Fronius CC-M40 DeviceNet Instruction Manual

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Fronius CC-M40 DeviceNet

Product Information

Specifications

- Vendor ID: 0534hex (1332dez)
- Device Type: Communication adapter
- Product Code: 000Chex (12dez)
- Product Name: Fronius FB Inside DeviceNet

Product Usage Instructions

Configurations Parameters
Some robot controllers may require the following configuration parameters to enable communication with the bus module:

- Vendor ID: 0534hex (1332dez)
- Device Type: Communication adapter
- Product Code: 000Chex (12dez)
- Product Name: Fronius FB Inside DeviceNet

Robot Interface Configuration
The DIP switch on the RI FB Inside/i robot interface is used for setting:

- The process data width
- The node address / IP address

Configuration of Process Data Width
DIP Switch settings:

- OFF OFF – Standard Image 320 Bit
- OFF ON – Economy Image 128 Bit
- ON OFF – Not used – Intelligent Revolution – Digital Revolution (Retro Fit)

Setting Node Address with DIP Switch (Example)
DIP Switch settings for node address:

- OFF OFF OFF OFF OFF ON – Node Address 1
- OFF OFF OFF OFF ON OFF – Node Address 2
- OFF OFF OFF OFF ON ON – Node Address 3
- ON ON ON ON ON OFF – Node Address 62
- ON ON ON ON ON ON – Node Address 63

Note on Setting Node Address
All DIP switches should be set back to 0 and the interface should be restarted, or use SmartManager of Pulse 4-step to reconfigure.

FAQ

- **Q: What do the LED indicators on the device signify?**

A: The LED MS (Module Status) indicates the power status, while the LED NS (Network Status) shows the online/offline and connection status.

- **Q: How many stations can be connected to the device?**
  A: The device supports a maximum of 64 participants.

Operating Instructions

RI FB Inside/i
RI MOD/i CC-M40 DeviceNet

General

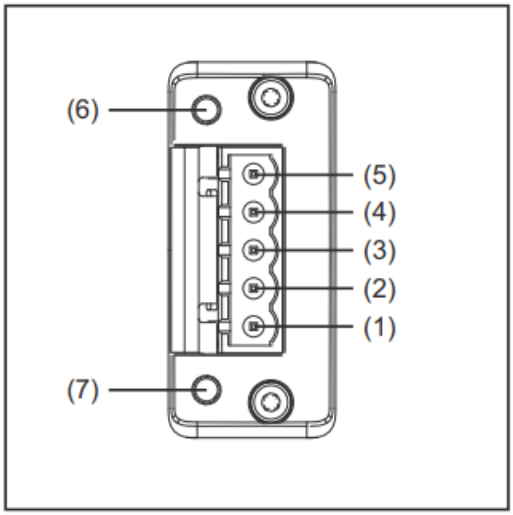
Safety

WARNING!

Incorrect operation and faulty work can cause serious personal injury and mate-rial damage.
All work and functions described in this document must be performed only by trained specialist personnel who have read and understood the following documents in full:

- this document
- the Operating Instructions of the robot interface “RI FB Inside/i”
- all documents relating to system components, especially the safety rules

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 gr een	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

LED NS (Network Status)	
Status	**Meaning**
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 gr een	Self-test is running

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.

Parameter	Value	Description
Vendor ID	0534hex (1332dec)	Fronius International GmbH
Device Type	000Chex (12dec)	Communication adapter
Product Code	0401hex (1025dec)	Fronius FB Inside DeviceNet

- Product Name Fronius-FB-Inside-DeviceNet(TM)

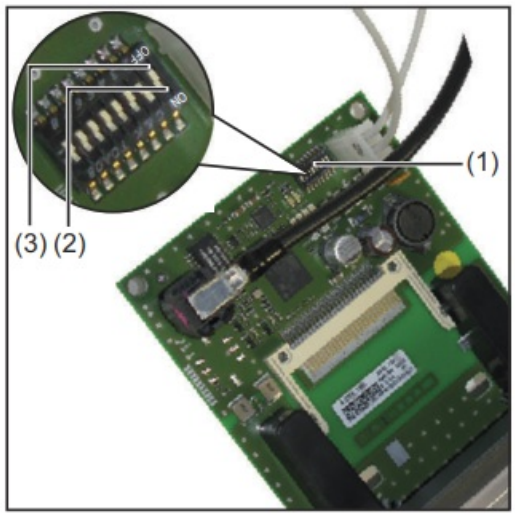
Configuration of robot interface

The dip-switch (1) on the robot interface RI FB Inside/i is used to configure

- the process data width
- the node address/IP address

At the factory, all positions of the dip switch are set to OFF (3).
This corresponds to the binary value 0.
The position (2) corresponds to the binary value 1.

Dip-switch function



Configuration of the process data width

Dip switch								Configuration
8	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
OFF	OFF	–	–	–	–	–	–	Standard image 320 Bit
OFF	ON	–	–	–	–	–	–	Economy image 128 Bit
ON	OFF	–	–	–	–	–	–	Retro Fit Scope dependent on bus module
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)

Set node ad-dress 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

NOTE!

- After every change of the configurations of the dip switch settings, the interface needs to be restarted so that the changes will take effect.
- (Restart = interrupting and restoring the power supply or executing the relevant function on the website of the power source)

Configure node address

- Upon delivery the configured node address is 0. The node address can be confirmed in two ways:
- Node addresses in the range of 1 to 63 can be configured with the dip switch.
- If node address 0 is kept on the dip switch, the node addresses in the range of 1 to 63 can also be configured with the following configuration tools:
    - the website of the welding machine

NOTE!

- If the node address is set to higher than 0 with the dip switch, the relevant node address will be configured to the range of 1 to 63 after restarting the robot interface.
- A node address that has been previously configured by a configuration tool will be overwritten.

NOTE!
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

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 Smart-Manager can be opened via the IP address of the welding machine.
Depending on the system configuration and software upgrades, the SmartMana-ger 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.

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 = 1230dec = 04CEhex
- for a negative value (SINT16) e. g. arc correction x factor
- 6.4 x 10 = -64dec = FFC0hex

Availability of Input Signals
The input signals listed below are available from firmware V4.1.x for all Inside/i systems.

Input signals (from robot to power source)

Address				Signal	Activity / data type	Range	Factor	Process image	
Relative			Absolute						
WORD	BYTE	BIT	BIT					Standard	Economy

0	0	0	0	Welding Start	Increa- si ng			√	√
		1	1	Robot ready	High				
		2	2	Working mode Bit 0	High	See table **Value ra nge for Working mode** on page **40**			
		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	Increa- si ng				
		1	9	Wire forward	Increa- si ng				
		2	10	Wire backward	Increa- si ng				
		3	11	Error quit	Increa- si ng				
		4	12	Touch sensing	High				
		5	13	Torch blow out	Increa- si ng				
		6	14	Processline selection Bit 0	High	See table **Value ra nge Process li- n e selection** on pag e **41**			
		7	15	Processline selection Bit 1	High				

Address						**Process image**	
Relative	**Absolu- te**		**Activity / data ty**		**Fac tor**		**Ec on**

WORD	BYTE	BIT	BIT	Signal	pe	Range		Standard	omy
1	2	0	16	Welding simulation	High				
		1	17	*Welding process MIG/MAG:* 1) Synchro pulse on	High				
				Welding process WIG: 2) TAC on	High				
		2	18	*Welding process WIG:* 2) Cap shaping	High				
		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	Increa- sing				
		6	30	Wire sense break	Increa- sing				
		7	31	—					

Address				Signal	Activity / data type	Range	Factor	Process image	
Relative			Absolute						
WORD	BYTE	BIT	BIT					Standard	Economy
2	4	0	32	TWIN mode Bit 0	High	See table **Value Range for TWIN Mode** on page **41**		√	√
		1	33	TWIN mode Bit 1	High				
		2	34	—					
		3	35	—					
		4	36	—					
		5	37	Documentation mode	High	See table **Value Range for Docu- mentation Mode** on page **41**			
		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					Process image	

Relative			Absolute	Signal	Activity / data type	Range	Factor	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	0–7	64–79	Welding characteristic- / Job number	UINT16	0 to 1000	1	√	√
10	10			*Welding process MIG/MAG:* 1) *Constant Wire:* Wire feed speed command value	SINT16	-327,68 to 327,67 [m/min]	100		
				Welding process WIG: 2) Main- / Hotwire current command value	UINT16	0 to 6553,5 [A]	10		

5	– 11	0-7	80-95	*For job-mode:* Power correction	SINT16	-20,00 to 20,00 [%]	100	√	ü

Address					**Activity / data type**	**Range**	**Factor**	**Process image**	
Relative			**Absolute**						
WORD	**BYTE**	**BIT**	**BIT**	**Signal**				**Standard**	**Economy**
6	12 – 13	0-7	96-111	*Welding process MIG/MAG:* 1) Arclength correction	SINT16	-10,0 to 10,0 [Schritte]	10	√	√
				Welding process *MIG/MAG Standard-Manuel:* Welding voltage	UINT16	0,0 to 6553,5 [V]	10		
				Welding process WIG: 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 [Schritte]	10		
				Welding process Constant Wire: Hotwire current	UINT16	0,0 to 6553,5 [A]	10		
				Welding process MIG/MAG: 1Pulse-/dynamic correction	SINT16	-10,0 to 10,0 [steps]	10		

7	14 – 15	0-7	112-127	*Welding process MIG/MAG Standard-Manuel:*Dynamic	UINT16	0,0 to 10,0 [steps]	10	√	√
				Welding process WIG: 2) Wire correction	SINT16	-10,0 to 10,0 [steps]	10		
8	16 – 17	0-7	128-143	*Welding process MIG/MAG:* 1)Wire retract correction	UINT16	0,0 to 10,0 [steps]	10	ü	
				Welding process WIG: 2) Wire retract end	UINT16	OFF, 1 to 50 [mm]	1		
9	18 – 19	0-7	144-159	Welding speed	UINT16	0,0 to 1000,0 [cm/min]	10	ü	

Address				**Signal**	**Activity / data type**	**Range**	**Factor**	**Process image**	
Relative			**Absolute**					**Standard**	**Economy**
WORD	**BYTE**	**BIT**	**BIT**						
10	20 – 21	0-7	160-175	Process controlled correction		See table **Value range for Process controlled correction** on page **41**		√	
11	22 – 23	0-7	176-191	*Welding process WIG:* 2) Wire positioning start				√	

12	24 – 25	0-7	192-207	—				√	
13	26 – 27	0-7	208-223	—				√	
14	28 – 29	0-7	224-239	—				√	
15	30 – 31	0-7	240-255	Wire forward / backward length	UINT16	OFF / 1 to 65535 [mm]	1	√	
16	32 – 33	0-7	256-271	Wire sense edge detection	UINT16	OFF / 0,5 to 20,0 [mm]	10	√	
17	34 – 35	0-7	272-287	—				√	
18	36 – 37	0-7	288-303	—				√	
19	38 – 39	0-7	304-319	Seam number	UINT16	0 to 65535	1	√	

1. MIG/MAG Puls-Synergic, MIG/MAG Standard-Synergic, MIG/MAG Stan-dard-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 welding 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 manual mode
1	0	0	0	1	Stop cooling 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 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 control-led 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 Output Signals

The output signals listed below are available from firmware V4.1.x for all Inside/i systems.

Output Signals (from Power Source to Robot)

Address				Signal	Activity / data type	Range	Factor	Process image	
relative			absolute						
WORD	BYTE	BIT	BIT					Standard	Economy
	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				

0	1	0	8	Collision box active	High	0 = collision - on or cable break		√	√
		1	9	Robot Motion Release	High				
		2	10	Wire stick workpiece	High				
		3	11	—					
		4	12	Short circuit contact tip	High				
		5	13	Parameter selection in- eternally	High				
		6	14	Characteristic number valid	High				
		7	15	Torch body gripped	High				

Address				**Signal**	**Activity / data type**	**Range**	**Factor**	**Process image**	
relative			**absolute**						
WORD	**BYTE**	**BIT**	**BIT**					**Standard**	**Economy**
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	—					
		6	22	Main supply status	Low				
		7	23	—					
	3	0	24	Sensor status 1	High	See table **Assign- ment of Sensor Sta- uses 1–4** on page **45**			
		1	25	Sensor status 2	High				
		2	26	Sensor status 3	High				
		3	27	Sensor status 4	High				
		4	28	—					

	3	5	29	—					
		6	30	—					
		7	31	—					
2	4	0	32	—				√	√
		1	33	—					
		2	34	—					
		3	35	Safety status Bit 0	High	See table **Value ran- g e Safety status** on page **46**			
		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	—					
		3	43	—					
		4	44	—					
		5	45	—					
		6	46	—					
		7	47	—					

Address				**Signal**	**Activity / data type**	**Range**	**Factor**	**Process image**	
relative			**absolute**					**Standard**	**Economy**
WORD	**BYTE**	**BIT**	**BIT**						
6	6	0	48	Process Bit 0	High	See table **Value Range for Process Bit** on page **46**			
		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				

3	7	0	56	ExtOutput1 <= OPT_In- put1	High				
		1	57	ExtOutput2 <= OPT_In- put2	High				
		2	58	ExtOutput3 <= OPT_In- put3	High				
		3	59	ExtOutput4 <= OPT_In- put4	High				
		4	60	ExtOutput5 <= OPT_In- put5	High				
		5	61	ExtOutput6 <= OPT_In- put6	High				
		6	62	ExtOutput7 <= OPT_In- put7	High				
		7	63	ExtOutput8 <= OPT_In- put8	High			√	√
4	8-9	0-7	64-79	Welding voltage	UINT16	0.0 to 655.35 [V]	100	√	√
5	10 – 11	0-7	80-95	Welding current	UINT16	0.0 to 6553.5 [A]	10	√	√
6	12 – 13	0-7	96-111	Wire feed speed	SINT16	-327.68 to 327.67 [m/min]	100	√	√
7	14 – 15	0-7	112-127	Actual real value for seam tracking	UINT16	0 to 6.5535	10000	√	√
8	16 – 17	0-7	128-143	Error number	UINT16	0 to 65535	1	√	
9	18 – 19	0-7	144-159	Warning number	UINT16	0 to 65535	1	√	

Address			**Activity** /		**Factor**	**Process image**	
relative	**absolute**						

WORD	BYTE	BIT	BIT	Signal	data type	Range		Standard	Economy
10	20 – 21	0-7	160-175	Motor current M1	SINT16	-327.68 to 327.67 [A]	100	√	
11	22 – 23	0-7	176-191	Motor current M2	SINT16	-327.68 to 327.67 [A]	100	√	
12	24 – 25	0-7	192-207	Motor current M3	SINT16	-327.68 to 327.67 [A]	100	√	
13	26 – 27	0-7	208-223	—				√	
14	28 – 29	0-7	224-239	—				√	
15	30 – 31	0-7	240-255	—				√	
16	32 – 33	0-7	256-271	Wire position	SINT16	-327.68 to 327.67 [mm]	100	√	
17	34 – 35	0-7	272-287	—				√	
18	36 – 37	0-7	288-303	—				√	
19	38 – 39	0-7	304-319	—				√	

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 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	Constantine
0	1	0	1	0	ColdWire
0	1	0	1	1	DynamicWire

Value Range for Process Bit

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

Retrofit Image Input and Output Signals

Input Signals

From robot to welding machine
Applicable to firmware V1.6.0 and higher

Seq. no	Signal designation	Range	Action
E01	Welding on		High
E02	Robot ready		High
E03	Operating modes bit 0	See table **Value range Operating modes** on page **48**	High
E04	Operating modes bit 1		High
E05	Operating modes bit 2		High
E06	—		
E07	—		
E08	—		
E09	Gas test		High
E10	Wire feed		High
E11	Wire-return		High
E12	Error quit		High
E13	Position searches		High
E14	Purge the welding torch		High
E15	—		
E16	—		
E17 – E24	Job number	0 to 99	
E25 – E31	Program number	1 to 127	
E32	Welding simulation		High

Only in Job mode operating mode			
E17 – E31	Job number	0 to 999	
E32	Welding simulation		High
E33 – E40	Set power value – Low byte	0 to 65,535 (0 to 100%)	
E41 – E48	Set power value – High byte		
E49 – E56	Arc length correction, set value Low byte	0 to 65535 (-30 to +30%)	
E57 – E64	Arc length correction, set value High byte		
E65 – E72	Pulse or dynamic correction	0 to 255 (-5 to +5%)	
E73 – E80	—		
E81	SynchroPulse on		High
E82 – E84	—		
E85	Full power range (0 to 30 m)		High
E86 – E96	—		

Value range Ope-rating modes

Bit 2	**Bit 1**	**Bit 0**	**Description**
0	0	0	MIG/MAG Synergic welding
0	0	1	MIG/MAG Synergic welding
0	1	0	Job mode
0	1	1	Internal parameter selection

Value range Operating modes

Output Signals

Seq. no	Signal designation	Range	Action
A01	Arc stable		High
A02	Limit signal		High
A03	Process active		High
A04	Main current signal		High
A05	Welding torch collision protection		High
A06	Power source ready		High
A07	Communication ready		High
A08	—		
A09 – A16	—		
A17 – A24	—		
A25	—		
A26	—		
A27	—		
A28	Wire present		
A29	Short circuit time exceeded		High
A30	—		
A31	—		
A32	Power out of range		High
A33 – A40	Welding voltage actual value – Low byte	0 to 65535 (0 to 100 V)	
A41 – A48	Welding voltage actual value – High byte		
A49 – A56	Welding current actual value – Low byte	0 to 65535 (0 to 1000 A)	
A57 – A64	Welding current actual value – High byte		
A65 – A72	Motor current actual value	0 to 255 (0 to 5 A)	
A73 – A80	—		
A81 – A88	Wire speed – Low byte	0 to Vimax	
A89 – A96	Wire speed – High byte		

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Documents / Resources

	Fronius CC-M40 DeviceNet [pdf] Instruction Manual CC-M40 DeviceNet, CC-M40, DeviceNet

References

- Fronius Spare Parts
- User Manual