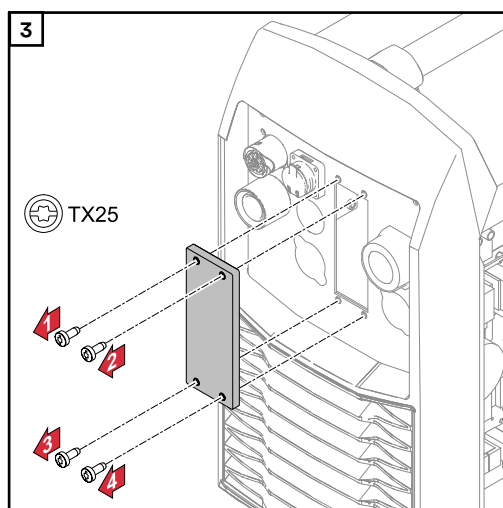
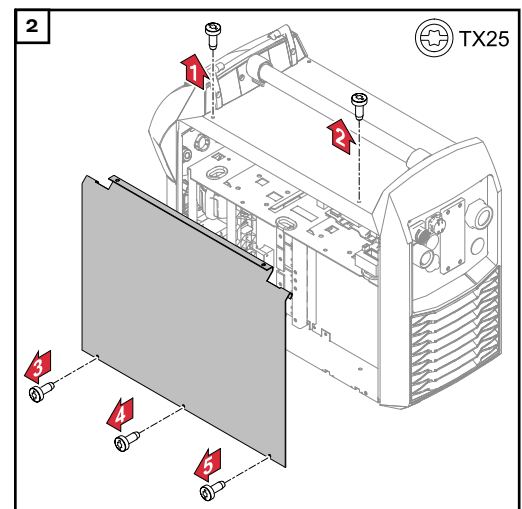
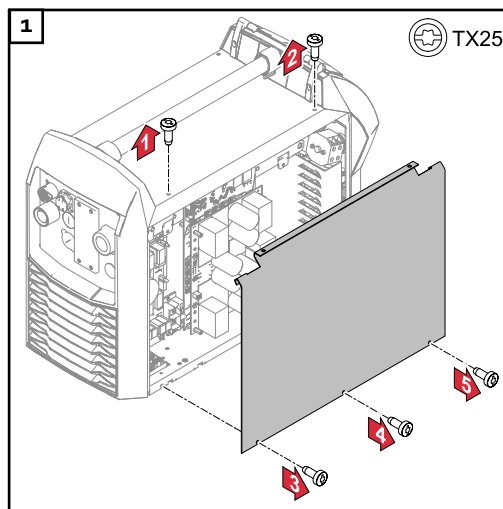
WARNING!

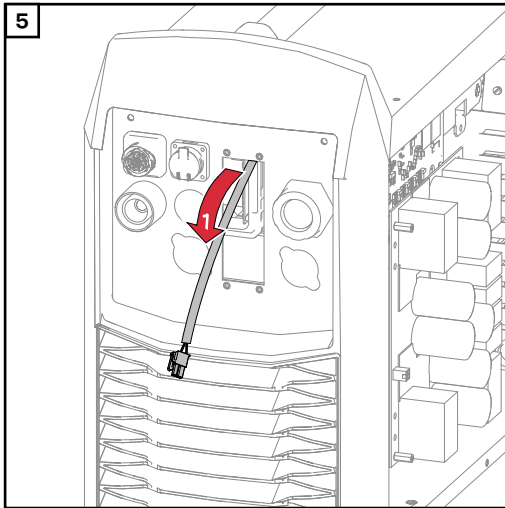
Danger from electrical current due to inadequate ground conductor connection.

This can result in serious personal injury and damage to property.

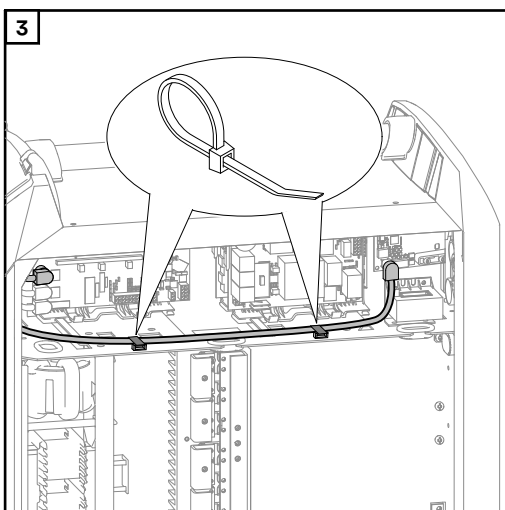
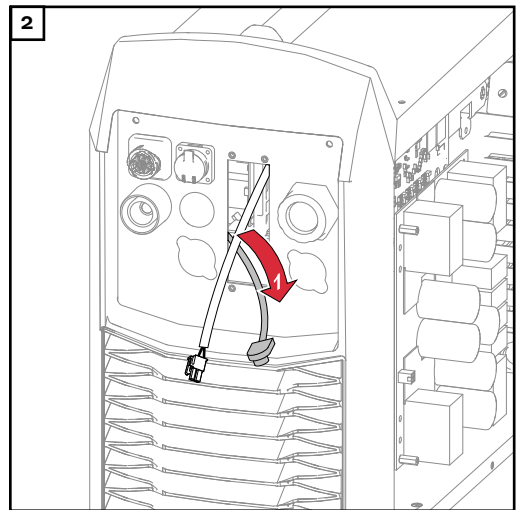
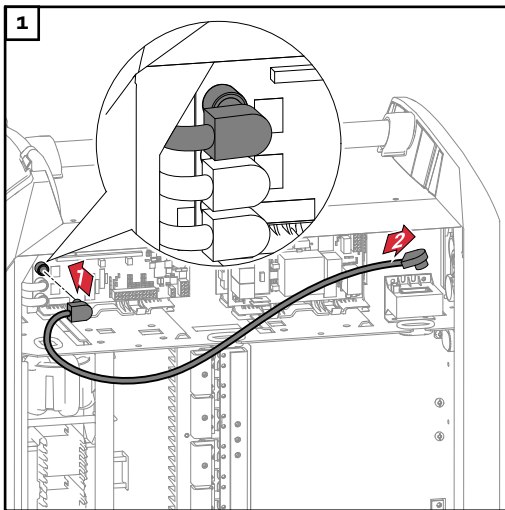
- ▶ Always use the original housing screws in the quantity initially supplied.

Preparation

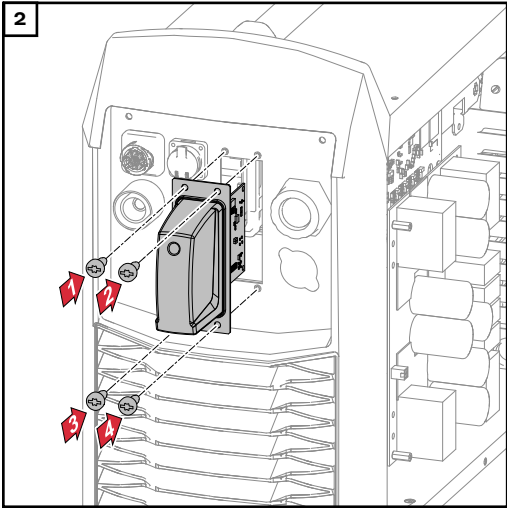
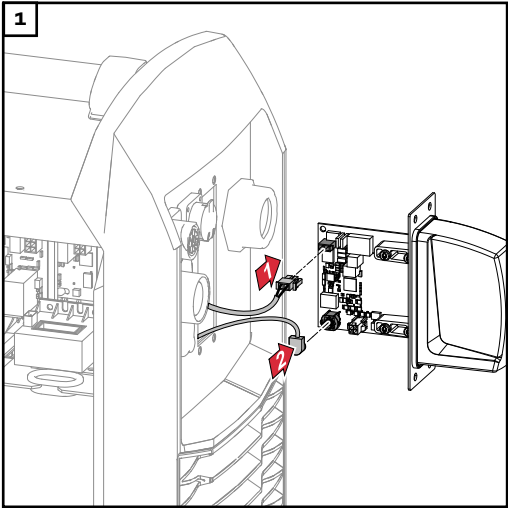




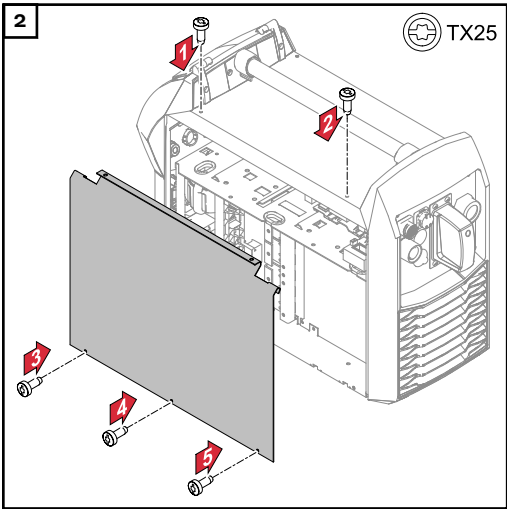
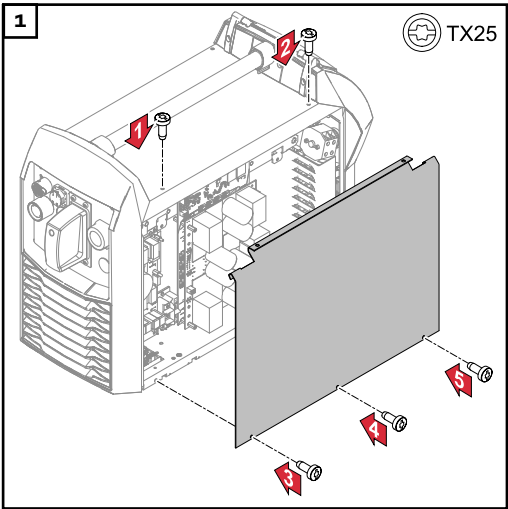
Routing the Data Cable



**Installing the
Robot Interface**



Final Tasks



Installing the Bus Module

Safety

WARNING!

Danger from electrical current.

Serious injuries or death may result.

- ▶ Before starting work, switch off all devices and components involved, and disconnect them from the grid.
- ▶ Secure all devices and components involved so that they cannot be switched back on.

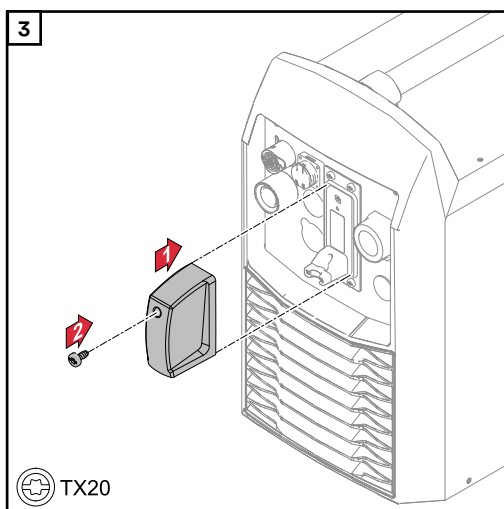
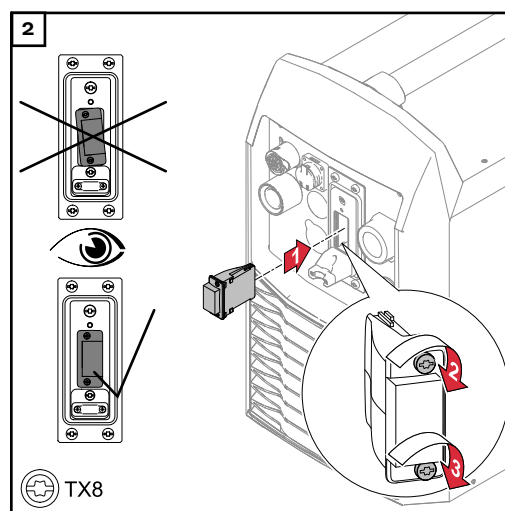
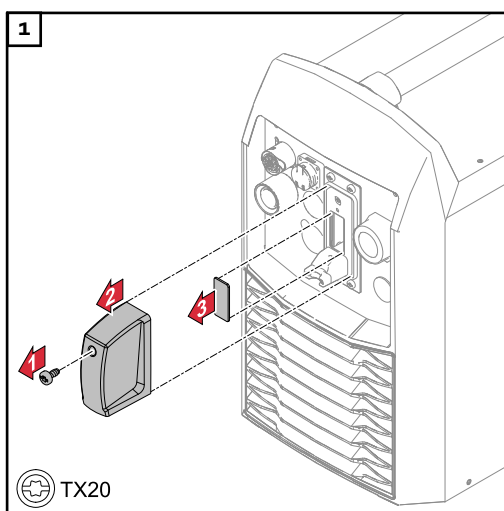
WARNING!

Danger from electrical current due to inadequate ground conductor connection.

Serious personal injury and property damage may result.

- ▶ Always use the original housing screws in the quantity initially supplied.

Installing the Bus Module



Input and Output Signals Standard Image IGM V1.0 - EtherCat

Data types

The following data types are used:

- **UINT16** (Unsigned Integer)
Whole number in the range from 0 to 65535
- **SINT16** (Signed Integer)
Whole number in the range from -32768 to 32767

Conversion examples:

- for a positive value (SINT16)
e.g. desired wire speed x factor
 $12.3 \text{ m/min} \times 100 = 1230_{\text{dec}} = 04CE_{\text{hex}}$
- for a negative value (SINT16)
e.g. arc correction x factor
 $-6.4 \times 10 = -64_{\text{dec}} = FFC0_{\text{hex}}$

Availability of input signals

The input signals listed below are available from firmware V4.3.0 of the TPS/i welding machine.

**Input signals
(from robot to
welding ma-
chine)**

Adress				Signal	Aktiv- ity / Data type	Range	Factor
relativ			absolute				
WORD	BYTE	BIT	BIT				
0	0	0	0	Welding start	Increas- ing		
		1	1	Robot ready	High		
		2	2	Working mode Bit 0	High	See table Value range for Working mode on page 37	
		3	3	Working mode Bit 1	High		
		4	4	Working mode Bit 2	High		
		5	5	Working mode Bit 3	High		
		6	6	Working mode Bit 4	High		
		7	7	—			
	1	0	8	Gas on	Increas- ing		
		1	9	Wire forward	Increas- ing		
		2	10	Wire backward	Increas- ing		
		3	11	Error quit	Increas- ing		
		4	12	Touch sensing	High		
		5	13	Torch blow out	Increas- ing		
		6	14	Processline selection Bit 0	High		
7		15	Processline selection Bit 1	High			

Adress				Signal	Aktiv- ity / Data type	Range	Factor
relativ			absolute				
WORD	BYTE	BIT	BIT				
1	2	0	16	Welding simulation	High		
		1	17	Welding process MIG/MAG: ¹⁾ Constant Wire:	High		
				Synchro pulse on			
		2	18	Welding process MIG/MAG: ¹⁾ Constant Wire:	High		
				SFI on			
				Welding process TIG: ²⁾ Cap shaping	High		
		3	19	—			
		4	20	Welding process TIG: ²⁾ Pilot arc on	High		
				5			
		6	22	Welding process MIG/MAG: ¹⁾ Constant Wire:	High		
	Wire brake on						
	Welding process TIG: ²⁾ Coldwire disable			High			
	7	23	Torchbody xchange				High
	3	0	24	—			
		1	25	Teach mode	High		
		2	26	—			
		3	27	—			
		4	28	—			
5		29	Wire sense start	Increas- ing			
6		30	Wire sense break	Increas- ing			
7		31	—				

Adress				Signal	Aktiv- ity / Data type	Range		Factor		
relativ			absolute							
WORD	BYTE	BIT	BIT							
2	4	0	32	Welding process MIG/MAG: ¹⁾ Constant Wire: TWIN mode Bit 0	High	See table Value Range for TWIN Mode on page 38				
		1	33	Welding process MIG/MAG: ¹⁾ Constant Wire: TWIN mode Bit 1	High					
		2	34	—						
		3	35	—						
		4	36	—						
		5	37	Documentation mode	High	See table Value Range for Documentation Mode on page 38				
		6	38	—						
		7	39	—						
	5	0	40	—						
		1	41	—						
		2	42	—						
		3	43	—						
		4	44	—						
		5	45	—						
		6	46	—						
		7	47	Disable process controlled cor- rection	High					

Adress				Signal	Aktiv- ity / Data type	Range	Factor
relativ			absolute				
WORD	BYTE	BIT	BIT				
3	6	0	48	—			
		1	49	—			
		2	50	—			
		3	51	—			
		4	52	—			
		5	53	—			
		6	54	—			
		7	55	—			
	7	0	56	ExtInput1 -> OPT_Output 1	High		
		1	57	ExtInput2 -> OPT_Output 2	High		
		2	58	ExtInput3 -> OPT_Output 3	High		
		3	59	ExtInput4 -> OPT_Output 4	High		
		4	60	ExtInput5 -> OPT_Output 5	High		
		5	61	ExtInput6 -> OPT_Output 6	High		
		6	62	ExtInput7 -> OPT_Output 7	High		
7		63	ExtInput8 -> OPT_Output 8	High			
4	8-9	0-15	64-79	Welding characteristic	UINT16	0 to 65535	1
				Job number	UINT16	0 to 1000	1
5	10-11	0-15	80-95	Welding process MIG/MAG: ¹⁾ Constant Wire: Wire feed speed command value	SINT16	-327,68 to 327,67 [m/min]	100
				Welding process TIG: ²⁾ Main- / Hotwire current command value	UINT16	0,0 to 6553,5 [A]	10
6	12-13	0-15	96-111	Welding process MIG/MAG: ¹⁾ Arclength correction	SINT16	-10,0 to +10,0 [steps]	10
				Welding process TIG: ²⁾ Wire feed speed command value	SINT16	-327,68 to 327,67 [m/min]	100
				Welding process Constant Wire: Current	UINT16	0,0 to 6553,5 [A]	10

Adress				Signal	Aktiv- ity / Data type	Range	Factor
relativ			absolute				
WORD	BYTE	BIT	BIT				
7	14- 15	0- 15	112-127	Welding process MIG/MAG: ¹⁾ Constant Wire:	SINT16	-10,0 to +10,0 [steps]	10
				Pulse-/dynamic correction			
				Welding process TIG: ²⁾ Wire correction	SINT16	-10,0 to +10,0 [steps]	10
8	16- 17	0- 15	128-143	Welding process MIG/MAG: ¹⁾ Constant Wire:	UINT 16	0,0 to 10,0	10
				Wire retract correction			
				Welding process TIG: ²⁾ Wire retract end	UINT 16	OFF (=0) 1 to 50 [mm]	1
9	18- 19	0- 15	144-159	Welding speed	UINT 16	0,0 to 1000,0 [cm/min]	10
10	20- 21	0- 15	160-175	Process controlled correction	SINT16	0,0 to +5,0	10
11	22- 23	0- 15	176-191	Welding process TIG: ²⁾	UINT 16	OFF (=0) 1 to 50 [mm]	1
				Wire positioning start			
12	24- 25	0- 15	192-207	—			
13	26- 27	0- 15	208-223	—			
14	28- 29	0- 15	224-239	Welding process TIG: ²⁾	UINT 16	0,1 to +9,0 [l/min]	10
				Plasma gas command value			
15	30- 31	0- 15	240-255	Wire forward / backward length	UINT16	OFF (=0) 1 to 65535 [mm]	1
16	32- 33	0- 15	256-271	Wire sense edge detection	UINT16	OFF (<0,5) 0,5 to 20,0 [mm]	10
17	34- 35	0- 15	272-287	—			
18	36- 37	0- 15	288-303	—			
19	38- 39	0- 15	304-319	Seam number	UINT16	0 to 65535	1

Adress				Signal	Aktiv- ity / Data type	Range	Factor
relativ			absolute				
WORD	BYTE	BIT	BIT				
20	40	0	320	Disable start-end-parameter	High		
		1	321	Welding process MIG/MAG: ¹⁾ Constant Wire:	High		
				Disable SFI-parameter			
		2	322	Welding process MIG/MAG: ¹⁾ Constant Wire:	High		
				Disable SP-parameter			
		3	323	Welding process MIG/MAG: ¹⁾ Constant Wire:	High		
				Disable process-mix-parameter			
		4	324	Disable gas-settings	High		
	5	325	Disable delay time flow sensor	High			
	6	326	Disable inching value	High			
	7	327	Disable process controlled cor- rection 2	High			
	41	0	328	Welding process MIG/MAG: ¹⁾ Constant Wire:	High		
				Enable TWIN-parameter			
		1	329	—			
		2	330	—			
		3	331	—			
4		332	Welding process MIG/MAG: ¹⁾ Constant Wire:	High			
			Contact tip short circuit detec- tion on				
5		333	—				
6	334	—					
7	335	—					

Adress				Signal	Aktiv- ity / Data type	Range	Factor
relativ			absolute				
WORD	BYTE	BIT	BIT				
21	42	0	336	Enable resistance overwrite	High		
		1	337	Set resistance value	High		
		2	338	Enable inductance overwrite	High		
		3	339	Set inductance value	High		
		4	340	TAG commando Bit 0	High		
		5	341	TAG commando Bit 1	High		
		6	342	—			
		7	343	—			
	43	0	344	Cooling unit mode Bit 0	High	See table Value Range for Cooling Unit Operating Mode on page 38	
		1	345	Cooling unit mode Bit 1	High		
		2	346	Cooling unit mode Bit 2	High		
		3	347	<i>Welding process MIG/MAG: ¹⁾ Constant Wire:</i> Pulse synchronization ratio Bit 0	High		
		4	348	<i>Welding process MIG/MAG: ¹⁾ Constant Wire:</i> Pulse synchronization ratio Bit 1	High		
		5	349	—			
		6	350	—			
		7	351	<i>Welding process TIG: ²⁾</i> Pulse frequency range selector	High		
22	44-45	0-15	352-367	Gas preflow	UINT 16	0,0 to +9,9 [s]	10
23	46-47	0-15	368-383	Gas postflow	UINT 16	0,0 to +60,0 [s]	10
24	48-49	0-15	384-399	Inching value	SINT 16	-327,68 to 327,67 [m/min]	100
25	50-51	0-15	400-415	Delay time flow sensor	UINT 16	5 to 25 [5 steps]	1
26	52-53	0-15	416-431	Gas command value	UINT 16	OFF (<0,5) 0,5 to +30,0 [l/min]	10
27	54-55	0-15	432-447	Gas factor	UINT 16	AUTO (<0,90) 0,90 to +20,00 [steps]	100

Adress				Signal	Aktiv- ity / Data type	Range	Factor
relativ			absolute				
WORD	BYTE	BIT	BIT				
28	56- 57	0- 15	448-463	Welding process MIG/MAG: ¹⁾ Constant Wire:	UINT 16	OFF (<5) 5 to 100 [steps]	1
				Ignition time out			
				Welding process TIG: ²⁾ Ignition time out	UINT 16	0,1 to 9,9 [s]	10
29	58- 59	0- 15	464-479	Welding process MIG/MAG: ¹⁾ Constant Wire:	UINT 16	0 to 400 [%]	1
				Starting current			
				Welding process TIG: ²⁾ Starting current	UINT 16	0 to 200 [%]	1
30	60- 61	0- 15	480-495	Welding process MIG/MAG: ¹⁾ Constant Wire:	UINT 16	OFF (=0,00) 0,1 to +10,0 [s]	10
				Start current time			
				Welding process TIG: ²⁾ Start current time	UINT 16	OFF (=0,0) 0,01 to +30,00 [s]	100
31	62- 63	0- 15	496-511	Welding process MIG/MAG: ¹⁾ Constant Wire:	UINT 16	0,0 to 9,9 [s]	10
				Slope 1			
				Welding process TIG: ²⁾ Slope 1	UINT 16	OFF (=0,00) 0,01 to +30,00 [s]	100
32	64- 65	0- 15	512-527	Welding process MIG/MAG: ¹⁾ Constant Wire:	UINT 16	0 to 9,9 [s]	10
				Slope 2			
				Welding process TIG: ²⁾ Slope 2	UINT 16	OFF (=0,00) 0,01 to +30,00 [s]	100

Adress				Signal	Aktiv- ity / Data type	Range	Factor
relativ			absolute				
WORD	BYTE	BIT	BIT				
33	66- 67	0- 15	528-543	Welding process MIG/MAG: ¹⁾ Constant Wire:	UINT 16	0 to 400 [%]	1
				End current			
				Welding process TIG: ²⁾ End current	UINT 16	0 to 200 [%]	1
34	68- 69	0- 15	544-559	Welding process MIG/MAG: ¹⁾ Constant Wire:	UINT 16	OFF (=0,0) 0,1 to 10,0 [s]	10
				End current time			
				Welding process TIG: ²⁾ End current time	UINT 16	OFF (=0,00) 0,01 to +30,00 [s]	100
35	70- 71	0- 15	560-575	Welding process MIG/MAG: ¹⁾ Constant Wire:	SINT 16	-10,0 to +10,0	10
				Start arclength correction			
				Welding process TIG: ²⁾ Pulse frequency	UINT 16	OFF (=0,0) 0,2 to 1999,9 2000 to 10000 [Hz]	10, 1
36	72- 73	0- 15	576-591	Welding process MIG/MAG: ¹⁾ Constant Wire:	SINT 16	-10,0 to +10,0	10
				End arclength correction			
				Welding process TIG: ²⁾ Base current	UINT 16	0 to 100 [%]	1
37	74- 75	0- 15	592-607	Welding process MIG/MAG: ¹⁾ Constant Wire:	UINT 16	OFF (=0,0) 0,01 to +10,00 [s]	100
				SFI hotstart			
				Welding process TIG: ²⁾ Duty cycle	UINT 16	10 to 90 [%]	1

Adress				Signal	Aktiv- ity / Data type	Range	Factor
relativ			absolute				
WORD	BYTE	BIT	BIT				
38	76- 77	0- 15	608-623	Welding process MIG/MAG: ¹⁾ Constant Wire:	UINT 16	0,1 to +6,0 [m/min]	10
				SP delta wire feed			
				Welding process TIG: ²⁾ Wire feed speed command value 2	UINT 16	0 to 100 [steps]	1
39	78- 79	0- 15	624-639	Welding process MIG/MAG: ¹⁾ Constant Wire: SP frequency	UINT 16	0,5 to 10,0 [Hz]	10
40	80- 81	0- 15	640-655	Welding process MIG/MAG: ¹⁾ Constant Wire: SP duty cycle	UINT 16	10 to 90 [Hz]	1
41	82- 83	0- 15	656-671	Welding process MIG/MAG: ¹⁾ Constant Wire: SP arc length correction high	SINT 16	-10,0 to +10,0	10
42	84- 85	0- 15	672-687	Welding process MIG/MAG: ¹⁾ Constant Wire: SP arc length correction low	SINT 16	-10,0 to +10,0	10
43	86- 87	0- 15	688-703	Welding process MIG/MAG: ¹⁾ Constant Wire: Process-mix high power time correction	SINT 16	-10,0 to +10,0	10
44	88- 89	0- 15	704-719	Welding process MIG/MAG: ¹⁾ Constant Wire: Process-mix low power time correction	SINT 16	-10,0 to +10,0	10
45	90- 91	0- 15	720-735	Welding process MIG/MAG: ¹⁾ Constant Wire: Process-mix low power correc- tion	SINT 16	-10,0 to +10,0	10

Adress				Signal	Aktiv- ity / Data type	Range		Factor
relativ			absolute					
WORD	BYTE	BIT	BIT					
46	92-93	0-15	736-751	Welding process MIG/MAG: ¹⁾ Constant Wire: Process controlled correction 2	SINT 16	See table Value range for Process controlled correction 2 on page 39		
47	94	0-7	752-759	Welding process MIG/MAG: ¹⁾ Constant Wire: Phase shift lead / trail	UINT 8	Auto (=255) 0 to 95 [%]		1
	95	0-7	760-767	Welding process MIG/MAG: ¹⁾ Constant Wire: Ignition delay trail	UINT 8	Auto (=255) / OFF (=254) 0,00 to 2,00 [sec]		100
48	96-97	0-15	768-783	TAG adress	UINT 16	0 to 65535		1
49	98-99	0-15	784-799	TAG value	UINT 16	0 to 65535		1
50	100-101	0-15	800-815	Resistance	UINT 16	0,0 to +400,0 [mOhm]		10
51	102-103	0-15	816-831	Inductance	UINT 16	0,0 to +250,0 [Mikrohenry]		10

- 1) MIG/MAG Puls-Synergic, MIG/MAG Standard-Synergic, MIG/MAG Standard-Manuel, MIG/MAG PMC, MIG/MAG, LSC
2) TIG cold wire, TIG hot wire

Value range for Working mode

Value range working mode:					
Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
0	0	0	0	0	Internal parameter selection
0	0	0	0	1	Special 2-step mode characteristics
0	0	0	1	0	Job mode
0	1	0	0	0	2-step mode characteristics
0	1	0	0	1	MIG/MAG Standard manual 2-step
1	0	0	0	0	Idle mode
1	0	0	0	1	Stop coolant pump
1	1	0	0	0	R/L measurement

Value range working mode:					
Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
1	1	0	0	1	R/L alignment

Value range for operating mode

Value range Process line selection

Bit 1	Bit 0	Description
0	0	Process line 1 (default)
0	1	Process line 2
1	0	Process line 3
1	1	Reserved

Value range for process line selection

Value Range for TWIN Mode

Bit 1	Bit 0	Description
0	0	TWIN Single mode
0	1	TWIN Lead mode
1	0	TWIN Trail mode
1	1	Reserved

Value range for TWIN mode

Value Range for Documentation Mode

Bit 0	Description
0	Seam number of welding machine (internal)
1	Seam number of robot (Word 19)

Value range for documentation mode

Value range for Process controlled correction

Process	Signal	Activity / data type	Value range configuration range	Unit	Factor
PMC	Arc length stabilizer	SINT16	-3276.8 to +3276.7 0.0 to +5.0	Volts	10

Value range for process-dependent correction

Value Range for Cooling Unit Operating Mode

Bit 2	Bit 1	Bit 0	Description
0	0	0	auto

Bit 2	Bit 1	Bit 0	Description
0	0	1	eco
0	1	0	on
0	0	0	off

Value Range for Cooling Unit Operating Mode

**Value range for
Process controlled correction 2**

Process	Signal	Activity / data type	Value range configuration range	Unit	Factor
PMC	Penetration stabilizer	SINT16	-3276.8 to +3276.7 0.0 to +10.0	m/min	10

Value range for process-dependent correction 2

**Availability of
the output sig-
nals**

The output signals listed below are available from firmware V4.3.0 of the TPS/i welding machine.

**Output signals
(from power
source to robot)**

Adress				Signal	Aktiv- ity / Data type	Range	Factor
relativ			absolute				
WORD	BYTE	BIT	BIT				
0	0	0	0	Heartbeat powersource	High / Low	1 Hz	
		1	1	Power source ready	High		
		2	2	Warning	High		
		3	3	Process active	High		
		4	4	Current flow	High		
		5	5	Arc stable- / touch signal	High		
		6	6	Main current signal	High		
		7	7	Touch signal	High		
	1	0	8	Collision box active	Low	0 = collision or cable break	
		1	9	Robot motion release	High		
		2	10	Welding process MIG/MAG: ¹⁾ Constant Wire: Wire stick workpiece	High		
		3	11	Welding process TIG: ²⁾ Electrode overload	High		
		4	12	Welding process MIG/MAG: ¹⁾ Constant Wire: Short circuit contact tip	High		
		5	13	Parameter selection internally	High		
		6	14	Characteristic number valid	High		
		7	15	Torchbody gripped	High		

Adress				Signal	Aktiv- ity / Data type	Range	Factor
relativ			absolute				
WORD	BYTE	BIT	BIT				
1	2	0	16	Command value out of range	High		
		1	17	Correction value out of range	High		
		2	18	—			
		3	19	Limit signal	High		
		4	20	—			
		5	21	Standby active	High		
		6	22	Main supply status	Low		
		7	23	—			
	3	0	24	Sensor status 1	High	See table Assignment of Sensor Statuses 1–4 on page 48	
		1	25	Sensor status 2	High		
		2	26	Sensor status 3	High		
		3	27	Sensor status 4	High		
		4	28	—			
		5	29	—			
		6	30	—			
		7	31	—			

Adress				Signal	Aktiv- ity / Data type	Range	Factor
relativ			absolute				
WORD	BYTE	BIT	BIT				
2	4	0	32	Function status Bit 0	High	See table Value Range for Function status on page 48	
		1	33	Function status Bit 1	High		
		2	34	—			
		3	35	Safety status Bit 0	High	See table Value range Safety status on page 48	
		4	36	Safety status Bit 1	High		
		5	37	—			
		6	38	Notification	High		
		7	39	System not ready	High		
	5	0	40	—			
		1	41	—			
		2	42	<i>Welding process TIG: 2)</i> Pulse current active	High		
		3	43	<i>Welding process TIG: 2)</i> Pilot arc active	High		
		4	44	Process run	High		
		5	45	—			
		6	46	Active processline Bit 0	High	See table Value range Process line selection on page 38	
		7	47	Active processline Bit 1	High		

Adress				Signal	Aktiv- ity / Data type	Range	Factor
relativ			absolute				
WORD	BYTE	BIT	BIT				
3	6	0	48	Process Bit 0	High		
		1	49	Process Bit 1	High		
		2	50	Process Bit 2	High		
		3	51	Process Bit 3	High		
		4	52	Process Bit 4	High		
		5	53	—			
		6	54	Welding process MIG/MAG: ¹⁾ Constant Wire: Touch signal gas nozzle	High		
		7	55	Welding process MIG/MAG: ¹⁾ Constant Wire: TWIN synchronization active	High		
	7	0	56	ExtOutput1 <- OPT_Input1	High		
		1	57	ExtOutput2 <- OPT_Input2	High		
		2	58	ExtOutput3 <- OPT_Input3	High		
		3	59	ExtOutput4 <- OPT_Input4	High		
		4	60	ExtOutput5 <- OPT_Input5	High		
		5	61	ExtOutput6 <- OPT_Input6	High		
		6	62	ExtOutput7 <- OPT_Input7	High		
		7	63	ExtOutput8 <- OPT_Input8	High		
4	8-9	0-15	64-79	Welding voltage	UINT16	0,00 to 327,67 [V]	100
5	10-11	0-15	80-95	Welding current	UINT16	0,0 to 3276,7 [A]	10
6	12-13	0-15	96-111	Wire feed speed	SINT16	-327,68 to 327,67 [m/min]	100
7	14-15	0-15	112-127	Welding process MIG/MAG: ¹⁾ Constant Wire: Actual real value for seam tracking	UINT16	0 to 6,5535	1000 0
8	16-17	0-15	128-143	Error number	UINT16	0 to 65535	1
9	18-19	0-15	144-159	Warning number	UINT16	0 to 65535	1
10	20-21	0-15	160-175	Motor current M1	SINT16	-327,68 to 327,67 [A]	100

Adress				Signal	Aktiv- ity / Data type	Range	Factor
relativ			absolute				
WORD	BYTE	BIT	BIT				
11	22- 23	0- 15	176-191	Motor current M2	SINT16	-327,68 to 327,67 [A]	100
12	24- 25	0-1 5	192-207	Motor current M3	SINT16	-327,68 to 327,67 [A]	100
13	26- 27	0- 15	208-223	Welding process TIG: 2) Actual real value AVC	UINT16	0,00 to 655,35 [V]	100
14	28- 29	0- 15	224-239	—			
15	30- 31	0- 15	240-255	—			
16	32- 33	0- 15	256-271	Wire position	SINT16	-327,68 to 327,67 [A]	100
17	34- 35	0- 15	272-287	—			
18	36- 37	0- 15	288-303	—			
19	38- 39	0- 15	304-319	—			

Adress				Signal	Aktiv- ity / Data type	Range	Factor
relativ			absolute				
WORD	BYTE	BIT	BIT				
20	40	0	320	Welding process MIG/MAG: ¹⁾ Constant Wire:	High		
				Gas MIG/MAG pushed			
				Welding process TIG: ²⁾ Gas TIG pushed	High		
		1	321	—			
		2	322	Wire feeder 1 available	High		
		3	323	Wire feeder 2 available	High		
		4	324	Wire feeder 3 available	High		
		5	325	Shielding gas controller avail- able	High		
	6	326	Wire forward pushed	High			
	7	327	Wire backward pushed	High			
	41	0	328	OPT/i safety stop available	High		
		1	329	Communication ready	High		
		2	330	Teach mode pushed	High		
		3	331	—			
		4	332	—			
		5	333	—			
6		334	—				
7		335	—				
21	42	0	336	—			
		1	337	TAG status Bit 0	High		
		2	338	TAG status Bit 1	High		
		3	339	TAG status Bit 2	High		
		4	340	TAG command response Bit 0	High		
		5	341	TAG command response Bit 1	High		
		6	342	—			
		7	343	—			
	43	0-7	344-351	—			
22	44-45	0-15	352-367	Cooler temperature	SINT16	-100,00 to +200,00 [°C]	100
23	46-47	0-15	368-383	Cooler flow rate	SINT16	-100,0 to +100,0 [l/min]	10

Adress				Signal	Aktiv- ity / Data type	Range	Factor
relativ			absolute				
WORD	BYTE	BIT	BIT				
24	48-48	0-15	384-399	Real energy actual value	UINT16	0,0 to 6553,5 [kJ]	10
25	50-51	0-15	400-415	Power actual value	UINT16	0,0 to 655,35 [kW]	10
26 -	52-55	0-32	416-447	Hour meter power on	UINT32	0,0 to 100000,0 [h]	10
28 -	56-59	0-32	448-479	Hour meter arc time	UINT32	0,0 to 100000,0 [h]	10
30	60-61	0-15	480-495	—			
31	62-63	0-15	496-511	—			
32	64-65	0-15	512-527	Welding voltage real value	UINT16	0,00 to 327,67 [V]	100
33	66-67	0-15	528-543	Welding current real value	UINT16	0,0 to 3276,7 [A]	10
34	68-69	0-15	544-559	Wire feed speed real value	SINT16	-327,68 to 327,67 [m/min]	100
35	70-71	0-15	560-575	Gas real value	UINT16	0,0 to 100,0 [steps]	10
36	72-73	0-15	576-591	Inching value feedback	SINT16	-327,68 to 327,67 [m/min]	100
37	74-75	0-15	592-607	Welding process TIG: 2) Working gas real value	UINT16	0,0 to +100,0 [l/min]	10
38	76-77	0-15	608-623	—			
39	78-79	0-15	624-639	—			
40	80-81	0-15	640-655	—			
41	82-83	0-15	656-671	—			
42	84-85	0-15	672-687	—			
43	86-87	0-15	688-703	—			
44	88-89	0-15	704-719	—			
45	90-91	0-15	720-735	—			

Adress				Signal	Aktiv- ity / Data type	Range	Factor
relativ			absolute				
WORD	BYTE	BIT	BIT				
46	92-93	0-15	736-751	—			
47	94-95	0-15	752-767	—			
48	96-97	0-15	768-783	TAG adress	UINT 16	0 to 65535	1
49	98-99	0-15	784-799	TAG value	UINT 16	0 to 65535	1
50	100-101	0-15	800-815	Resistance	UINT 16	0,0 to +400,0 [mOhm]	10
51	102-103	0-15	816-831	Inductance	UINT 16	0,0 to +250,0 [Mikrohenry]	10

- 1) MIG/MAG Puls-Synergic, MIG/MAG Standard-Synergic, MIG/MAG Standard-Manuel, MIG/MAG PMC, MIG/MAG, LSC
- 2) TIG cold wire, TIG hot wire

Assignment of Sensor Statuses 1–4

Signal	Description
Sensor status 1	OPT/i WF R wire end (4,100,869)
Sensor status 2	OPT/i WF R wire drum (4,100,879)
Sensor status 3	OPT/i WF R ring sensor (4,100,878)
Sensor status 4	Wire buffer set CMT TPS/i (4,001,763)

Assignment of sensor statuses

Value Range for Function status

Bit 1	Bit 0	Description
0	0	Inactive
0	1	Idle
1	0	Finished
1	1	Error

Value range for function status

Value range Safety status

Bit 1	Bit 0	Description
0	0	Reserve
0	1	Hold
1	0	Stop

Bit 1	Bit 0	Description
1	1	Not installed / active

Value range Safety status

Value Range for Process Bit

Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
0	0	0	0	0	No internal parameter selection or process
0	0	0	0	1	MIG/MAG pulse synergic
0	0	0	1	0	MIG/MAG standard synergic
0	0	0	1	1	MIG/MAG PMC
0	0	1	0	0	MIG/MAG LSC
0	0	1	0	1	MIG/MAG standard manual
0	0	1	1	0	Electrode
0	0	1	1	1	TIG
0	1	0	0	0	CMT
0	1	0	0	1	ConstantWire
0	1	0	1	0	ColdWire
0	1	0	1	1	DynamicWire

Value Range for Process Bit

Input and Output Signals - DeviceNet

Data types

The following data types are used:

- **UINT16** (Unsigned Integer)
Whole number in the range from 0 to 65535
- **SINT16** (Signed Integer)
Whole number in the range from -32768 to 32767

Conversion examples:

- for a positive value (SINT16)
e.g. desired wire speed x factor
 $12.3 \text{ m/min} \times 100 = 1230_{\text{dec}} = 04\text{CE}_{\text{hex}}$
- for a negative value (SINT16)
e.g. arc correction x factor
 $-6.4 \times 10 = -64_{\text{dec}} = \text{FFCO}_{\text{hex}}$

Availability of input signals

The input signals listed below are available from firmware V4.3.0 of the TPS/i welding machine.

Input signals (from robot to welding machine)

Address				Signal	Activity / data type	Range	Factor	Process image	
Relative			Abso- lute					Standard	Economy
WORD	BYTE	BIT	BIT						
0	0	0	0	Welding Start	Increas- ing			✓	✓
		1	1	Robot ready	High				
		2	2	Working mode Bit 0	High	See table Value Range for Work- ing Mode on page 56			
		3	3	Working mode Bit 1	High				
		4	4	Working mode Bit 2	High				
		5	5	Working mode Bit 3	High				
		6	6	Working mode Bit 4	High				
		7	7	—					
	1	0	8	Gas on	Increas- ing				
		1	9	Wire forward	Increas- ing				
		2	10	Wire backward	Increas- ing				
		3	11	Error quit	Increas- ing				
		4	12	Touch sensing	High				
		5	13	Torch blow out	Increas- ing				
		6	14	Processline selection Bit 0	High	See table Value range Process line selection on page 57			
		7	15	Processline selection Bit 1	High				

Address				Signal	Activity / data type	Range	Factor	Process image	
Relative			Abso- lute					Standard	Economy
WORD	BYTE	BIT	BIT						
1	2	0	16	Welding simulation	High			✓	✓
		1	17	Welding process MIG/MAG: ¹⁾	High				
				Synchro pulse on					
				Welding process TIG: ²⁾	High				
				TAC on					
		2	18	Welding process TIG: ²⁾	High				
				Cap shaping					
		3	19	—					
		4	20	—					
		5	21	Booster manual	High				
		6	22	Wire brake on	High				
		7	23	Torchbody Xchange	High				
	3	0	24	—					
		1	25	Teach mode	High				
		2	26	—					
		3	27	—					
		4	28	—					
		5	29	Wire sense start	Increas- ing				
		6	30	Wire sense break	Increas- ing				
		7	31	—					

Address				Signal	Activity / data type	Range	Factor	Process image	
Relative			Abso- lute					Standard	Economy
WORD	BYTE	BIT	BIT						
2	4	0	32	TWIN mode Bit 0	High	See table Value Range for TWIN Mode on page 57		✓	✓
		1	33	TWIN mode Bit 1	High				
		2	34	—					
		3	35	—					
		4	36	—					
		5	37	Documentation mode	High	See table Value Range for Documentation Mode on page 57			
		6	38	—					
		7	39	—					
	5	0	40	—					
		1	41	—					
		2	42	—					
		3	43	—					
		4	44	—					
		5	45	—					
		6	46	—					
		7	47	Disable process controlled correction	High				

Address				Signal	Activity / data type	Range	Factor	Process image	
Relative			Abso- lute					Standard	Economy
WORD	BYTE	BIT	BIT						
3	6	0	48	—				✓	✓
		1	49	—					
		2	50	—					
		3	51	—					
		4	52	—					
		5	53	—					
		6	54	—					
		7	55	—					
	7	0	56	ExtInput1 => OPT_Output 1	High				
		1	57	ExtInput2 => OPT_Output 2	High				
		2	58	ExtInput3 => OPT_Output 3	High				
		3	59	ExtInput4 => OPT_Output 4	High				
		4	60	ExtInput5 => OPT_Output 5	High				
		5	61	ExtInput6 => OPT_Output 6	High				
		6	62	ExtInput7 => OPT_Output 7	High				
		7	63	ExtInput8 => OPT_Output 8	High				
4	8-9	0-15	64-79	Welding characteristic- / Job number	UINT16	0 to 1000	1	✓	✓
5	10-11	0-15	80-95	<i>Welding process MIG/MAG: 1)</i> <i>Constant Wire:</i> Wire feed speed command value	SINT16	-327,68 to 327,67 [m/min]	100	✓	✓
				<i>Welding process TIG: 2)</i> Main- / Hotwire current command value	UINT16	0,0 to 6553,5 [A]	10		
				<i>For job-mode</i> Power correction	SINT16	-20,00 to 20,00 [%]	100		

Address				Signal	Activity / data type	Range	Factor	Process image	
Relative			Abso- lute					Standard	Economy
WORD	BYTE	BIT	BIT						
6	12 - 13	0- 15	96-111	Welding process MIG/MAG: ¹⁾ Arclength correction	SINT16	-10,0 to 10,0 [steps]	10	✓	✓
				Welding process MIG/MAG Standard-Manuel: Welding voltage	UINT16	0,0 to 6553,5 [V]	10		
				Welding process TIG: ²⁾ Wire feed speed command value	SINT16	-327,68 to 327,67 [m/min]	100		
				For job-mode Arclength correction	SINT16	-10,0 to 10,0 [steps]	10		
				Welding process Constant Wire: Hotwire current	UINT16	0,0 to 6553,5 [A]	10		
7	14 - 15	0- 15	112-127	Welding process MIG/MAG: ¹⁾ Pulse-/dynamic correction	SINT16	-10,0 to 10,0 [steps]	10	✓	✓
				Welding process MIG/MAG Standard-Manuel: Dynamic	UINT16	0,0 to 10,0 [steps]	10		
				Welding process TIG: ²⁾ Wire correction	SINT16	-10,0 to 10,0 [steps]	10		
8	16 - 17	0- 15	128-143	Welding process MIG/MAG: ¹⁾ Wire retract correction	UINT16	0,0 to 10,0 [steps]	10	✓	✓
				Welding process TIG: ²⁾ Wire retract end	UINT16	OFF, 1 to 50 [mm]	1		
9	18 - 19	0- 15	144-159	Welding speed	UINT16	0,0 to 1000,0 [cm/min]	10	✓	

Address				Signal	Activity / data type	Range	Factor	Process image	
Relative			Abso-lute					Standard	Economy
WORD	BYTE	BIT	BIT						
10	20 - 21	0-15	160-175	Process controlled correction		See table Value range for Process controlled correction on page 57		✓	
11	22 - 23	0-15	176-191	Welding process TIG: ²⁾ Wire positioning start				✓	
12	24 - 25	0-15	192-207	—				✓	
13	26 - 27	0-15	208-223	—				✓	
14	28 - 29	0-15	224-239	—				✓	
15	30 - 31	0-15	240-255	Wire forward / backward length	UINT16	OFF / 1 to 65535 [mm]	1	✓	
16	32 - 33	0-15	256-271	Wire sense edge detection	UINT16	OFF / 0,5 to 20,0 [mm]	10	✓	
17	34 - 35	0-15	272-287	—				✓	
18	36 - 37	0-15	288-303	—				✓	
19	38 - 39	0-15	304-319	Seam number	UINT16	0 to 65535	1	✓	

- 1) MIG/MAG Puls-Synergic, MIG/MAG Standard-Synergic, MIG/MAG Standard-Manuel, MIG/MAG PMC, MIG/MAG, LSC
- 2) WIG-coldwire, WIG-hotwire

Value Range for Working Mode

Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
0	0	0	0	0	Internal parameter selection
0	0	0	0	1	Special 2-step mode characteristics
0	0	0	1	0	Job mode

Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
0	1	0	0	0	2-step mode characteristics
0	1	0	0	1	2-step MIG/MAG standard manual
1	0	0	0	0	Idle Mode
1	0	0	0	1	Stop coolant pump
1	1	0	0	1	R/L-Measurement

Value range for operating mode

Value range Process line selection

Bit 1	Bit 0	Description
0	0	Process line 1 (default)
0	1	Process line 2
1	0	Process line 3
1	1	Reserved

Value range for process line selection

Value Range for TWIN Mode

Bit 1	Bit 0	Description
0	0	TWIN Single mode
0	1	TWIN Lead mode
1	0	TWIN Trail mode
1	1	Reserved

Value range for TWIN mode

Value Range for Documentation Mode

Bit 0	Description
0	Seam number of welding machine (internal)
1	Seam number of robot (Word 19)

Value range for documentation mode

Value range for Process controlled correction

Process	Signal	Activity / data type	Value range configuration range	Unit	Factor
PMC	Arc length stabilizer	SINT16	-327.8 to +327.7 0.0 to +5.0	Volts	10

Value range for process-dependent correction

Availability of the output signals

The output signals listed below are available from firmware V4.3.0 of the TPS/i welding machine.

Output signals (from welding machine to robot)

Address				Signal	Activity / data type	Range	Factor	Process image	
relative			absolute					Standard	Economy
WORD	BYTE	BIT	BIT						
0	0	0	0	Heartbeat Powersource	High/Low	1 Hz		✓	✓
		1	1	Power source ready	High				
		2	2	Warning	High				
		3	3	Process active	High				
		4	4	Current flow	High				
		5	5	Arc stable- / touch signal	High				
		6	6	Main current signal	High				
		7	7	Touch signal	High				
	1	0	8	Collisionbox active	High	0 = collision or cable break			
		1	9	Robot Motion Release	High				
		2	10	Wire stick workpiece	High				
		3	11	Welding process TIG: ²⁾ Electrode overload	High				
		4	12	Short circuit contact tip	High				
		5	13	Parameter selection internally	High				
		6	14	Characteristic number valid	High				
		7	15	Torch body gripped	High				

Address				Signal	Activity / data type	Range	Factor	Process image	
relative			absolute					Standard	Economy
WORD	BYTE	BIT	BIT						
1	2	0	16	Command value out of range	High			✓	✓
		1	17	Correction out of range	High				
		2	18	—					
		3	19	Limitsignal	High				
		4	20	—					
		5	21	Standby active	High				
		6	22	Main supply status	Low				
		7	23	—					
	3	0	24	Sensor status 1	High	See table Assign- ment of Sensor Statuses 1–4 on page 61			
		1	25	Sensor status 2	High				
		2	26	Sensor status 3	High				
		3	27	Sensor status 4	High				
		4	28	—					
		5	29	—					
		6	30	—					
		7	31	—					
2	4	0	32	Function status Bit 0	High	See table Value Range for Function status on page 62			
		1	33	Function status Bit 1	High				
		2	34	—					
		3	35	Safety status Bit 0	High	See table Value range Safety status on page 62			
		4	36	Safety status Bit 1	High				
		5	37	—					
		6	38	Notification	High				
		7	39	System not ready	High				
	5	0	40	—					
		1	41	—					
		2	42	<i>Welding process WIG: 2)</i> Pulse current active	High				
		3	43	—					
		4	44	Process run	High				
		5	45	—					
		6	46	Active processline Bit 0	High				
		7	47	Active processline Bit 1	High				

Address				Signal	Activity / data type	Range	Factor	Process image	
relative			absolute					Standard	Economy
WORD	BYTE	BIT	BIT						
3	6	0	48	Process Bit 0	High	See table Value Range for Process Bit on page 62		✓	✓
		1	49	Process Bit 1	High				
		2	50	Process Bit 2	High				
		3	51	Process Bit 3	High				
		4	52	Process Bit 4	High				
		5	53	—					
		6	54	Touch signal gas nozzle	High				
		7	55	TWIN synchronization active	High				
	7	0	56	ExtOutput1 <= OPT_Input1	High				
		1	57	ExtOutput2 <= OPT_Input2	High				
		2	58	ExtOutput3 <= OPT_Input3	High				
		3	59	ExtOutput4 <= OPT_Input4	High				
		4	60	ExtOutput5 <= OPT_Input5	High				
		5	61	ExtOutput6 <= OPT_Input6	High				
		6	62	ExtOutput7 <= OPT_Input7	High				
		7	63	ExtOutput8 <= OPT_Input8	High				
4	8-9	0-15	64-79	Welding voltage	UINT16	0,00 to 655,35 [V]	100	✓	✓
5	10-11	0-15	80-95	Welding current	UINT16	0,0 to 6553,5 [A]	10	✓	✓
6	12-13	0-15	96-111	Wire feed speed	SINT16	-327,68 to 327,67 [m/min]	100	✓	✓
7	14-15	0-15	112-127	Actual real value for seam tracking	UINT16	0 to 6,5535	10000	✓	✓
8	16-17	0-15	128-143	Error number	UINT16	0 to 65535	1	✓	
9	18-19	0-15	144-159	Warning number	UINT16	0 to 65535	1	✓	

Address				Signal	Activity / data type	Range	Factor	Process image	
relative			absolute					Standard	Economy
WORD	BYTE	BIT	BIT						
10	20 - 21	0- 15	160-175	Motor current M1	SINT16	-327,68 to 327,67 [A]	100	✓	
11	22 - 23	0- 15	176-191	Motor current M2	SINT16	-327,68 to 327,67 [A]	100	✓	
12	24 - 25	0- 15	192-207	Motor current M3	SINT16	-327,68 to 327,67 [A]	100	✓	
13	26 - 27	0- 15	208-223	Welding process TIG: ²⁾ Actual real value AVC	UINT16	0,0 to 6553,5 [V]	100	✓	
14	28 - 29	0- 15	224-239	—				✓	
15	30 - 31	0- 15	240-255	Resistance	UINT16	0,0 to +400,0 [mOhm]	10	✓	
16	32 - 33	0- 15	256-271	Wire position	SINT16	-327,68 to 327,67 [mm]	100	✓	
17	34 - 35	0- 15	272-287	Wire buffer level (only RI FB PRO/i)	SINT16	-100 to 100 [%]	1	✓	
18	36 - 37	0- 15	288-303	—				✓	
19	38 - 39	0- 15	304-319	—				✓	

- 1) MIG/MAG Puls-Synergic, MIG/MAG Standard-Synergic, MIG/MAG Standard-Manuel, MIG/MAG PMC, MIG/MAG, LSC
- 2) WIG-cold wire, WIG-hot wire

Assignment of Sensor Statuses 1–4

Signal	Description
Sensor status 1	OPT/i WF R wire end (4,100,869)
Sensor status 2	OPT/i WF R wire drum (4,100,879)
Sensor status 3	OPT/i WF R ring sensor (4,100,878)
Sensor status 4	Wire buffer set CMT TPS/i (4,001,763)

Assignment of sensor statuses

**Value Range for
Function status**

Bit 1	Bit 0	Description
0	0	Inactive
0	1	Idle
1	0	Finished
1	1	Error

Value range for function status

**Value range
Safety status**

Bit 1	Bit 0	Description
0	0	Reserve
0	1	Hold
1	0	Stop
1	1	Not installed / active

Value range Safety status

**Value Range for
Process Bit**

Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description
0	0	0	0	0	No internal parameter selection or process
0	0	0	0	1	MIG/MAG pulse synergic
0	0	0	1	0	MIG/MAG standard synergic
0	0	0	1	1	MIG/MAG PMC
0	0	1	0	0	MIG/MAG LSC
0	0	1	0	1	MIG/MAG standard manual
0	0	1	1	0	Electrode
0	0	1	1	1	TIG
0	1	0	0	0	CMT
0	1	0	0	1	ConstantWire
0	1	0	1	0	ColdWire
0	1	0	1	1	DynamicWire

Value Range for Process Bit

TAG Table IGM

TAG number	Name	Access	Range	Factor
0				
1	TIG Wire start delay	write	0 .. Off 0.1 to 9.9 6553.5 .. Manual [s]	10
2	TIG Wire end delay	write	0 .. Off 0.1 to 9.9 6553.5 .. Manual [s]	10
3	Cycle TIG on	write	1 .. Off 2 .. On	1
4	Cycle TIG Interval time	write	0.02 to 2.00 [s]	100
5	Cycle TIG Interval pause time	write	0.02 to 2.00 [s]	100
6	Cycle TIG Interval cycles	write	0 .. Permanent 1 to 2000 [Steps]	1
7	Cycle TIG Background current	write	0 .. Off 1 to 5000 [A]	1
8	CMT Cycle step	write	1 .. Off 2 .. On	1
9	CMT Cycle step cycles	write	1 to 2000 [Steps]	1
10	CMT Cycle step interval breaktime	write	0.02 to 2.00 [s]	100
11	CMT Cycle interval cycles	write	0 .. Permanent 1 to 2000 [Steps]	1
12	TIG Elektrode diameter	write	0 .. Off 1.0 to 6.4 [mm]	10
13	TIG AC Frequency	write	< 40 .. Synchron 40 to 250 [Hz]	1
14	TIG AC Balance	write	15 to 50 [Steps]	1
15	TIG AC Current offset	write	-70 to 70 [%]	1
16	TIG Phase Sync	write	0 to 5 [Steps]	1

TAG number	Name	Access	Range	Factor
17	TIG Waveform positive	write	1 .. SquareHard 2 .. SquareSoft 3 .. Sine 4 .. Triangle	1
18	TIG Waveform negative	write	1 .. SquareHard 2 .. SquareSoft 3 .. Sine 4 .. Triangle	1
19	TIG DC Waveform pulse	write	1 .. SquareHard 2 .. SquareSoft 3 .. Sine	1
20	TIG DC Waveform background	write	1 .. SquareHard 2 .. SquareSoft 3 .. Sine	1
21	TIG rPI	write	1 .. Off 2 .. On 3 .. Auto	1
22	TIG Spot time	write	0.02 to 120 [s]	100
23	HF-Ignition	write	1 .. Off 2 .. On 3...TouchHF 4...Extern	
25	Ar / He-Mode	write	0 .. Auto 1 .. Gas 1 2 .. Gas 2	1
26	TIG Working 2 Gas Value	write	< 0.5 .. Off 1 to 2 [l/min]	10
27	TIG Working 2 Gas Factor	write	0.9 to 20.0	100
28	Arc-break voltage	write	10.0 to 30.0 [Steps]	10
29	TIG Comfort stop sensitivity	write	0.1 to 2.0 [Steps]	1
30	TIG TAC	write	0 .. Off 0.1 to 9.9 6553.5 .. On [s]	10



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