Operating Instructions

RI FB PRO/i TWIN Controller
RI MOD/i CC EtherCAT

DE | Bedienungsanleitung

EN-US | Operating instructions

42,0410,2452 011-03022023

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Allgemeines

Sicherheit

⚠ WARNUNG!

Gefahr durch Fehlbedienung und fehlerhaft durchgeführte Arbeiten.
Schwere Personen- und Sachschäden können die Folge sein.
- ▶ Alle in diesem Dokument beschriebenen Arbeiten und Funktionen dürfen nur von technisch geschultem Fachpersonal ausgeführt werden.
- ▶ Dieses Dokument vollständig lesen und verstehen.
- ▶ Sämtliche Sicherheitsvorschriften und Benutzerdokumentationen dieses Gerätes und aller Systemkomponenten lesen und verstehen.

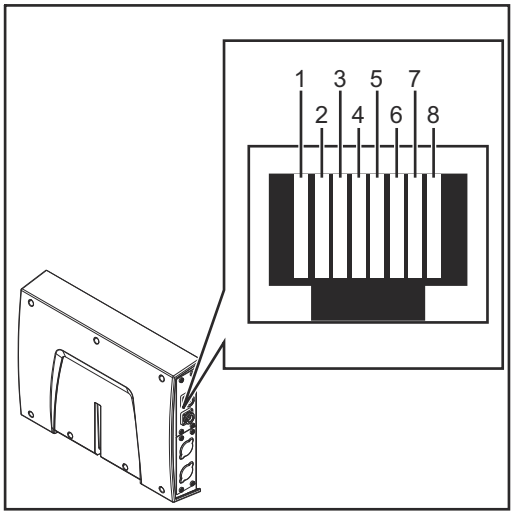
⚠ WARNUNG!

Gefahr durch elektrischen Strom.
Schwere Personen- und Sachschäden können die Folge sein.
- ▶ Vor Beginn der Arbeiten alle beteiligten Geräte und Komponenten ausschalten und vom Stromnetz trennen.
- ▶ Alle beteiligten Geräte und Komponenten gegen Wiedereinschalten sichern.

⚠ WARNUNG!

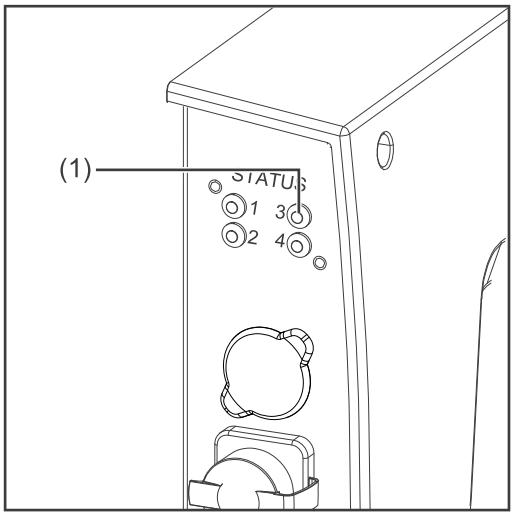
Gefahr durch unplanmäßige Signalübertragung.
Schwere Personen- und Sachschäden können die Folge sein.
- ▶ Über das Interface keine sicherheitsrelevanten Signale übertragen.

Anschlüsse und Anzeigen

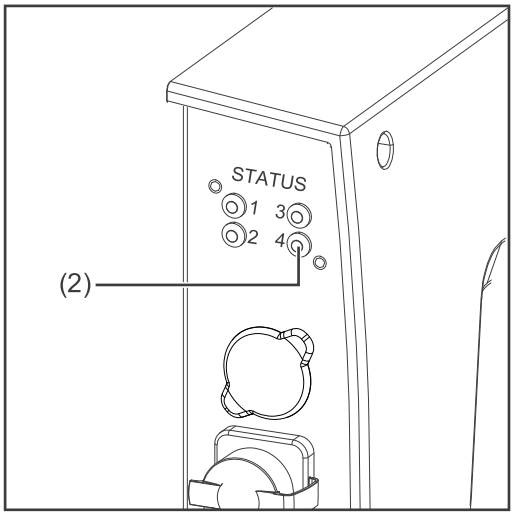


Pin-Belegung RJ 45 ProfiNet Anschluss

1	TX+
2	TX-
3	RX+
6	RX-
4,5,7, 8	Normalerweise nicht verwendet; um die Signalvollständigkeit sicherzustellen, sind diese Pins miteinander verbunden und enden über einen Filterkreis am Schutzleiter (PE).



(1) LED RUN - Betrieb **Diese LED gibt den Status der CoE Kommunikation wieder. (CoE = CA-Nopen over EtherCAT)**
Aus: CoE Gerät im Status ‘init‘ (oder keine Versorgungsspannung)
Leuchtet grün: CoE Gerät im Status ‘operational‘
Blinkt grün: CoE Gerät im Status ‘pre-operational‘
Blinkt grün (kurz): CoE Gerät im Status ‘safe-operational‘
Leuchtet rot: Wenn die LEDs RUN und ERR leuchten, zeigt das ein schwerwiegendes Ereignis an, welches das Interface in einen Ausnahmezustand bringt. In diesem Fall den Servicedienst verständigen.



(2) LED ERR - Fehler
Aus: keine Fehler (oder keine Versorgungsspannung)
Blinkt rot: falsche Konfiguration Vom Master empfangener Statuswechsel ist nicht möglich wegen ungültiger Register- oder Objekteinstellungen
Blinkt rot (doppelt): Application watchdog timeout Syn manager watchdog timeout
Leuchtet rot: Application controller failure Anybus Modul in EXCEPTION

Eigenschaften der Datenübertragung

Übertragungstechnik: EtherCAT
Medium: Bei der Auswahl der Kabel, Stecker und Abschluss-Widerstände ist die IEC 61784-5-12 für die Planung und Installation von EtherCAT Systemen zu beachten. Seitens Hersteller wurden die EMV-Tests mit einem original Beckhoff-Kabel (ZK1090-9191-xxxx) durchgeführt.

Übertragungs-Geschwindigkeit: 100 Mbit/s
Busanschluss: RJ-45 Ethernet
Application Layer: CANopen

Konfigurations-parameter

Bei einigen Robotersteuerungen kann es erforderlich sein die hier beschriebenen Konfigurationsparameter anzugeben, damit das Busmodul mit dem Roboter kommunizieren kann.

Parameter	Wert	Beschreibung
Vendor ID	0000 02C1$_{hex}$ (705$_{dez}$)	Fronius International GmbH
Product Code	0001 0324$_{hex}$ (66340$_{dez}$)	TWIN Standard Image
Device Name		Fronius-RI-FB-Pro-EtherCAT

Vergabe der EtherCAT-Adresse

Die EtherCAT-Adresse wird vom Master vergeben.

Prozessdaten-Breite des Busmoduls einstellen

Prozessdaten-Breite des Busmoduls einstellen

IP-Adresse der verwendeten Stromquelle notieren:

1 Am Bedienpanel der Stromquelle „Voreinstellungen“ auswählen

2 Am Bedienpanel der Stromquelle „System“ auswählen

3 Am Bedienpanel der Stromquelle „Information“ auswählen

4 Angezeigte IP-Adresse notieren (Beispiel: 10.5.72.13)

Website der Stromquelle (SmartManager) im Internetbrowser aufrufen:

5 Computer mit dem Netzwerk der Stromquelle verbinden

6 IP-Adresse der Stromquelle in die Suchleiste des Internetbrowsers eingeben und bestätigen

7 Standard-Benutzernamen (admin) und Passwort (admin) eingeben
- Website der Stromquelle wird angezeigt

Prozessdaten-Breite des Busmoduls einstellen:

8 Auf der Website der Stromquelle den Reiter „RI FB PRO/i TWIN Controller“ auswählen

9 Bei Punkt „Prozessdaten“ die gewünschte Prozessdaten-Konfiguration auswählen

10 „Speichern“ auswählen
- Die Feldbus-Verbindung wird neu gestartet und die Konfiguration übernommen

Ein- und Ausgangssignale

Datentypen

Folgende Datentypen werden verwendet:
- **UINT16** (Unsigned Integer)
  Ganzzahl im Bereich von 0 bis 65535
- **SINT16** (Signed Integer)
  Ganzzahl im Bereich von -32768 bis 32767

Umrechnungsbeispiele:
- für positiven Wert (SINT16)
  z.B. gewünschter Drahtvorschub x Faktor
  12.3 m/min x 100 = 1230_{dez} = $04CE_{hex}$

- für negativen Wert (SINT16)
  z.B. gewünschte Lichtbogen-Korrektur x Faktor
  -6.4 x 10 = -64_{dez} = $FFC0_{hex}$

Verfügbarkeit der Eingangssignale

Die nachfolgend angeführten Eingangssignale sind ab Firmware V1.8.0 des RI FB PRO/i TWIN Controller verfügbar.

Eingangssignale (vom Roboter zur Stromquelle)

Adresse							
relativ			absolut				
WORD	BYTE	BIT	BIT	Signal	Aktivität / Datentyp	Bereich	Faktor
0	0	0	0	Welding Start	steigend		
		1	1	Robot ready	High		
		2	2	Working mode Bit 0	High	Siehe nachfolgende Tabelle **Wertebereich Working mode** auf Seite **15**	
		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	steigend		
		1	9	Wire forward	steigend		
		2	10	Wire backward	steigend		
		3	11	Error quit	steigend		
		4	12	Touch sensing	High		
		5	13	Torch blow out	steigend		
		6	14	Processline selection Bit 0 (only available for single-wire applications)	High	Siehe nachfolgende Tabelle **Wertebereich Processline selection** auf Seite **15**	
		7	15	Processline selection Bit 1 (only available for single-wire applications)	High		
1	2	0	16	Welding Simulation	High		
		1	17	—			
		2	18	—			
		3	19	—			
		4	20	—			
		5	21	—			
		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	steigend		
		6	30	Wire sense break	steigend		
		7	31	—			

Adresse							
relativ			absolut				
WORD	BYTE	BIT	BIT	Signal	Aktivität / Datentyp	Bereich	Faktor
2	4	0	32	Operating mode TWIN System Bit 0	High	Siehe nachfolgende Tabelle **Wertebereich Operating mode TWIN System** auf Seite **16**	
		1	33	Operating mode TWIN System Bit 1	High		
		2	34	—			
		3	35	—			
		4	36	—			
		5	37	Documentation mode	High	Siehe nachfolgende Tabelle **Wertebereich Documentation mode** auf Seite **16**	
		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, Power source 1	High		

Adresse							
relativ			absolut				
WORD	BYTE	BIT	BIT	Signal	Aktivität / Datentyp	Bereich	Faktor
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	0	64	—			
		1	65	—			
		2	66	—			
		3	67	—			
		4	68	—			
		5	69	—			
		6	70	—			
		7	71	Disable Process controlled correction, Power source 2	High		
	9	0	72	Contact tip short circuit detection on	High		
		1	73	—			
		2	74	—			
		3	75	—			
		4	76	—			
		5	77	—			
		6	78	—			
		7	79	—			
5	10	0-7	80-87	—			
	11	0-7	88-95	—			

Adresse							
relativ			absolut				
WORD	BYTE	BIT	BIT	Signal	Aktivität / Datentyp	Bereich	Faktor
6	12	0-7	96-103	Welding characteristic- / Job number, Power source 1	UINT16	0 bis 1000	1
	13	0-7	104-111				
7	14	0-7	112-119	Welding characteristic- / Job number, Power source 2	UINT16	0 bis 1000	1
	15	0-7	120-127				
8	16, 17	0-7	128-143	*Beim Schweißverfahren MIG/MAG Puls-Synergic, MIG/MAG Standard-Synergic, MIG/MAG Standard-Manuell, MIG/MAG PMC, MIG/MAG LSC, CMT, ConstantWire:* **Wire feed speed command value, Power source 1**	SINT16	-327,68 bis 327,67 [m/min]	100
				Beim Job-Betrieb: **Power correction, Power source 1**	SINT16	-20,00 bis 20,00 [%]	100
9	18, 19	0-7	144-159	*Beim Schweißverfahren MIG/MAG Puls-Synergic, MIG/MAG Standard-Synergic, MIG/MAG Standard-Manuell, MIG/MAG PMC, MIG/MAG LSC, CMT, ConstantWire:* **Wire feed speed command value, Power source 2**	SINT16	-327,68 bis 327,67 [m/min]	100
				Beim Job-Betrieb: **Power correction, Power source 2**	SINT16	-20,00 bis 20,00 [%]	100

Adresse							
relativ			absolut				
WORD	BYTE	BIT	BIT	Signal	Aktivität / Datentyp	Bereich	Faktor
10	20, 21	0-7	160-175	*Beim Schweißverfahren MIG/MAG Puls-Synergic, MIG/MAG Standard-Synergic, MIG/MAG PMC, MIG/MAG LSC, CMT:* **Arclength correction, Power source 1**	SINT16	-10,0 bis 10,0 [Schritte]	10
				Beim Schweißverfahren MIG/MAG Standard-Manuell: **Welding voltage, Power source 1**	UINT16	0,0 bis 6553,5 [V]	10
				Beim Job-Betrieb: **Arclength correction, Power source 1**	SINT16	-10,0 bis 10,0 [Schritte]	10
				Beim Schweißverfahren ConstantWire: **Hotwire current, Power source 1**	UINT16	0,0 bis 6553,5 [A]	10
11	22, 23	0-7	176-191	*Beim Schweißverfahren MIG/MAG Puls-Synergic, MIG/MAG Standard-Synergic, MIG/MAG PMC, MIG/MAG LSC, CMT:* **Arclength correction, Power source 2**	SINT16	-10,0 bis 10,0 [Schritte]	10
				Beim Schweißverfahren MIG/MAG Standard-Manuell: **Welding voltage, Power source 2**	UINT16	0,0 bis 6553,5 [V]	10
				Beim Job-Betrieb: **Arclength correction, Power source 2**	SINT16	-10,0 bis 10,0 [Schritte]	10
				Beim Schweißverfahren ConstantWire: **Hotwire current, Power source 2**	UINT16	0,0 bis 6553,5 [A]	10

Adresse							
relativ			absolut				
WORD	BYTE	BIT	BIT	Signal	Aktivität / Datentyp	Bereich	Faktor
12	24, 25	0-7	192-207	*Beim Schweißverfahren MIG/MAG Puls-Synergic, MIG/MAG Standard-Synergic, MIG/MAG PMC, MIG/MAG LSC, CMT:* **Pulse-/dynamic correction, Power source 1**	SINT16	-10,0 bis 10,0 [Schritte]	10
				Beim Schweißverfahren MIG/MAG Standard-Manuell: **Dynamic, Power source 1**	UINT16	0,0 bis 10,0 [Schritte]	10
13	26, 27	0-7	208-223	*Beim Schweißverfahren MIG/MAG Puls-Synergic, MIG/MAG Standard-Synergic, MIG/MAG PMC, MIG/MAG LSC, CMT:* **Pulse-/dynamic correction, Power source 2**	SINT16	-10,0 bis 10,0 [Schritte]	10
				Beim Schweißverfahren MIG/MAG Standard-Manuell: **Dynamic, Power source 2**	UINT16	0,0 bis 10,0 [Schritte]	10
14	28	0-7	224-231	Wire retract correction, Power source 1	UINT16	0,0 bis 10,0	10
	29	0-7	232-239				
15	30	0-7	240-247	Wire retract correction, Power source 2	UINT16	0,0 bis 10,0	10
	31	0-7	248-255				
16	32	0-7	256-263	Welding speed	UINT16	0,0 bis 1000 [m/min]	10
	33	0-7	264-271				
17	34	0-7	272-279	Process controlled correction, Power source 1	SINT16	Siehe Tabelle **Wertebereich Process controlled correction** auf Seite **16**	
	35	0-7	280-287				
18	36	0-7	288-295	Process controlled correction, Power source 2	SINT16		
	37	0-7	296-303				
19	38	0-7	304-311	Wire forward / backward length	UINT16	OFF / 1 bis 65535 [mm]	1
	39	0-7	312-319				
20	40	0-7	320-327	Wire sense edge detection	UINT16	OFF / 0,5 bis 20,0 [mm]	10
	41	0-7	328-335				
21	42	0-7	336-343	—			
	43	0-7	344-351				

Adresse							
relativ			absolut				
WORD	BYTE	BIT	BIT	Signal	Aktivität / Datentyp	Bereich	Faktor
22	44	0-7	352-359	—			
	45	0-7	360-367				
23	46	0-7	368-375	—			
	47	0-7	376-383				
24	48	0-7	384-391	—			
	49	0-7	392-399				
25	50	0-7	400-407	—			
	51	0-7	408-415				
26	52	0-7	416-423	—			
	53	0-7	424-431				
27	54	0-7	432-439	—			
	55	0-7	440-447				
28	56	0-7	448-455	—			
	57	0-7	456-463				
29	58	0-7	464-471	Seam number	UINT16	0 bis 65535	1
	59	0-7	472-479				

Wertebereich Working mode

Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Beschreibung
0	0	0	0	0	Parameteranwahl intern
0	0	0	0	1	Kennlinien Betrieb Sonder 2-Takt
0	0	0	1	0	Job-Betrieb
0	1	0	0	0	Kennlinien Betrieb 2-Takt
0	1	0	0	1	MIG/MAG Standard-Manuell 2-Takt
1	0	0	0	1	Kühlmittel-Pumpe stoppen

Wertebereich Betriebsart

Wertebereich Processline selection

Bit 1	Bit 0	Beschreibung
0	0	Prozesslinie 1 (default)
0	1	Prozesslinie 2
1	0	Prozesslinie 3
1	1	Reserviert

Wertebereich Prozesslinien-Auswahl

Wertebereich Operating mode TWIN System

Bit 1	Bit 0	Funktion Stromquelle 1	Funktion Stromquelle 2
0	0	Single mode	OFF
0	1	TWIN Lead	TWIN Trail
1	0	TWIN Trail	TWIN Lead
1	1	OFF	Single mode

Wertebereich Betriebsart TWIN System

Wertebereich Documentation mode

Bit 0	Beschreibung
0	Nahtnummer von Stromquelle (intern)
1	Nahtnummer von Roboter (Word 29)

Wertebereich Dokumentationsmodus

Wertebereich Process controlled correction

Prozess	Signal	Aktivität / Datentyp	Wertebereich Einstellbereich	Einheit	Faktor
PMC	Arc length stabilizer	SINT16	-327,8 bis +327,7 0,0 bis +5,0	Volt	10

Wertebereich prozessabhängige Korrektur

Verfügbarkeit der Ausgangssignale

Die nachfolgend angeführten Ausgangssignale sind ab Firmware V1.8.0 des RI FB PRO/i TWIN Controller verfügbar.

Ausgangssignale (von der Stromquelle zum Roboter)

Adresse							
relativ			absolut				
WORD	BYTE	BIT	BIT	Signal	Aktivität / Datentyp	Bereich	Faktor
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	Low	0 = Kollision oder Kabelbruch	
		1	9	Robot Motion Release, Power source 1	High		
		2	10	Wire stick workpiece	High		
		3	11	—			
		4	12	Short circuit contact tip	High		
		5	13	Parameter selection internally	High		
		6	14	—			
		7	15	Torch body gripped	High		

Adresse							
relativ			absolut				
WORD	BYTE	BIT	BIT	Signal	Aktivität / Datentyp	Bereich	Faktor
1	2	0	16	Command value out of range	High		
		1	17	Correction out of range	High		
		2	18	—			
		3	19	Limitsignal, Power Source 1	High		
		4	20	—			
		5	21	—			
		6	22	Main supply status	Low		
		7	23	—			
	3	0	24	Sensor status 1, Power Source 1	High	Siehe Tabelle **Zuordnung Sensorstatus 1-4** auf Seite **22**	
		1	25	Sensor status 2, Power Source 1	High		
		2	26	Sensor status 3, Power Source 1	High		
		3	27	Sensor status 4, Power Source 1	High		
		4	28	—			
		5	29	—			
		6	30	—			
		7	31	—			
2	4	0	32	—			
		1	33	—			
		2	34	—			
		3	35	Safety status Bit 0, Power Source 1	High		
		4	36	Safety status Bit 1, Power Source 1	High		
		5	37	—			
		6	38	Notification	High		
		7	39	System not ready	High		
	5	0	40	—			
		1	41	—			
		2	42	—			
		3	43	—			
		4	44	—			
		5	45	—			
		6	46	—			
		7	47	—			

Adresse							
relativ			absolut				
WORD	BYTE	BIT	BIT	Signal	Aktivität / Datentyp	Bereich	Faktor
3	6	0	48	—			
		1	49	—			
		2	50	—			
		3	51	—			
		4	52	—			
		5	53	—			
		6	54	Gas nozzle touched	High		
		7	55	—			
	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	0	64	—			
		1	65	Robot Motion Release, Power source 2	High		
		2	66	Limitsignal, Power source 2	High		
		3	67	—			
		4	68	—			
		5	69	—			
		6	70	—			
		7	71	—			
	9	0	72	—			
		1	73	—			
		2	74	—			
		3	75	—			
		4	76	—			
		5	77	—			
		6	78	—			
		7	79	—			

Adresse							
relativ			absolut				
WORD	BYTE	BIT	BIT	Signal	Aktivität / Datentyp	Bereich	Faktor
5	10	0	80	Sensor status 1, Power Source 2	High	Siehe Tabelle **Zuordnung Sensorstatus 1-4** auf Seite **22**	
		1	81	Sensor status 2, Power Source 2	High		
		2	82	Sensor status 3, Power Source 2	High		
		3	83	Sensor status 4, Power Source 2	High		
		4	84	—			
		5	85	—			
		6	86	—			
		7	87	—			
	11	0	88	—			
		1	89	—			
		2	90	—			
		3	91	Safety status Bit 0, Power Source 2	High		
		4	92	Safety status Bit 1, Power Source 2	High		
		5	93	—			
		6	94	—			
		7	95	—			
6	12	0-7	96-103	Welding voltage, Power source 1	UINT16	0,0 bis 655,35 [V]	100
	13	0-7	104-111				
7	14	0-7	112-119	Welding voltage, Power source 2	UINT16	0,0 bis 655,35 [V]	100
	15	0-7	120-127				
8	16	0-7	128-135	Welding current, Power source 1	UINT16	0,0 bis 6553,5 [A]	10
	17	0-7	136-143				
9	18	0-7	144-151	Welding current, Power source 2	UINT16	0,0 bis 6553,5 [A]	10
	19	0-7	152-159				
10	20	0-7	160-167	Wire feed speed, Power source 1	SINT16	-327,68 bis 327,67 [m/min]	100
	21	0-7	168-175				
11	22	0-7	176-183	Wire feed speed, Power source 2	SINT16	-327,68 bis 327,67 [m/min]	100
	23	0-7	184-191				
12	24	0-7	192-199	Actual real value for seam tracking	UINT16	0 bis 6,5535	10000
	25	0-7	200-207				
13	26	0-7	208-215	Error number, Power source 1	UINT16	0 bis 65535	1
	27	0-7	216-223				

Adresse							
relativ			absolut				
WORD	BYTE	BIT	BIT	Signal	Aktivität / Datentyp	Bereich	Faktor
14	28	0-7	224-231	Error number, Power source 2	UINT16	0 bis 65535	1
	29	0-7	232-239				
15	30	0-7	240-247	Motor current M1, Power source 1	UINT16	-327,68 bis 327,67 [A]	100
	31	0-7	248-255				
16	32	0-7	256-263	Motor current M1, Power source 2	UINT16	-327,68 bis 327,67 [A]	100
	33	0-7	264-271				
17	34	0-7	272-279	Motor current M2, Power source 1	UINT16	-327,68 bis 327,67 [A]	100
	35	0-7	280-287				
18	36	0-7	288-295	Motor current M2, Power source 2	UINT16	-327,68 bis 327,67 [A]	100
	37	0-7	296-303				
19	38	0-7	304-311	Motor current M3, Power source 1	UINT16	-327,68 bis 327,67 [A]	100
	39	0-7	312-319				
20	40	0-7	320-327	Motor current M3, Power source 2	UINT16	-327,68 bis 327,67 [A]	100
	41	0-7	328-335				
21	42	0-7	336-343	Warning, Power source 1	UINT16	0 bis 65535	1
	43	0-7	344-351				
22	44	0-7	352-359	Warning, Power source 2	UINT16	0 bis 65535	1
	45	0-7	360-367				
23	46	0-7	368-375	Wire position, Power source 1	UINT16	-327,68 bis 327,67 [mm]	100
	47	0-7	376-383				
24	48	0-7	284-291	Wire position, Power source 2	UINT16	-327,68 bis 327,67 [mm]	100
	49	0-7	292-399				
25	50	0-7	400-407	—			
	51	0-7	408-415				
26	52	0-7	416-423	—			
	53	0-7	424-431				
27	54	0-7	432-439	—			
	55	0-7	440-447				
28	56	0-7	448-455	—			
	57	0-7	456-463				
29	58	0-7	464-471	—			
	59	0-7	472-479				

Zuordnung Sensorstatus 1-4

Signal	Beschreibung
Sensor status 1	OPT/i WF R Drahtende (4,100,869)
Sensor status 2	OPT/i WF R Drahtfass (4,100,879)
Sensor status 3	OPT/i WF R Ringsensor (4,100,878)
Sensor status 4	Drahtpufferset CMT TPS/i (4,001,763)

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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.

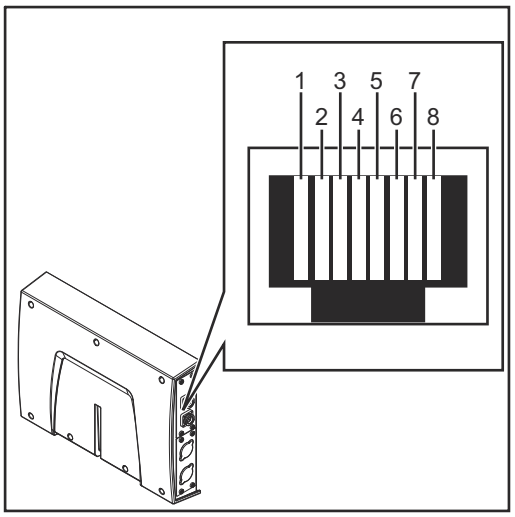
⚠ WARNING!

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!

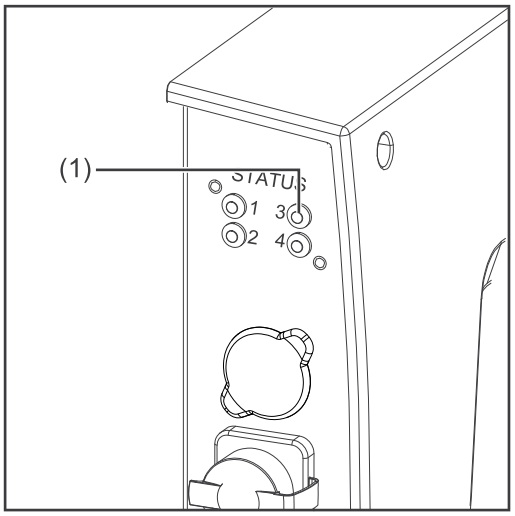
Danger from unplanned signal transmission.
This can result in serious personal injury and damage to property.
- ▶ Do not transfer safety signals via the interface.

Connections and Indicators

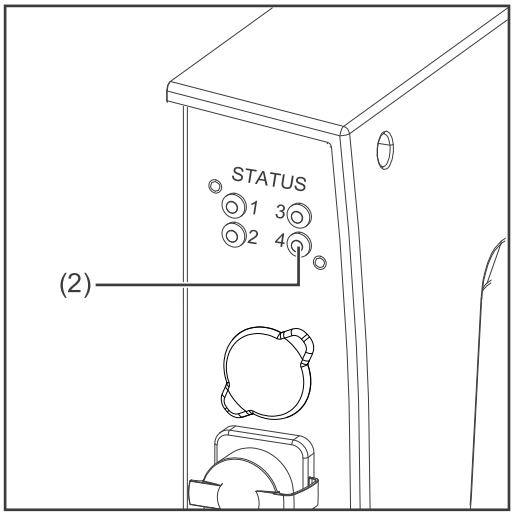


Pin assignment RJ45 ProfiNet connection

1	TX+
2	TX-
3	RX+
6	RX-
4,5,7, 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).



(1) RUN LED - operation This LED indicates the status of the CoE communication. (CoE = CA-Nopen over EtherCAT)
Off: CoE device in 'init' status (or no supply voltage)
Lights up green: CoE device in 'operational' status
Flashes green: CoE device in 'pre-operational' status
Flashes green (briefly): CoE device in 'safe-operational' status
Lights up red: If the RUN LED and ERR LED light up red, this indicates a serious event which places the interface in an exception state. In this case, inform the service team.



(2) ERR LED - error
Off: No error (or no supply voltage)
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 Syn manager watchdog timeout
Lights up red: Application controller failure Anybus module in EXCEPTION

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.

Parameter	Value	Description
Vendor ID	0000 $02C1_{hex}$ (705_{dec})	Fronius International GmbH
Product Code	0001 0324_{hex} (66340_{dec})	TWIN Standard Image
Device name		Fronius-RI-FB-Pro-EtherCAT

Assigning the EtherCAT Address

The EtherCAT address is assigned by the master.

Set the Process Data Width of the Bus Module

Setting the Process Data Width of the Bus Module

Note down the IP address of the power source used:

1. On the power source control panel, select "Defaults"
2. On the power source control panel, select "System"
3. On the power source control panel, select "Information"
4. Note down the displayed IP address (example: 10.5.72.13)

Access the website of the power source (SmartManager) in the internet browser:

5. Connect the computer to the network of the power source
6. Enter the IP address of the power source in the search bar of the Internet browser and confirm
7. Enter the standard user name (admin) and password (admin)
   - The website of the power source is displayed

Set the process data width of the bus module:

8. On the power source website, select the "RI FB PRO/i TWIN Controller" tab
9. Under "Process data", select the desired process data configuration
10. Select "Save"
    - The field bus connection is restarted and the configuration is adopted

Input and output signals

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 m/min x 100 = 1230_{dec} = $04CE_{hex}$

- for a negative value (SINT16)
  e.g. arc correction x factor
  -6.4 x 10 = -64_{dec} = $FFC0_{hex}$

Availability of input signals

The input signals listed below are available as of firmware V1.8.0 of the RI FB PRO/i TWIN.

Input signals (from robot to power source)

Address							
Relative			Absolute				
WORD	BYTE	BIT	BIT	Signal	Activity/ data type	Range	Factor
0	0	0	0	Welding Start	Increasing		
		1	1	Robot ready	High		
		2	2	Working mode Bit 0	High	See following 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	Increasing		
		1	9	Wire forward	Increasing		
		2	10	Wire backward	Increasing		
		3	11	Error quit	Increasing		
		4	12	Touch sensing	High		
		5	13	Torch blow out	Increasing		
		6	14	Processline selection Bit 0 (only available for single-wire applications)	High	See following table **Value range Process line selection** on page **37**	
		7	15	Processline selection Bit 1 (only available for single-wire applications)	High		

Address							
Relative			Absolute				
WORD	BYTE	BIT	BIT	Signal	Activity/ data type	Range	Factor
1	2	0	16	Welding Simulation	High		
		1	17	—			
		2	18	—			
		3	19	—			
		4	20	—			
		5	21	—			
		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	Increa-sing		
		6	30	Wire sense break	Increa-sing		
		7	31	—			

Address							
Relative			Absolute				
WORD	BYTE	BIT	BIT	Signal	Activity/ data type	Range	Factor
2	4	0	32	Operating mode TWIN System Bit 0	High	See following table **Value range for Operating mode TWIN System** on page **37**	
		1	33	Operating mode TWIN System Bit 1	High		
		2	34	—			
		3	35	—			
		4	36	—			
		5	37	Documentation mode	High	See following table **Value range for Documentation mode** on page **37**	
		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, Power source 1	High		

Address							
Relative			Absolute				
WORD	BYTE	BIT	BIT	Signal	Activity/ data type	Range	Factor
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	0	64	—			
		1	65	—			
		2	66	—			
		3	67	—			
		4	68	—			
		5	69	—			
		6	70	—			
		7	71	Disable Process controlled correction, Power source 2	High		
	9	0	72	Contact tip short circuit detection on	High		
		1	73	—			
		2	74	—			
		3	75	—			
		4	76	—			
		5	77	—			
		6	78	—			
		7	79	—			

Address							
Relative			Absolute				
WORD	BYTE	BIT	BIT	Signal	Activity/ data type	Range	Factor
5	10	0–7	80–87	—			
	11	0–7	88–95	—			
6	12	0–7	96–103	Welding characteristic- / Job number, Power source 1	UINT16	0 to 1000	1
	13	0–7	104–111				
7	14	0–7	112–119	Welding characteristic- / Job number, Power source 2	UINT16	0 to 1000	1
	15	0–7	120–127				
8	16, 17	0–7	128–143	*For the welding processes MIG/MAG pulse synergic, MIG/MAG standard synergic, MIG/MAG standard manual, MIG/MAG PMC, MIG/MAG LSC, CMT, ConstantWire:* **Wire feed speed command value, Power source 1**	SINT16	-327.68 to 327.67 [m/min]	100
				For job mode: **Power correction, Power source 1**	SINT16	-20.00 to 20.00 [%]	100
9	18, 19	0–7	144–159	*For the welding processes MIG/MAG pulse synergic, MIG/MAG standard synergic, MIG/MAG standard manual, MIG/MAG PMC, MIG/MAG LSC, CMT, ConstantWire:* **Wire feed speed command value, Power source 2**	SINT16	-327.68 to 327.67 [m/min]	100
				For job mode: **Power correction, Power source 2**	SINT16	-20.00 to 20.00 [%]	100

Address							
Relative			Absolute				
WORD	BYTE	BIT	BIT	Signal	Activity/ data type	Range	Factor
10	20, 21	0–7	160–175	*For the welding processes MIG/MAG pulse synergic, MIG/MAG standard synergic, MIG/MAG PMC, MIG/MAG LSC, CMT:* **Arclength correction, Power source 1**	SINT16	-10.0 to 10.0 [steps]	10
				For the welding process MIG/MAG standard manual: **Welding voltage, Power source 1**	UINT16	0.0 to 6553.5 [V]	10
				For job mode: **Arclength correction, Power source 1**	SINT16	-10.0 to 10.0 [steps]	10
				For the welding process ConstantWire: **Hotwire current, Power source 1**	UINT16	0.0 to 6553.5 [A]	10
11	22, 23	0–7	176–191	*For the welding processes MIG/MAG pulse synergic, MIG/MAG standard synergic, MIG/MAG PMC, MIG/MAG LSC, CMT:* **Arclength correction, Power source 2**	SINT16	-10.0 to 10.0 [steps]	10
				For the welding process MIG/MAG standard manual: **Welding voltage, Power source 2**	UINT16	0.0 to 6553.5 [V]	10
				For job mode: **Arclength correction, Power source 2**	SINT16	-10.0 to 10.0 [steps]	10
				For the welding process ConstantWire: **Hotwire current, Power source 2**	UINT16	0.0 to 6553.5 [A]	10

Address							
Relative			Absolute				
WORD	BYTE	BIT	BIT	Signal	Activity/ data type	Range	Factor
12	24, 25	0–7	192–207	*For the welding processes MIG/MAG pulse synergic, MIG/MAG standard synergic, MIG/MAG PMC, MIG/MAG LSC, CMT:* **Pulse-/dynamic correction, Power source 1**	SINT16	-10.0 to 10.0 [steps]	10
				For the welding process MIG/MAG standard manual: **Dynamic, Power source 1**	UINT16	0.0 to 10.0 [steps]	10
13	26, 27	0–7	208–223	*For the welding processes MIG/MAG pulse synergic, MIG/MAG standard synergic, MIG/MAG PMC, MIG/MAG LSC, CMT:* **Pulse-/dynamic correction, Power source 2**	SINT16	-10.0 to 10.0 [steps]	10
				For the welding process MIG/MAG standard manual: **Dynamic, Power source 2**	UINT16	0.0 to 10.0 [steps]	10
14	28	0–7	224–231	Wire retract correction, Power source 1	UINT16	0.0 to 10.0	10
	29	0–7	232–239				
15	30	0–7	240–247	Wire retract correction, Power source 2	UINT16	0.0 to 10.0	10
	31	0–7	248–255				
16	32	0–7	256–263	Welding speed	UINT16	0.0 to 1000 [m/min]	10
	33	0–7	264–271				
17	34	0–7	272–279	Process controlled correction, Power source 1	SINT16	See table **Value range for Process controlled correction** on page **37**	
	35	0–7	280–287				
18	36	0–7	288–295	Process controlled correction, Power source 2	SINT16		
	37	0–7	296–303				
19	38	0–7	304–311	Wire forward / backward length	UINT16	OFF / 1 to 65535 [mm]	1
	39	0–7	312–319				

Address							
Relative			Absolute				
WORD	BYTE	BIT	BIT	Signal	Activity/ data type	Range	Factor
20	40	0–7	320–327	Wire sense edge detection	UINT16	OFF / 0.5 to 20.0 [mm]	10
	41	0–7	328–335				
21	42	0–7	336–343	—			
	43	0–7	344–351				
22	44	0–7	352–359	—			
	45	0–7	360–367				
23	46	0–7	368–375	—			
	47	0–7	376–383				
24	48	0–7	384–391	—			
	49	0–7	392–399				
25	50	0–7	400–407	—			
	51	0–7	408–415				
26	52	0–7	416–423	—			
	53	0–7	424–431				
27	54	0–7	432–439	—			
	55	0–7	440–447				
28	56	0–7	448–455	—			
	57	0–7	456–463				
29	58	0–7	464–471	Seam number	UINT16	0 to 65535	1
	59	0–7	472–479				

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
0	1	0	0	0	2-step mode characteristics
0	1	0	0	1	2-step MIG/MAG standard manual
1	0	0	0	1	Stop coolant pump

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 Operating mode TWIN System

Bit 1	Bit 0	Function power source 1	Function power source 2
0	0	Single mode	OFF
0	1	TWIN Lead	TWIN Trail
1	0	TWIN Trail	TWIN Lead
1	1	OFF	Single mode

Value range for TWIN System Mode

Value range for Documentation mode

Bit 0	Description
0	Seam number of power source (internal)
1	Seam number of robot (Word 29)

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 as of firmware V1.8.0 of the RI FB PRO/i TWIN.

Output signals (from power source to robot)

Address							
Relative			Absolute				
WORD	BYTE	BIT	BIT	Signal	Activity/ data type	Range	Factor
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	Low	0 = collision or cable break	
		1	9	Robot Motion Release, Power source 1	High		
		2	10	Wire stick workpiece	High		
		3	11	—			
		4	12	Short circuit contact tip	High		
		5	13	Parameter selection internally	High		
		6	14	—			
		7	15	Torch body gripped	High		

Address							
Relative			Absolute				
WORD	BYTE	BIT	BIT	Signal	Activity/ data type	Range	Factor
1	2	0	16	Command value out of range	High		
		1	17	Correction out of range	High		
		2	18	—			
		3	19	Limitsignal, Power Source 1	High		
		4	20	—			
		5	21	—			
		6	22	Main supply status	Low		
		7	23	—			
	3	0	24	Sensor status 1, Power Source 1	High	See table **Assignment of Sensor Statuses 1–4** on page **43**	
		1	25	Sensor status 2, Power Source 1	High		
		2	26	Sensor status 3, Power Source 1	High		
		3	27	Sensor status 4, Power Source 1	High		
		4	28	—			
		5	29	—			
		6	30	—			
		7	31	—			
2	4	0	32	—			
		1	33	—			
		2	34	—			
		3	35	Safety status Bit 0, Power Source 1	High		
		4	36	Safety status Bit 1, Power Source 1	High		
		5	37	—			
		6	38	Notification	High		
		7	39	System not ready	High		
	5	0	40	—			
		1	41	—			
		2	42	—			
		3	43	—			
		4	44	—			
		5	45	—			
		6	46	—			
		7	47	—			

Address							
Relative			Absolute				
WORD	BYTE	BIT	BIT	Signal	Activity/ data type	Range	Factor
3	6	0	48	—			
		1	49	—			
		2	50	—			
		3	51	—			
		4	52	—			
		5	53	—			
		6	54	Gas nozzle touched	High		
		7	55	—			
	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	0	64	—			
		1	65	Robot Motion Release, Power source 2	High		
		2	66	Limitsignal, Power source 2	High		
		3	67	—			
		4	68	—			
		5	69	—			
		6	70	—			
		7	71	—			
	9	0	72	—			
		1	73	—			
		2	74	—			
		3	75	—			
		4	76	—			
		5	77	—			
		6	78	—			
		7	79	—			

Address							
Relative			Absolute				
WORD	BYTE	BIT	BIT	Signal	Activity/ data type	Range	Factor
5	10	0	80	Sensor status 1, Power Source 2	High	See table **Assignment of Sensor Statuses 1–4** on page **43**	
		1	81	Sensor status 2, Power Source 2	High		
		2	82	Sensor status 3, Power Source 2	High		
		3	83	Sensor status 4, Power Source 2	High		
		4	84	—			
		5	85	—			
		6	86	—			
		7	87	—			
	11	0	88	—			
		1	89	—			
		2	90	—			
		3	91	Safety status Bit 0, Power Source 2	High		
		4	92	Safety status Bit 1, Power Source 2	High		
		5	93	—			
		6	94	—			
		7	95	—			
6	12	0–7	96–103	Welding voltage, Power source 1	UINT16	0.0 to 655.35 [V]	100
	13	0–7	104–111				
7	14	0–7	112–119	Welding voltage, Power source 2	UINT16	0.0 to 655.35 [V]	100
	15	0–7	120–127				
8	16	0–7	128–135	Welding current, Power source 1	UINT16	0.0 to 6553.5 [A]	10
	17	0–7	136–143				
9	18	0–7	144–151	Welding current, Power source 2	UINT16	0.0 to 6553.5 [A]	10
	19	0–7	152–159				
10	20	0–7	160–167	Wire feed speed, Power source 1	SINT16	-327.68 to 327.67 [m/min]	100
	21	0–7	168–175				
11	22	0–7	176–183	Wire feed speed, Power source 2	SINT16	-327.68 to 327.67 [m/min]	100
	23	0–7	184–191				
12	24	0–7	192–199	Actual real value for seam tracking	UINT16	0 to 6.5535	10000
	25	0–7	200–207				
13	26	0–7	208–215	Error number, Power source 1	UINT16	0 to 65535	1
	27	0–7	216–223				

Address							
Relative			Absolute				
WORD	BYTE	BIT	BIT	Signal	Activity/ data type	Range	Factor
14	28	0–7	224–231	Error number, Power source 2	UINT16	0 to 65535	1
	29	0–7	232–239				
15	30	0–7	240–247	Motor current M1, Power source 1	UINT16	-327.68 to 327.67 [A]	100
	31	0–7	248–255				
16	32	0–7	256–263	Motor current M1, Power source 2	UINT16	-327.68 to 327.67 [A]	100
	33	0–7	264–271				
17	34	0–7	272–279	Motor current M2, Power source 1	UINT16	-327.68 to 327.67 [A]	100
	35	0–7	280–287				
18	36	0–7	288–295	Motor current M2, Power source 2	UINT16	-327.68 to 327.67 [A]	100
	37	0–7	296–303				
19	38	0–7	304–311	Motor current M3, Power source 1	UINT16	-327.68 to 327.67 [A]	100
	39	0–7	312–319				
20	40	0–7	320–327	Motor current M3, Power source 2	UINT16	-327.68 to 327.67 [A]	100
	41	0–7	328–335				
21	42	0–7	336–343	Warning,, Power Source 1	UINT16	0 to 65535	1
	43	0–7	344–351				
22	44	0–7	352–359	Warning,, Power source 2	UINT16	0 to 65535	1
	45	0–7	360–367				
23	46	0–7	368–375	Wire position, Power source 1	UINT16	-327.68 to 327.67 [mm]	100
	47	0–7	376–383				
24	48	0–7	284–291	Wire position, Power source 2	UINT16	-327.68 to 327.67 [mm]	100
	49	0–7	292–399				
25	50	0–7	400–407	—			
	51	0–7	408–415				
26	52	0–7	416–423	—			
	53	0–7	424–431				
27	54	0–7	432–439	—			
	55	0–7	440–447				
28	56	0–7	448–455	—			
	57	0–7	456–463				
29	58	0–7	464–471	—			
	59	0–7	472–479				

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)

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