ROBOT CONTROL INTERFACE - RCI²

USER GUIDE

MIGATRONIC

50115001 C1 Valid from 2020 week 19

Table of contents

Specifications ..... 3 - 4

How it works 5

Connection to a robot and welding machine 6

How to connect the installation ..... 7 - 8

How to do the first configuration and setup 9

Jumper settings 10

Fieldbus serial communication setup 11

Status menu ..... 12 - 14

Setup menu ..... 15 - 31

Robot / PLC setup 32

Analog Configuration file - PI ..... 33 - 38

Fieldbus Configuration file - PI and PI PLASMA ..... 39 - 46

Fieldbus Configuration file - PI and PI PLASMA - Std. Motoman ..... 47 - 49

Analog Configuration file - Sigma Galaxy ..... 50 - 57

Fieldbus Configuration file - Sigma Galaxy - Standard ..... 58 - 60

Fieldbus Configuration file - Sigma Galaxy - Standard Motoman ..... 61 - 64

Detailed Interface layout 65

Software upgrade 66

Troubleshooting 67

Error List ..... 68 - 70

ANYBUS - Error List ..... 71 - 75

Electric Diagram 76

SIGMA Robot interface basic setup 77

Spare parts list 78

Specifications

SUPPORTED POWER SOURCES

Migatronic power sources:	SIGMA GALAXY with control unit 76113597, PI 350/500 and PI PLASMA

ANALOG PART OF INTERFACE

ANALOG INPUTS

Galvanic isolated differential inputs:	3
Common mode range:	± 20 VDC
Max differential voltage:	10 VDC
Differential Input impedance:	100K Ohm
Sampling frequency:	100 Hz
Max. pulse frequency (square wave):	10 Hz
Digital resolution:	10 Bit
Error:	± 2 % of reading ± 2 digits(20mV)

ANALOG OUTPUTS

Galvanic isolated differential outputs:	2
Maximum load:	2K Ohm
Output voltage:	0-10 V
Digital resolution:	12 Bit
Sampling frequency:	97 Hz
Error:	± 2 % of reading ± 5 digits(50mV)
Remarks:	cannot be used for certification of the welding process

DIGITAL INPUTS

Galvanic isolated inputs:	16
HIGH level (H):	10-26 VDC
LOW level (L):	0-3 VDC
Input impedance:	5K Ohm
Response time to input changes:	100 ms

DIGITAL OUTPUTS

Galvanic isolated outputs:	16
LOW level:	0 V
HIGH level:	+20V from internal supply (JMP2 1-2) or +24V from external supply (JPM2 2-3)
Max load:	50 mA
Response time:	100 ms

GENERAL DATA

Operating temperature:	-10 to 40°C (14 to 104°F)

Specifications

FIELDBUS PART OF INTERFACE

Supported Fieldbus communication interface

General Technical Data

Certification	UL, cUL File number E214107
CE - Declaration of Pre-Conformity	
Emission EN 61000-6-4	
	EN55011 Radiated emission
	EN55011 Conducted emission
Immunity EN 61000-6-2	EN61000-4-2 Electrostatic discharge
	EN61000-4-3 Radiated immunity
	EN61000-4-4 Fast transients/burst
	EN61000-4-5 Surge immunity
	EN61000-4-6 Conducted immunity

DeviceNet

Vendor ID / Name:	90 (005Ah) / (HMS Industrial Networks)
Product Name:	'Anybus-CompactCom DeviceNet'
ProdTypStr:	Generic Device
Device Type:	0 (0000h)
Product Code:	98 (0062h) (Anybus-CompactCom DeviceNet)
Baud rates:	125kbps – 250kbps - 500kbps
Major Revision:	2
Minor Revision:	1

The Anybus CompactCom DeviceNet module accepts 11-25 V on the industrial network side of the module. Maximum current consumption at 11-25 V is 36-38 mA/module.

Ethernet IP

Vendor ID / Name:	90 (005Ah) / (HMS Industrial Networks)
Product Name:	'Anybus-CC EtherNet/IP'
ProdTypStr:	Generic Device
Device Type:	0 (0000h) (Generic Device)
Product Code:	99 (0063h) (Anybus-CompactCom EtherNet/IP)
Assembly instance input:	100 (0064h)
Assembly instance output:	150 (0096h)
Configuration instance:	1 (0001h)
Major Revision:	2 (0002h)
Minor Revision:	11 (000Bh)

The Ethernet interface supports 10/100Mbit, full or half duplex operation.

ProfiNET

Vendor ID:	268 (010Ch) (HMS Industrial Networks)
Device Type:	7 (0007h) (Anybus-CompactCom PROFINET IO)
Station Type:	'ABCC-PRT'

ProfiBus

IM Manufacturer ID:	268 (010Ch) (HMS Industrial Networks)
IM Order ID:	'ABCC-DPV1'
IM Profile ID:	62976 (F600h) (Generic Device)
IM Profile Specific Type:	4 (0004h) (Communication Module)
IM Version:	257 (0101h)
IM Supported:	30 (001Eh) (IMO..4 supported)

EtherCAT

Vendor ID E000 001Bha (HMS Industrial Networks Secondary Vendor ID, has to be replaced by Vendor ID of end product vendor.)
a. For firmware revision 1.02 and later.
Product Code 0000 0034h (Anybus CompactCom EtherCAT)
Device Name 'Anybus-CC EtherCAT'
Serial Number (Assigned during manufacturing)

How it works

Robot Control Interface (RCI²)
The Robot Control Interface is a flexible I/O interface system designed for controlling different Migatronic machines and devices by means of robots controllers and PLCs.

The Robot Control Interface (RCI²) acts as "translator" between MIGANET and the connected robot controller.

Interface concept
Several machine parameters like program selection, secondary functions, internal alarms etc. are fully accessible, and thus creation of both sophisticated and simple custom applications is possible.

There are two possible ways to control the welding machine, of which only one can be active at a time:

1: **Serial communication:**
Serial communication through Fieldbus and industrial Ethernet via ANYBUS communication modules. (Referred to as Fieldbus in the rest of this manual.)

2: **Analog communication:**
A set of analog inputs and outputs can control the welding machine.

Configuration
RCI² has to be setup for the desired way of communication, by loading a configuration file directly into RCI².
There are four different groups of configuration files.

Pi/Pi Plasma – Analog communication

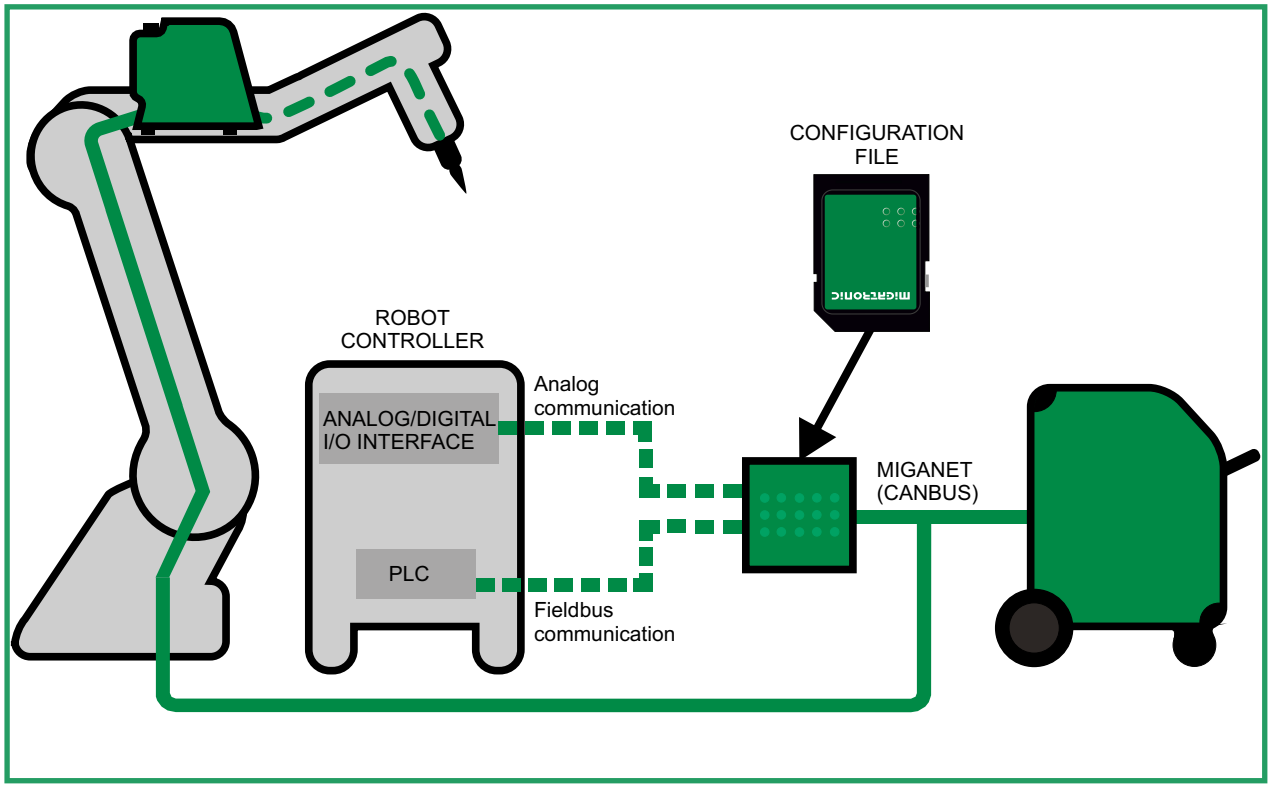
Pi/Pi Plasma – Fieldbus serial communication

Sigma Galaxy – Analog communication

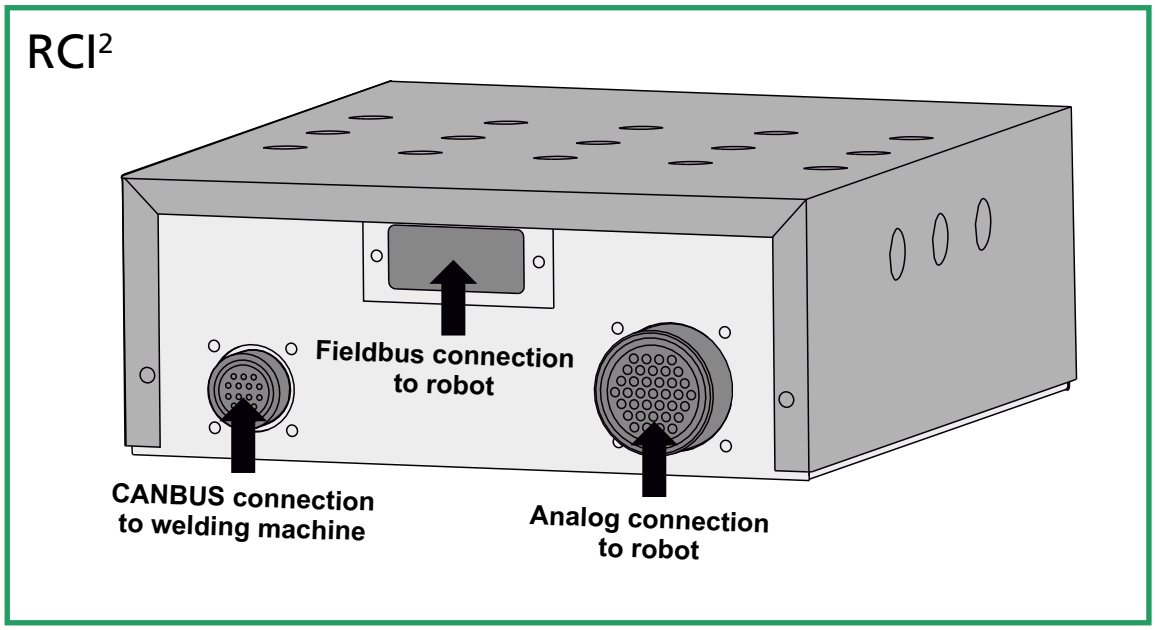
Sigma Galaxy – Fieldbus serial communication

Each group can contain more configuration files with special functionality.
See list on page 33-64.

SD card
The SD card contains the configurations files that are needed by RCI².
It also contains documentation and setup files that are needed by the robot/PLC controller.



Connection to robot and welding machine



Fieldbus communication

One of the following Anybus modules is installed when RCI² is intended for serial communication.

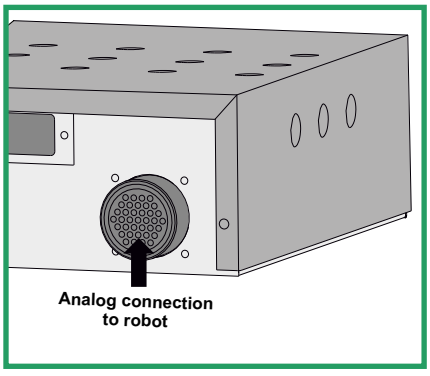
ETHERNET/IP	DEVICENET	PROFINET	PROFIBUS	EtherCAT
				

Analog communication

The analog communication is accessible through the 37 pin military plug.

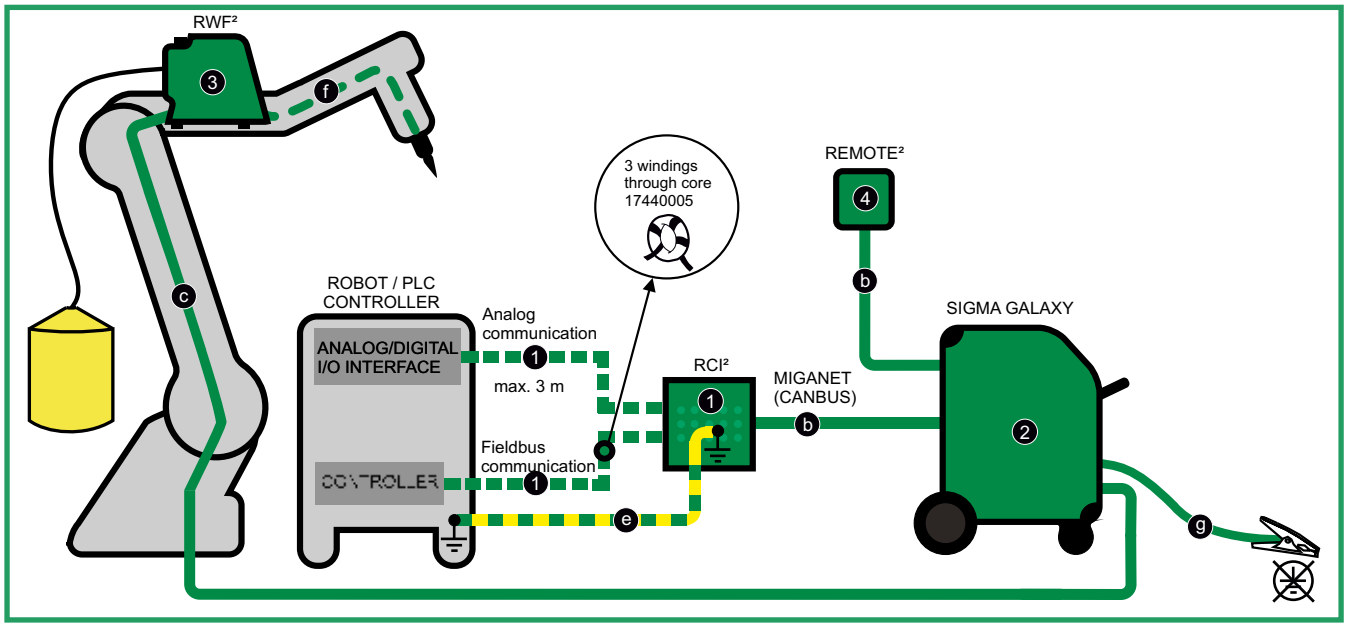
The configuration file is defining the function of each pin.

Setup for analog communication. See page 9

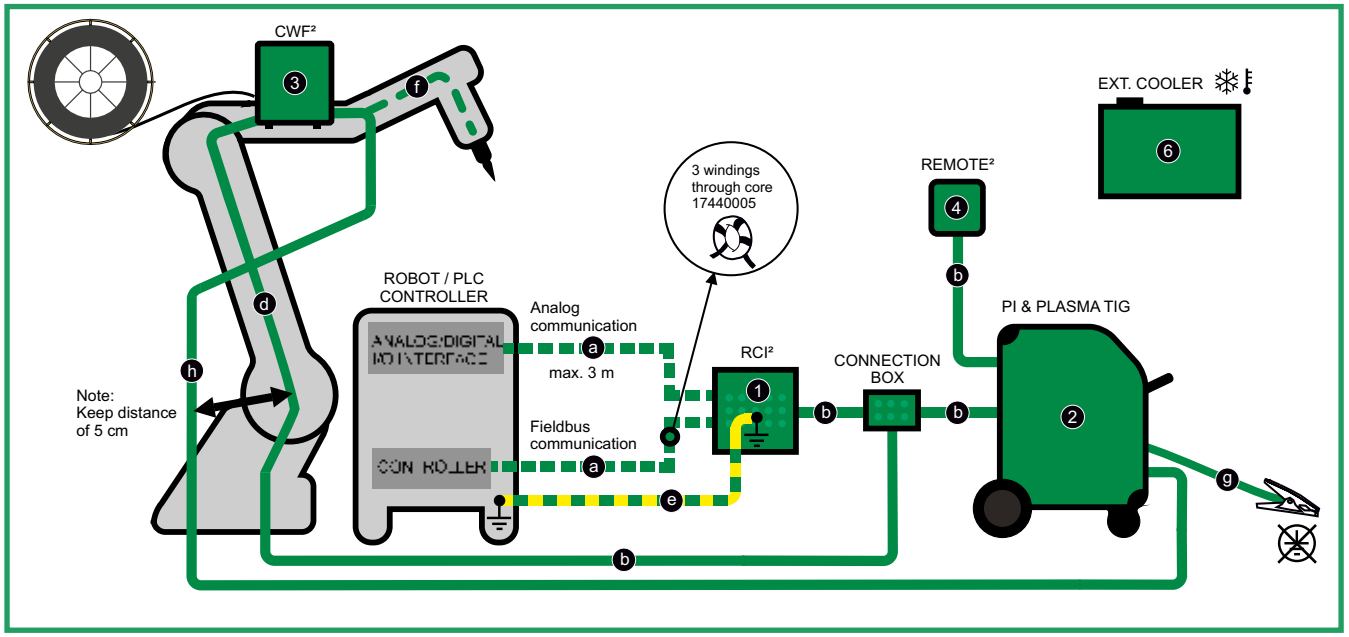


How to connect the installation

MIG installation



TIG installation



Main components:

1. Interface - RCI² I/O
2. Welding inverter - MIG /TIG/Plasma TIG
3. Wire feed unit - RWF²/CWF
4. Remote² control
5. CAN connector box
6. Ext. cooler - option for Plasma TIG

Cables and fittings:

a. Signal cable for robot controller fieldbus or analog
b. CAN communication cable for welding inverter
c. Interconnection, water hose, gas and 2xwelding cable and CAN
d. Highly flexible interconnection for robot
e. Earth connection
f. Welding torch
g. Welding return cable
h. Interconnection, water hose, gas and welding cable

Welding process	Distance to work piece (c + f + h)	Total cable length in welding circuit (c + f + g + h)	Total length of CAN cable (b + d + c)
MIG – IAC and pulse	10 m	20 m	30 m
MIG – non pulse	30 m	60 m	30 m
TIG	10 m	20 m	30 m

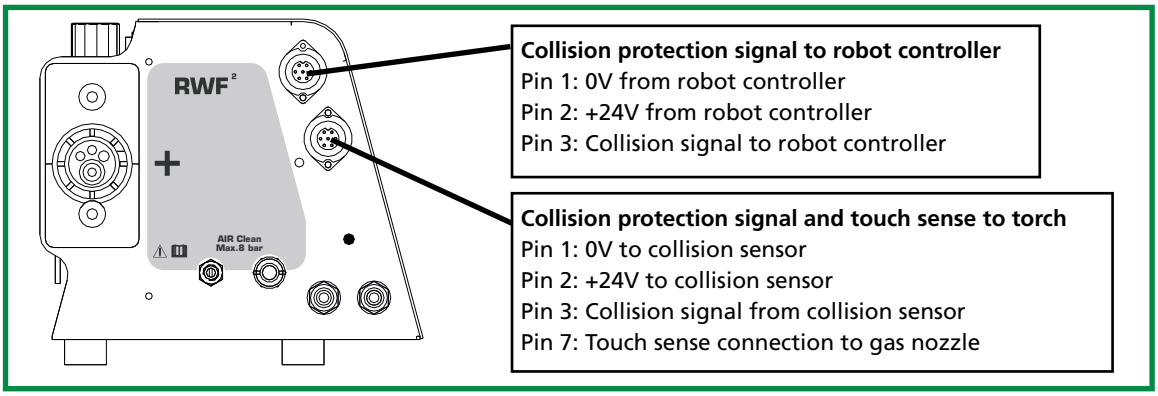
How to connect the installation

Touch sensing

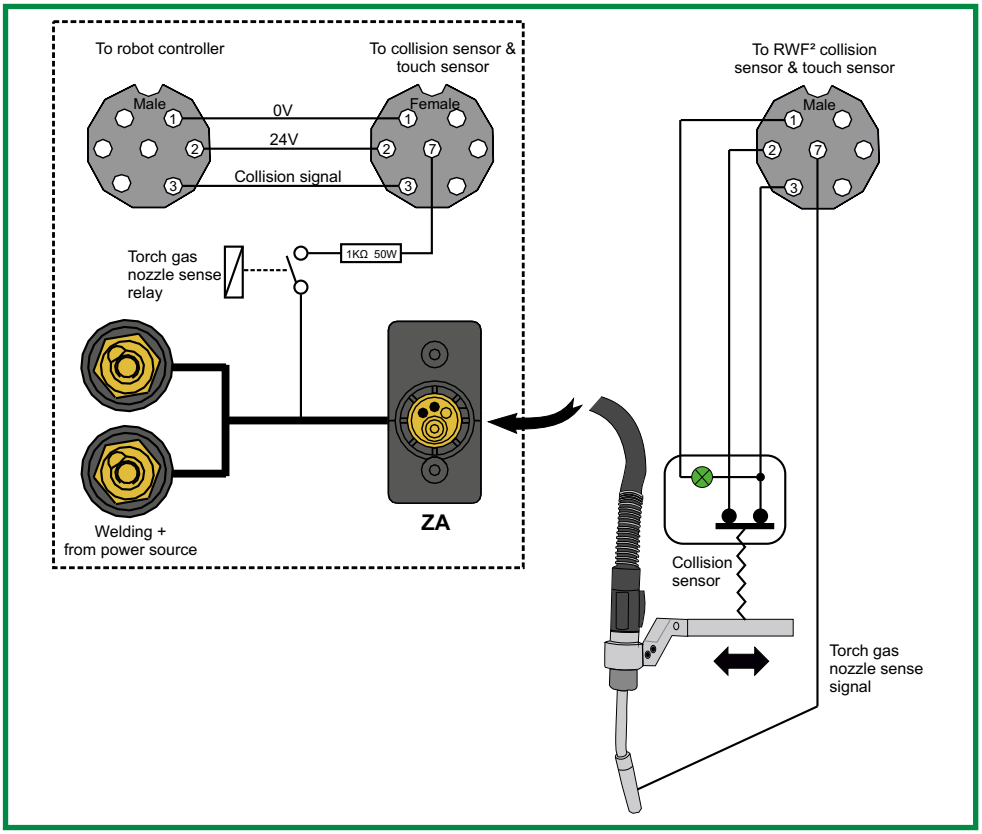
For exact positioning of the welding torch, it is possible to use the Touch Sensing signal.
This option is available when using Fieldbus communication only.
When the welding wire has contact to the work piece, the robot/controller is told so by changing the status of an output bit. Touch sensing can also be connected to the gas nozzle.
N.B. Gas nozzle sensing is automatically enabled through a relay when activating touch sensing. The relay will, for safety reasons, disconnect the gas nozzle sense signal during welding.

Activate Touch sensing by enabling the Touch sensing input bit.
E.x. For Sigma Galaxy this is input Bit # 123. See Fieldbus configuration file for more details.

Read the Touch sensing status output bit.
When the welding wire (or optional the gas nozzle) has contact to work piece, while not welding:
E.x. For Sigma Galaxy output Bit # 147 is ON when there is contact, and OFF when no contact.
See Fieldbus configuration file for more details.



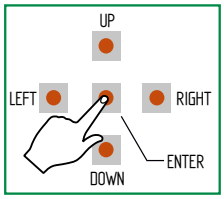
RWF²



How to do the first configuration and setup

Choose the configuration file suitable for your selection of communication method, from the list on page 33-64. The configuration file is placed on the preinstalled SD card.

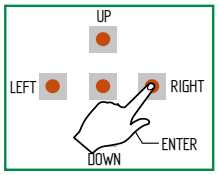
Enter Setup menu **1**



3 SECS

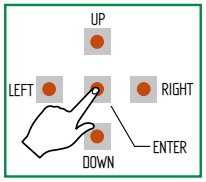
```
=Setup==========>
▪ Exit
```

Choose Config file setting **2**



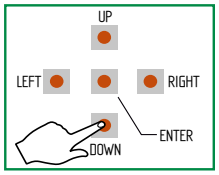

```
-Config file---<
▾ Load from SD
```

Enter Load menu **3**



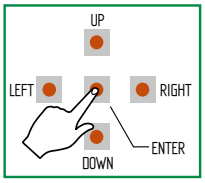

```
= Load from SD
▾ 10010201.TXT
```

Scroll to the desired file **4**




```
= Load from SD
▴▾ 10010xxx.TXT
```

Select with ENTER **5**



During loading process the display will indicate that a backup file is being saved on the SD card.

```
= Load from SD
Backup config...
```

Indication of successful loading

```
= Load from SD
OK! 10010xxx.TXT
```

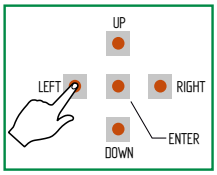
```
-Config file---<
▾ Load from SD
```

IMPORTANT

Fieldbus serial communication:
Continue to page 11 without leaving the Setup menu.

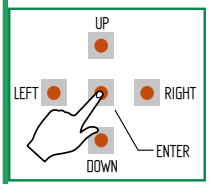
Analog communication:
Continue on this and the next page to complete setup.

Leave the Setup menu **6**




```
= Load from SD
▪ Exit&Reboot
```

Confirm with ENTER



Setup for Analog communication is finished

Jumper settings

DIGITAL INPUTS LEVEL - JMP1

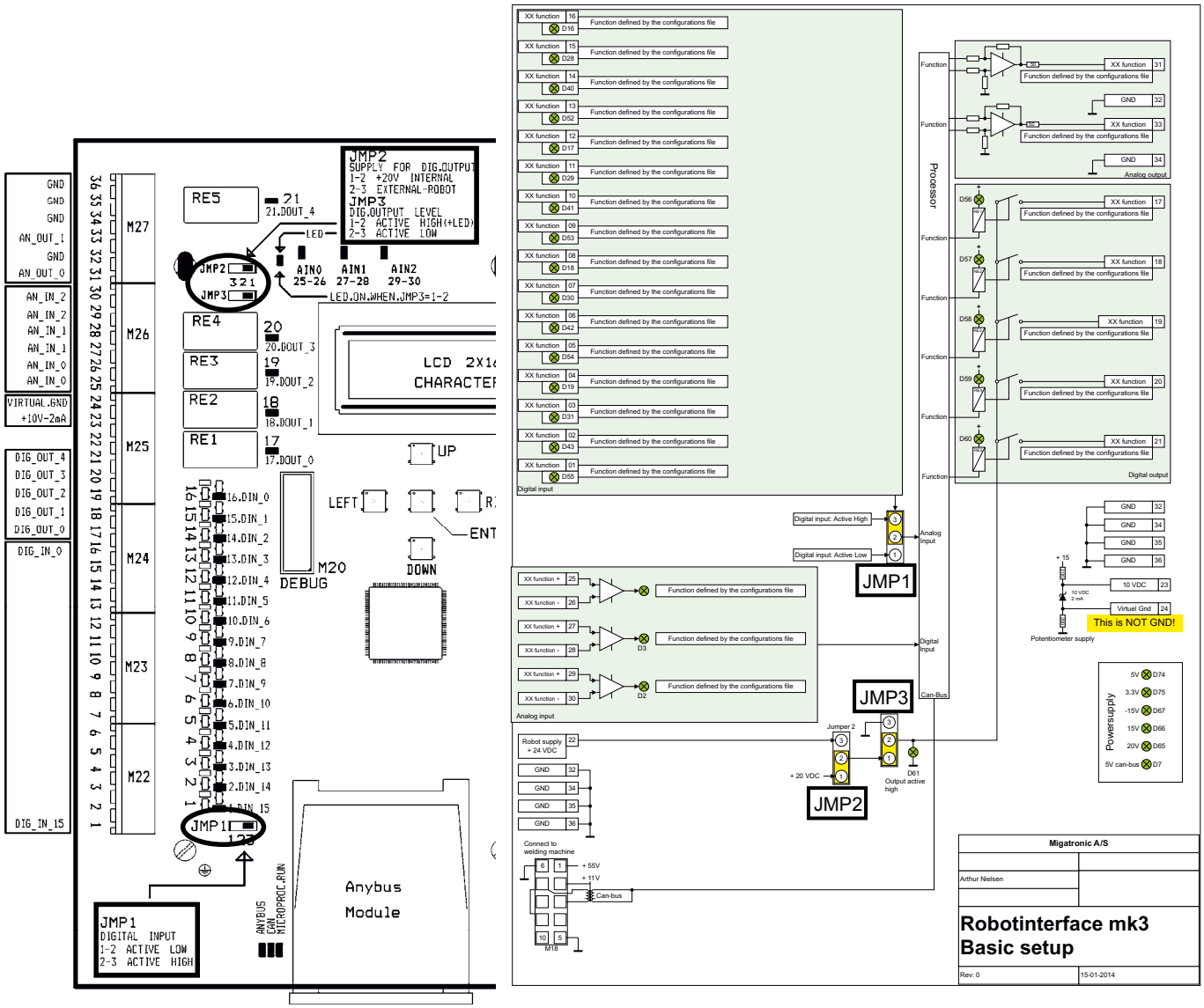
The active input level for all inputs is determined by positioning of jumper JMP1.
JMP1 position 1-2 = Active LOW
JMP1 position 2-3 = Active HIGH – (default)

DIGITAL OUTPUTS LEVEL – JMP3

The active output level on all outputs is determined by positioning of jumper JMP3.
JMP3 position 1-2 = Active HIGH – (default)
JMP3 position 2-3 = Active LOW

DIGITAL OUTPUTS VOLTAGE SOURCE – JMP2

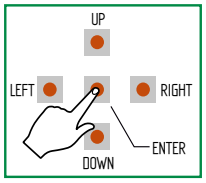
Another jumper (JMP2) is provided to configure the voltage level of all the digital outputs.
JMP2 position 1-2 = +20VDC supplied by RCI – (default)
JMP2 position 2-3 = +24VDC supplied by external power supply from robot or custom hardware



Fieldbus serial communication setup

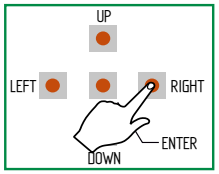
The communication address information needed by the installed Anybus module depends on the type of installed Anybus module. See the page corresponding to your network type.

Enter Setup menu **1**




```
=Setup==========>
▪ Exit
```

Press RIGHT until the display shows the name of your Anybus module.




```
-DeviceNet------
```

Continue on page 20

```
-EthernetIP
▾ DHCP
```

Continue on page 21

```
-EtherCAT------>
▪ Device ID
```

Continue on page 22

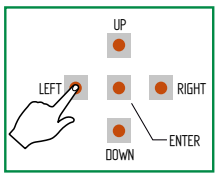
```
-Profibus------>
▾ Node address
```

Continue on page 23

```
-Profinet------>
▾ IP Address
```

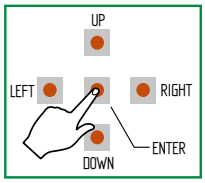
Continue on page 24

Leave the Setup menu **2**



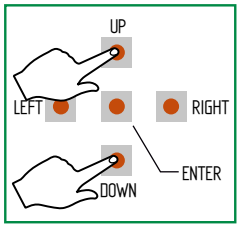

```
= Load from SD
▪ Exit&Reboot
```

Confirm with ENTER



Status menu

The initial menu is showing the status of the interface.
No changes of configurations are possible, from here.
For setup see page 15.



SETUP MENU is LOCKED – NEED PASSWORD

1

```
Status:        
      _____>
```

NOT CONFIGURED	Interface is not configured. Please load a configuration file.
INITIALIZATION	At turn-ON of interface.
ERROR	An error is present. Check the error log and the error list on page 68-70
RUNNING	The interface is working properly without problems.
DEVICE ERROR	An error is present on one of the connected devices, welding machine or RWF². Check the error log and the error list on page 68-70

2

```
Software ver.:
RCI2 1.00
```

The version code of the installed software is shown

3

```
Config.name:
12345678.TXT
```

The file name of the installed configuration file is shown.
The configuration file holds all information needed for correct communication between robot and welding machine.

4

```
Config.descr:
STANDARD CONFIG#1
```

A text description of the installed configuration file is shown.
The configuration file holds all information needed for correct communication between robot and welding machine.

5

```
Anybus Status:
(Not Present)
```

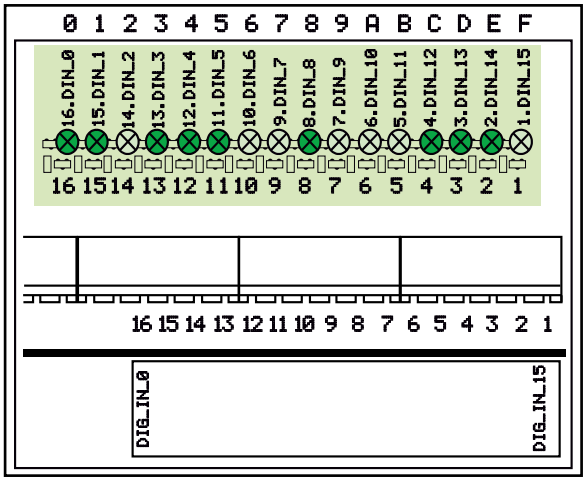
When an Anybus module is installed and the correct configuration file is loaded, this menu is indicating the status of the serial communication and Anybus module status.

Anybus Status:	**Description**
Setup	Anybus Setup in progress.
Network init	The Anybus module is currently performing network-related initialization tasks. Telegrams now contains Process Data (if such data is mapped), however the network Process Data channel is not yet active.
Wait process	Communication between robot and Anybus module is missing. Check cable between robot and RCI² interface. Check network setup.
Idle	The network interface is idle. The exact interpretation of this state is network specific. Depending on the network type, the Read Process Data may be either updated or static (unchanged).
Process active	The network Process Data channel is active and error free
Error	There is at least one serious network error. Enter setup menu – Diagnostic, and readout the error code.
Exception	The module has ceased all network participation due to a host application-related error. This state is unrecoverable, i.e. the module must be restarted in order to be able to exchange network data. Exchange the Anybus module if a restart does not solve the problem.
(not present)	RCI² is not configured for use of Anybus module

Status menu

6 Digital Inputs:
__2___67_9AB___F

Indication of activity on the digital inputs when RCI² is setup for “analog” use. The displayed number is referring to the digital input number.
See example below.



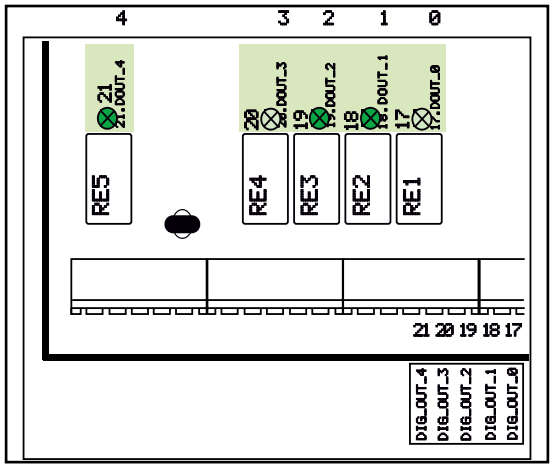
Displayed numbers

Connector numbers

Digital input numbers

7 Digital Outputs:
0__3_

Indication of activity on the digital output
when RCI² is setup for “analog” use
The displayed number is referring to the digital output number.
See example below



Displayed numbers

Connector numbers

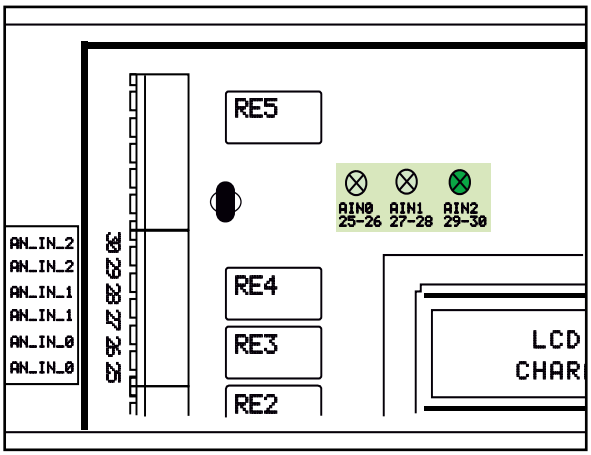
Digital output numbers

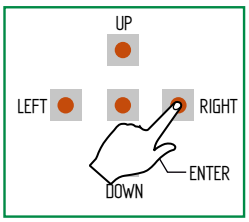
Status menu

8

```
Analog Inputs:
0=7.53V  1=10.00V
```

The 3 analog inputs can be monitored in this menu.
The LED brightness will vary according to the analog voltage



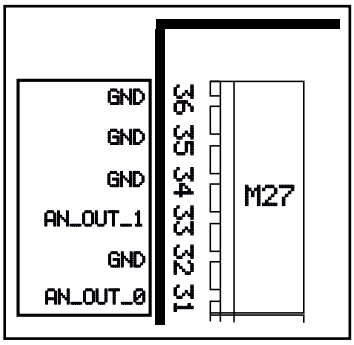



```
Analog Inputs:
2=0.00V
```

9

```
Analog Outputs:
0=00.00V 1=7.89V
```

The 2 analog outputs, AN_OUT_1 and AN_OUT_0
can be monitored in this menu.



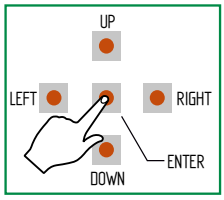
10

```
Clock:  09:35:47
FRI   2013-11-08
```

Local time and date, used in ERROR LOG reports,
and indication of when BACKUP files were stored.

Setup menu

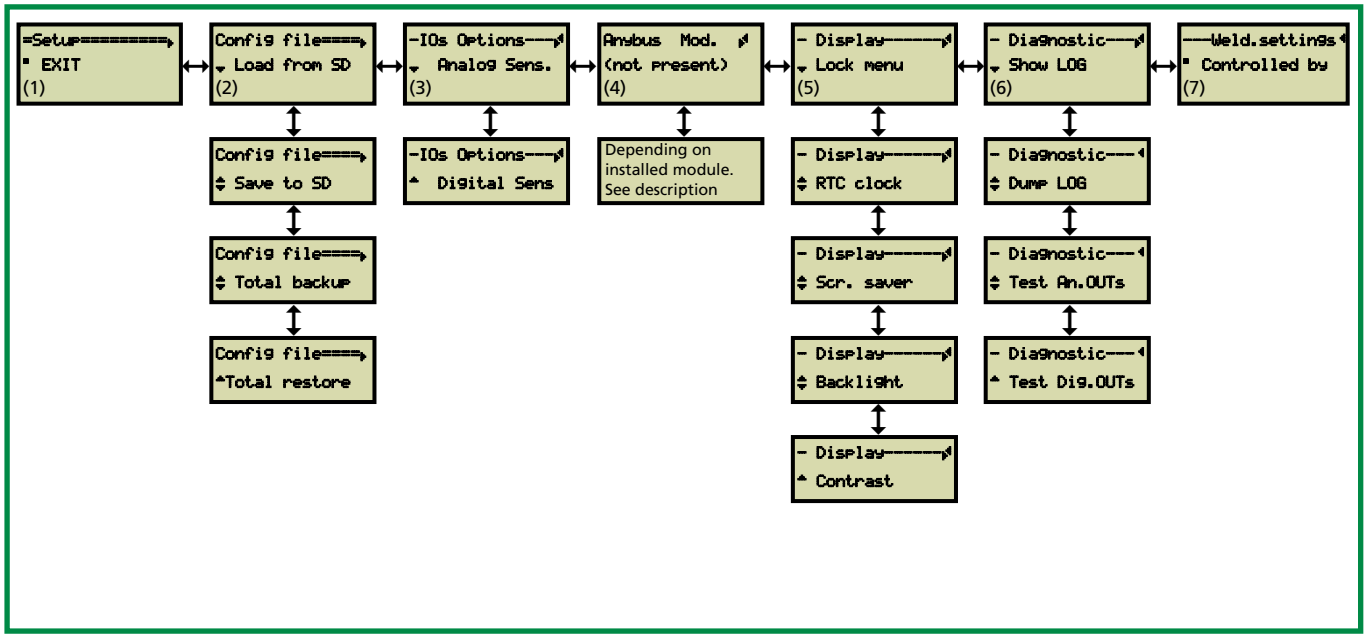
This page is showing the structure of SETUP MENU for the interface.
In this area it is possible to CONFIGURE different parameters of the interface



Follow the navigation arrows as shown in the display

Enter the unlock code and press ENTER
if this information is shown

Menu structure



See the following pages for menu description

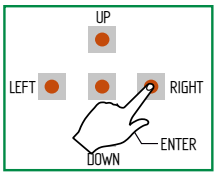
Setup menu

(1) – Setup → Exit

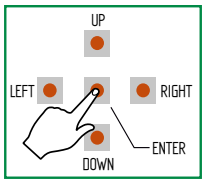
```
=Setup==========▸
▫ Exit
```

```
=Setup==========▸
▫ Exit&Reboot
```

Next menu



Leave the menu with ENTER

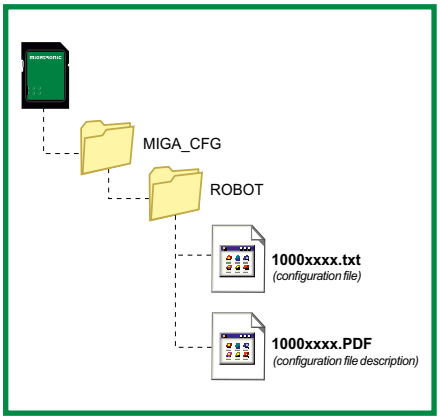


Exit&Reboot is shown when changes have been made to settings in other menus, and the interface needs to reboot to become active again. Not all changes to parameters will force the REBOOT

(2) – Config file

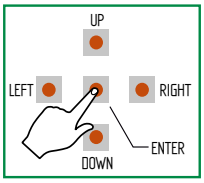
A configuration file, holding information on input and output setting, must be loaded into RCI[2]. Take care that the inserted SD card holds the configuration files in a file structure as shown to the right.

List of available configuration files see page 33-64. Customized configuration files can be produced on request.



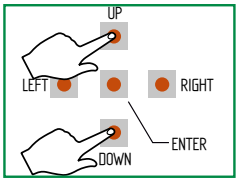

```
Config file====▸
▾ Load from SD
```

Enter Load menu

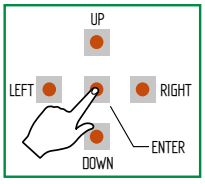


Press ENTER

Select file




```
= Load from SD
▾ 1000xxxx.TXT
```



Confirm with ENTER

```
= Load from SD
Backup config...
```

Backup file name is
BACK00.TXT
BACK01.TXT etc etc.

```
= Load from SD
Load config...
```

A backup file is saved automatically on the SD card, every time a new file is loaded.
Latest backup file has the highest number

Setup menu

Configuration file is saved successfully.

```
= Load from SD
OK 1000xxxx.TXT
```

Possible errors during reading and saving to SD card

```
= Load from SD
Backup fail
```

Check if there is enough space on the SD card, SD write protected OFF or SD card is defective.

```
= Load from SD
Read error
```

Impossible to read the selected file or problems on SD card.

```
= Load from SD
Error at NN
```

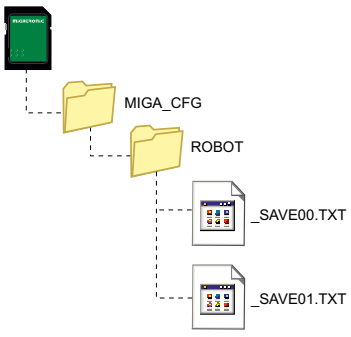
Syntax error at line NN.

```
= Load from SD
No files or SD
```

SD card folder or files are missing.

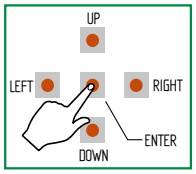
```
Config file====>
↕ Save to SD
```

This function is used when you want to copy the installed configuration file to another SD card. Configuration file only is copied.



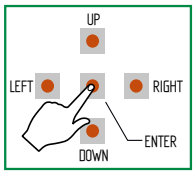
Save a copy of the configuration file to a SD card.

Press Enter




```
= Save to SD
(OK) to confirm
```

Press Enter




```
= Save to SD
(OK) _Save00.TXT
```

Saved file name is SAVE00.TXT SAVE01.TXT etc etc.

Possible errors during reading and saving to SD card

```
= Save to SD
Write error
```

SD card or folders are missing or problems on the SD card

Setup menu

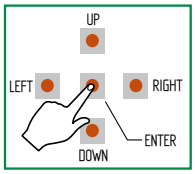
```
Config file====▸
▲▼ Backup all
```

A backup of all configurations settings and Anybus network setups are stored on the SD card.
This function is useful when replacing the RCI² after a breakdown, or when cloning of RCI² is needed.
Previous backup file will be overwritten.

RCI2.BCK

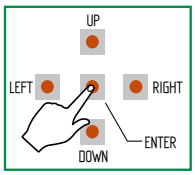
A Total backup of all settings to the SD card.

Press Enter




```
= Backup
(OK) to confirm
```

Press Enter




```
= Backup
(OK)!
```

Saved file name is RCI2.BCK saved at the root of SD card.

Possible errors during backup to SD card

```
= Backup
Write error
```

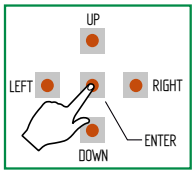
SD card or folders are missing or problems on the SD card

```
Config file====▸
▲ Restore all
```

Upload of backup file with all configuration setups and Anybus network setups stored on the SD card.
This function is useful when replacing the RCI² after a breakdown, or when cloning the RCI² is needed.

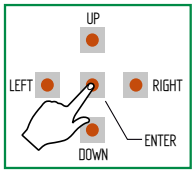
Restore settings from backup of all settings to the SD card.

Press Enter




```
= Restore
(OK) to confirm
```

Press Enter




```
= Restore
(OK)! Reboot...
```

Read file name URI_BCK.BIN from the root of SD card.

Possible errors during restore from SD card

```
Config file====▸
(Read error!)
```

SD card or folders are missing or problems on the SD card.

Setup menu

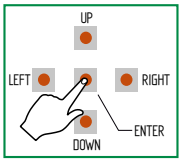
(3) – IOs options

```
-IOs Options---◢
▼  Analog Sens.
```

This filter allows change of sensitivity to background noise on all inputs. LOW is default.

Change the sensitivity for analog inputs

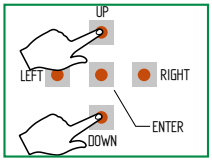
Press Enter




```
=  Analog Sens.
High
```

High sensitivity = no filter

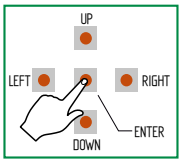
Press Down or Up




```
=  Analog Sens.
Low
```

Low sensitivity = active filter

Press Enter

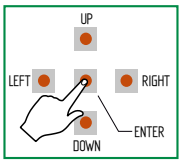



```
-IOs Options---◢
▲  Digital Sens
```

This filter allows change of sensitivity to background noise on all inputs. LOW is default.

Change the sensitivity for digital inputs

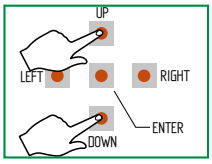
Press Enter




```
=  Digital Sens.
High
```

High sensitivity = no filter

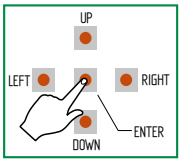
Press Down or Up




```
=  Digital Sens.
Low
```

Low sensitivity = active filter

Press Enter



Setup menu

(4) – Anybus module

```
Anybus  Mod.
(not present)
```

No Anybus module is installed or detected.

DeviceNet

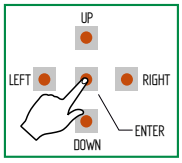
```
-DeviceNet-----
Device address
```

The interface automatically detects and identifies the installed Anybus module and consequently displays different scenarios, depending on the information needed by the Anybus module.

The EDS file needed by the robot controller/PLC can be found on the SD card, or downloaded from *www.migatronic.com MY MIGATRONIC*

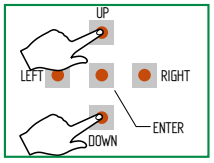
DeviceNet address setup

Press Enter



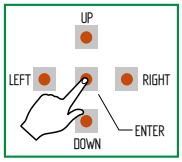

```
= Device address
N
```

Press Down or Up



Set the network device address.
N is in the range 0 to 255.

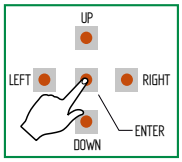
Press Enter to leave Device address




```
-DeviceNet-----
Baud rate
```

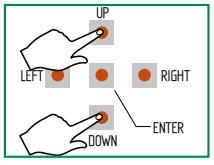
DeviceNet baud rate setup

Press Enter



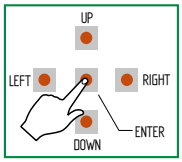

```
= Baud rate
125kbps
```

Press Down or Up



Set the network baud rate.
Possible settings.
125 - 250 - 500kbps and Autobaud

Press Enter to leave



Setup menu

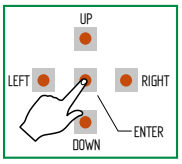
ETHERNET/IP

The interface automatically detects and identifies the installed Anybus module and consequently displays different scenarios, depending on the information needed by the Anybus module.

The EDS file needed by the robot controller/PLC can be found on the SD card, or downloaded from *www.migatronic.com MY MIGATRONIC*

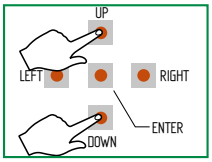
DHCP setting

Press Enter



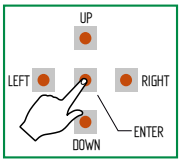
DHCP = Enabled
IP address is issued by the DHCP network server

Press Down or Up



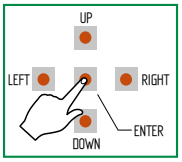
DHCP = Disabled
IP address must be configured manually

Press Enter to leave

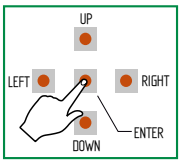


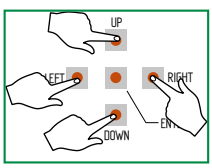
IP address manual setup

Press Enter



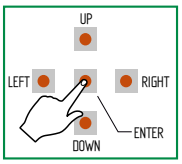
Press Enter





Set the IP address as specified by the robot or network controller. E.x. 192.168.000.010

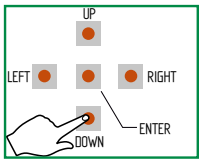
Press Enter to leave



Setup menu

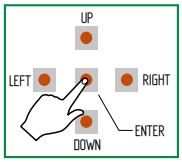
IP address manual setup SUBNET MASK

Press Down

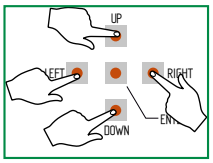



```
-Ethernet IP---▸
▲ Subnet mask
```

Press Enter

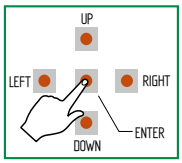



```
= Subnet mask
000.000.000.000
```



Set the IP subnet mask address as specified by the robot or network controller.
E.x. 255.255.255.000

Press Enter to leave



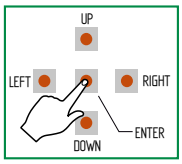
EtherCAT

```
-EtherCAT------▸
▪  Device ID
```

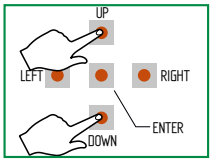
The ESI file needed by the robot controller/PLC can be found on the SD card, or downloaded from *www.migatronic.com MY MIGATRONIC*

Device ID setup

Press Enter

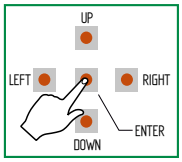



```
= Device address
N
```



Set the Device ID as specified by the robot or network controller. N is in the range 0 to 65535.

Press Enter



Setup menu

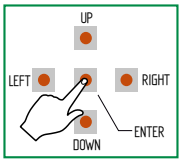
PROFIBUS

```
-Profibus-----
▪  Node address
```

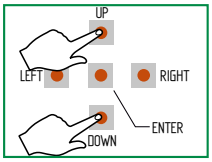
The GSD/GSE file needed by the robot controller/PLC can be found on the SD card, or downloaded from *www.migatronic.com MY MIGATRONIC*

Node address setup

Press Enter

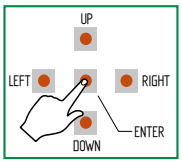



```
= Node address
N
```



Set the node address as specified by the robot or network controller.
N is in the range 0 to 125 and SSA
(Set Slave Address = Master is setting the address)

Press Enter



Setup menu

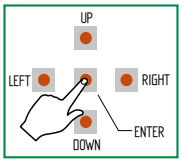
PROFINET IO

```
-Profinet------
 IP address
```

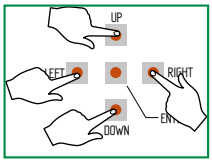
The GSDML file needed by the robot controller/PLC can be found on the SD card, or downloaded from *www.migatronic.com MY MIGATRONIC*

IP address setup

Press Enter

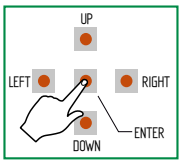



```
= IP Address
000.000.000.000
```

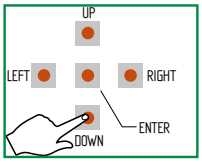


Set the IP address as specified by the robot or network controller.
E.x. 192.168.000.010

Press Enter

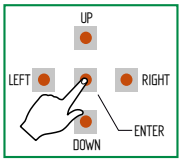


Press Down

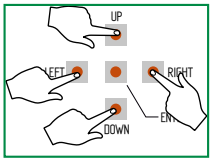



```
-Profinet------
 Subnet  mask
```

Press Enter

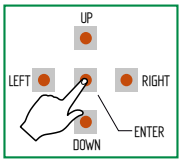



```
= Subnet mask
000.000.000.000
```



Set the IP subnet mask address as specified by the robot or network controller.
E.x. 255.255.255.000

Press Enter to leave




```
-Profinet------
 Device ID
```

Setup menu

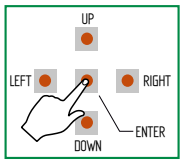
(5) – Display

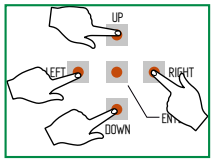
It is possible to lock the interface to protect the stored configuration against unintentional changes. Moreover it is possible to set the Real Time Clock interface and regulate the backlight and contrast of the LCD Display. Screen Saver capability is also implemented in this menu.

Lock menu

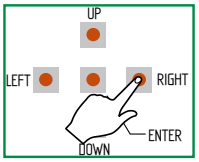
Set locking code

Press Enter

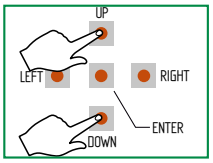




Set the locking code



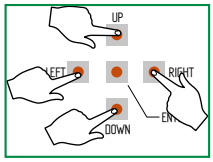
Move the cursor to the lock icon



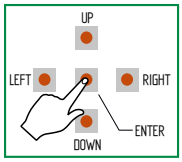
When the locking function is activated, you will see this screen if you try enter the Setup menu.

Setup menu is locked

Example



Enter the code



Press Enter

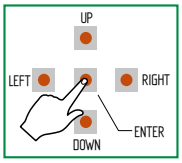
If you do not remember the password contact Migatronic

Setup menu

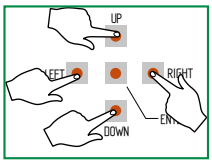
Real Time Clock

Set real time clock

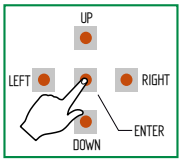
Press Enter



Set time and date



Press Enter to leave

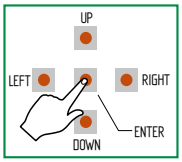


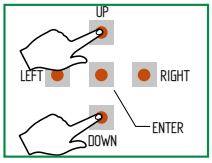
Screen saver

It is possible to enable the auto OFF of Display backlight with a time variable from 5 to 60 minutes or disable the function.

Set screen saver time

Press Enter

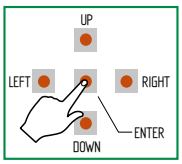




UP = increase

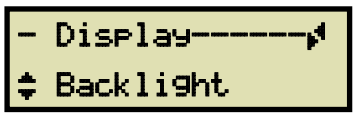
DOWN = decrease

Press Enter to leave



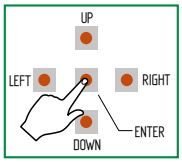
Setup menu

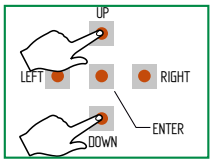
Backlight



Set the intensity of backlight

Press Enter

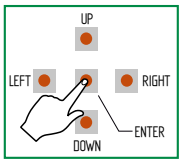




UP = increase

DOWN = decrease

Press Enter to leave

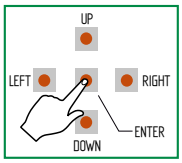


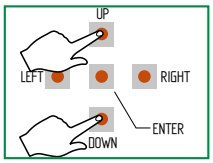
Contrast

Please note that the contrast of display is strongly depending from the temperature of LCD display.

Set the intensity of backlight

Press Enter

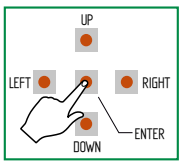




UP = increase

DOWN = decrease

Press Enter to leave



Setup menu

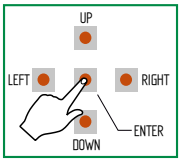
(6) – Diagnostic

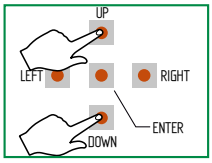
In this area it is possible to go through the error list and save it on the SD card.
Other 2 functions are dedicated to manually force the status of Analog and Digital outputs and Mixed Digital/Analog interface for debugging purposes: data sent to the interface by the welding machine are ignored.

Show LOG

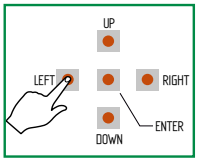
Set the intensity of backlight

Press Enter

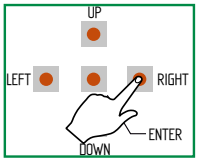




Scroll through the list. Ex. 005/008
First number is the current error displayed.
Second number is the total amount of saved errors.
E12.13 is the error code.

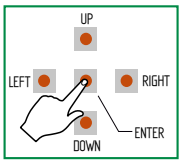


The time error came



Error description

Press Enter to leave



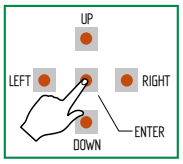
Setup menu

Dump LOG

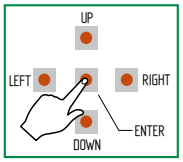
RI_LOG00.TXT
RI_LOG01.TXT

Save a copy of the error log to SD card

Press Enter



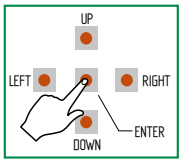
Press Enter



Log file is saved on root of the inserted SD card

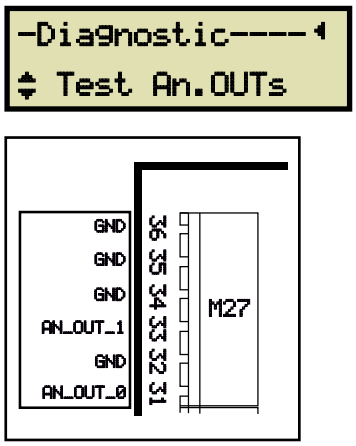
Saved file name is
RI_LOG00.TXT
RI_LOG01.TXT etc etc

Press Enter to leave



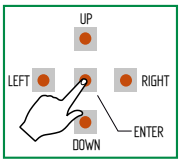
Setup menu

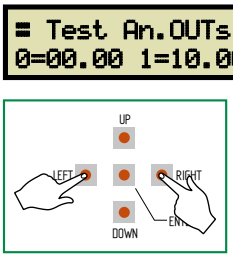
Test of Analog Outputs

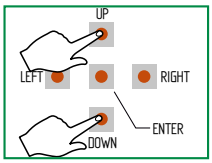


Test the analog output by forcing a voltage to the terminals

Press Enter







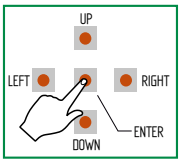
10.00V

00.00V

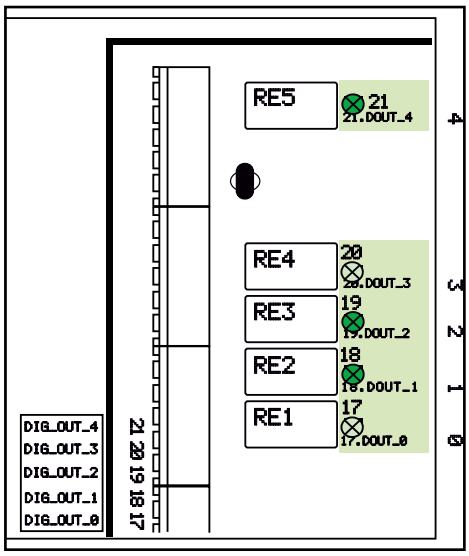
Ch. 0 Ch. 1

	Millitary plug	Pin row plug
Channel 0:	L (+) / M (gnd)	31 (+) / 32 (gnd)
Channel 1:	J (+) / K (gnd)	33 (+) / 34 (gnd)

Press Enter to leave

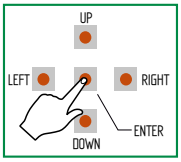


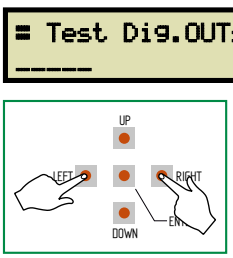
Test of Digital Outputs

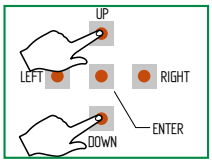


Test the digital output by forcing the terminals HI or LOW

Press Enter







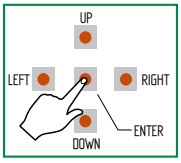
ON

OFF

Ch. 0-1-2-3-4

	Millitary plug	Pin row plug
Channel 0:	d / K (gnd)	17 / 34 (gnd)
Channel 1:	j / K (gnd)	18 / 34 (gnd)
Channel 2:	k / K (gnd)	19 / 34 (gnd)
Channel 3:	h / K (gnd)	20 / 34 (gnd)
Channel 4:	e / K (gnd)	21 / 34 (gnd)

Press Enter to leave

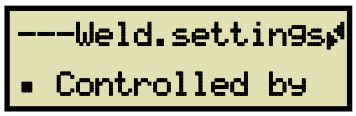


Setup menu

(7) – Weld. Settings

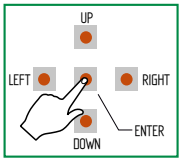
In this area it is possible to select the control of parameters from machine or robot.
Especially, during installation it can be an advantage to select control from machine, as it is then only the trigger signal and emergency stop that can be activated from robot. In MIG it is also possible to active the functions: wire inching and wire inch speed, touch sensing, gas test and panel lock.

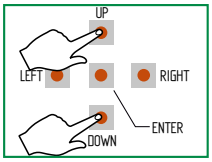
Weld. settings menu



Select control mode

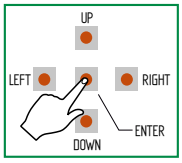
Press Enter





Scroll up and down
to find the requested control mode

Press Enter to leave

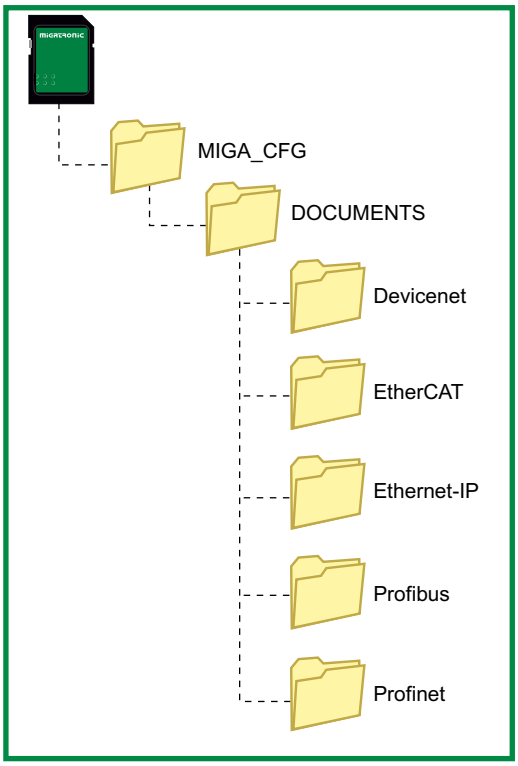


Robot / PLC setup

The SD card comes with the RCI², holds also setup and configuration files that are needed by some robot and PLCs.

Take out the SD card and read the MIGA_CFG/ DOCUMENTS folder on your PC.

Each folder contains EDS or GSD files, user manuals, quick setup guide and various Anybus module documentation, for the communication devices.



PI DC or AC/DC with/without CWF – 10010601

Analog Configuration - 10010601 v1.02

PI DC or AC/DC with/without CWF

DIGITAL INPUTS (JMP1=Active-HIGH)				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Active**
1 / m	DIN15	!Quick-Stop	**Emergency stop** *When input is H the machine can operate.* *When input is L the welding will stop instantly without slope down and the machine cannot start welding; the CWF also stops feeding without retract.*	L
2 / n	DIN14	!Panel-Lock	**Panel locking** *When input is H machine and CWF panels can be operated.* *When input is L panels are locked (panels can be unlocked also using "User-Menu").*	L

3 / Z	DIN13	Pulse-Mode-Bit1	**Current Pulse Mode Selection**
			Select current pulse mode based on inputs combination:
			`(Bit1)LL(Bit0)` → `No pulsation`
			`(Bit1)LH(Bit0)` → `Slow-Pulse`
			`(Bit1)HL(Bit0)` → `Fast-Pulse`
			`(Bit1)HH(Bit0)` → `Synergic-Pulse`
				xx

4 / N	DIN12	Pulse-Mode-Bit0		
5 / P	DIN11	Process-Selection	**Welding Process Selection** *When input is L selects TIG-DC process.* *When input is H selects TIG-AC process.*	H
6 / T	DIN10			

7 / C	DIN9	Program-Bit3	**Welding Program Selection**
			Select program number based on inputs combination:
			`(Bit3)LLLL(Bit0)` → `Selected from machine`
			`(Bit3)LLLH(Bit0)` → `Select program #1`
			`(Bit3)LLHL(Bit0)` → `Select program #2`
			`(Bit3)LLHH(Bit0)` → `Select program #3`
			…
			`(Bit3)HHHH(Bit0)` → `Select program #15`
				xxxx

8 / D	DIN8	Program-Bit2		
9 / G	DIN7	Program-Bit1		
10 / H	DIN6	Program-Bit0		
11 / X	DIN5	Pulse-Wire	**Enable CWF Wire Pulse*** *When input is H the pulsation of wire is enabled according to the CWF settings. If Slow-Pulse with correct timings (see user manual) is enabled the wire-pulse is synchronized with current.*	H
12 / W	DIN4	Error-Reset	**Active Errors Reset** *When input makes a L-to-H transition all errors on PI, CWF and interface are cleared. If errors are not clearable error signals remain active.*	H
13 / U	DIN3	Fwd-Wire-Inch	**Forward Wire Inching*** *When arc is off wire can be jogged forward from the CWF by setting this input H.*	H
14 / V	DIN2	Rev-Wire-Inch	**Reverse Wire Inching*** *When arc is off wire can be jogged backward in the CWF by setting this input H.*	H
15 / S	DIN1	Gas-Purge	**Gas Purge Control** *Set this input H to start Shield and Plasma Gas purge. This input has no effects during welding.*	H
16 / R	DIN0	Arc-Trigger	**Start Welding Arc** *When input is H welding is started (other tasks as wire-inch, gas purge etc. are aborted).* *If Quick-Stop is active arc is not started.* *When input going H-to-L, the actual wire-speed is latched disregarding the analogue value at the analog input.*	H

PI DC or AC/DC with/without CWF – 10010601

Analog Configuration - 10010601 v1.02

PI DC or AC/DC with/without CWF

DIGITAL OUTPUTS (JMP3=Active-HIGH)				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Active**
17 / d	DOUT0	Arc-Detect	**Arc-Detect Status** *Output is H when welding arc is present.*	H
18 / j	DOUT1	Error-Shield-Gas	**Shield Gas Error** *Output is H when shield gas can not be maintained at set level (i.e. low pressure, blocked pipes, etc.).*	H
19 / k	DOUT2			
20 / h	DOUT3	!Error	**Global Error Status** *Output is H when status is OK.* *Output is L when some errors are active (interface, machine or feeder).*	L
21 / e	DOUT4			

ANALOG INPUTS				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Range**
25 / E	AIN0	Wire-Speed(+)	**Set CWF Wire Speed*** *Control CWF wire speed in real-time:* *0V → 0 $^m/_{min}$; 10V → 5 $^m/_{min}$*	0-10V
26 / F		Wire-Speed(-)		
27 / A	AIN1	Welding-Current(+)	**Set Welding Current** *Control welding-current in real-time:* *0V → 0A ; 10V → 500A*	0-10V
28 / B		Welding-Current(-)		
29 / f	AIN2			
30 / g				

ANALOG OUTPUTS				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Range**
31 / L	AOUT0	Welding-Current(+)	**Read Welding-Arc Current** *Measure welding arc current in real-time:* *0V → 0A ; 10V → 1000A*	0-10V
32 / M		Welding-Current(-)		
33 / J	AOUT1	Welding-Voltage(+)	**Read Welding-Arc Voltage** *Measure welding arc voltage in real-time:* *0V → 0V ; 10V → 100V*	0-10V
34 / K		Welding-Voltage(-)		

* Inputs working on selected CWF if present

PI Plasma-DC with/without CWF - 10010602

Analog Configuration - 10010602 v1.02

PI Plasma-DC with/wihout CWF

DIGITAL INPUTS (JMP1=Active-HIGH)				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Active**
1 / m	DIN15	!Quick-Stop	**Emergency stop** *When input is H the machine can operate.* *When input is L the welding will stop instantly without slope down and the machine cannot start welding; the CWF also stops feeding without retract.*	L
2 / n	DIN14	!Panel-Lock	**Panel locking** *When input is H machine and CWF panels can be operated.* *When input is L panels are locked (panels can be unlocked also using "User-Menu").*	L
3 / Z	DIN13	Pulse-Mode-Bit1	**Current Pulse Mode Selection** *Select current pulse mode based on inputs combination:* *(Bit1)LL(Bit0) → No pulsation* *(Bit1)LH(Bit0) → Slow-Pulse* *(Bit1)HL(Bit0) → Fast-Pulse* *(Bit1)HH(Bit0) → Synergic-Pulse*	xx
4 / N	DIN12	Pulse-Mode-Bit0		
5 / P	DIN11	Process-Selection	**Welding Process Selection** *When input is L selects TIG-DC process.* *When input is H selects PLASMA-DC process.*	H
6 / T	DIN10	Pilot-Trigger	**Start Plasma Pilot Arc** *When input is H and Plasma process is selected the pilot-arc is turned ON. When input is L the pilot-arc is turned OFF.* *Pilot-arc can be operated also during welding.*	H
7 / C	DIN9	Program-Bit3	**Welding Program Selection** *Select program number based on inputs combination:* *(Bit3)LLLL(Bit0) → Selected from machine* *(Bit3)LLLH(Bit0) → Select program #1* *(Bit3)LLHL(Bit0) → Select program #2* *(Bit3)LLHH(Bit0) → Select program #3* *…* *(Bit3)HHHH(Bit0) → Select program #15*	xxxx
8 / D	DIN8	Program-Bit2		
9 / G	DIN7	Program-Bit1		
10 / H	DIN6	Program-Bit0		
11 / X	DIN5	Pulse-Wire	**Enable CWF Wire Pulse*** *When input is H the pulsation of wire is enabled according to the CWF settings. If Slow-Pulse with correct timings (see user manual) is enabled the wire-pulse is synchronized with current.*	H
12 / W	DIN4	Error-Reset	**Active Errors Reset** *When input makes a L-to-H transition all errors on PI, CWF and interface are cleared. If errors are not clearable error signals remain active.*	H
13 / U	DIN3	Fwd-Wire-Inch	**Forward Wire Inching*** *When arc is off wire can be jogged forward from the CWF by setting this input H.*	H
14 / V	DIN2	Rev-Wire-Inch	**Reverse Wire Inching*** *When arc is off wire can be jogged backward in the CWF by setting this input H.*	H
15 / S	DIN1	Gas-Purge	**Gas Purge Control** *Set this input H to start Shield and Plasma Gas purge. This input has no effects during welding.*	H
16 / R	DIN0	Arc-Trigger	**Start Welding Arc** *When input is H welding is started (other tasks as wire-inch, gas purge etc. are aborted).* *If Quick-Stop is active arc is not started.* *When input going H-to-L, the actual wire-speed is latched disregarding the analogue value at the analog input.*	H

PI Plasma-DC with/without CWF - 10010602

Analog Configuration - 10010602 v1.02

PI Plasma-DC with/wihout CWF

DIGITAL OUTPUTS (JMP3=Active-HIGH)				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Active**
17 / d	DOUT0	Arc-Detect	**Arc-Detect Status** *Output is H when welding arc is present.*	H
18 / j	DOUT1	Error-Shield-Gas	**Shield Gas Error** *Output is H when shield gas can not be maintained at set level (i.e. low pressure, blocked pipes, etc.).*	H
19 / k	DOUT2	Error-Plasma-Gas	**Plasma Gas Error** *Output is H when plasma gas can not be maintained at set level (i.e. low pressure, blocked pipes, etc.).*	H
20 / h	DOUT3	!Error	**Global Error Status** *Output is H when status is OK.* *Output is L when some errors are active (interface, machine or feeder).*	L
21 / e	DOUT4	Pilot-Arc-Detect	**Pilot-Arc-Detect Status** *Output is H when pilot-arc is present.*	H

ANALOG INPUTS				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Range**
25 / E	AIN0	Wire-Speed(+)	**Set CWF Wire Speed*** *Control CWF wire speed in real-time:* *0V → $0^m/_{min}$; 10V → $5^m/_{min}$*	0-10V
26 / F		Wire-Speed(-)		
27 / A	AIN1	Welding-Current(+)	**Set Welding Current** *Control welding-current in real-time:* *0V → 0A ; 10V → 500A*	0-10V
28 / B		Welding-Current(-)		
29 / f	AIN2			
30 / g				

ANALOG OUTPUTS				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Range**
31 / L	AOUT0	Welding-Current(+)	**Read Welding-Arc Current** *Measure welding arc current in real-time:* *0V → 0A ; 10V → 1000A*	0-10V
32 / M		Welding-Current(-)		
33 / J	AOUT1	Welding-Voltage(+)	**Read Welding-Arc Voltage** *Measure welding arc voltage in real-time:* *0V → 0V ; 10V → 100V*	0-10V
34 / K		Welding-Voltage(-)		

* Inputs working on selected CWF if present

PI Plasma-DC with/without CWF and analog controlled plasma gas - 10010603

Analog Configuration - 10010603 v1.02

PI Plasma-DC with/without CWF and analog controlled plasma gas

DIGITAL INPUTS (JMP1=Active-HIGH)				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Active**
1 / m	DIN15	!Quick-Stop	**Emergency stop** *When input is H the machine can operate.* *When input is L the welding will stop instantly without slope down and the machine cannot start welding; the CWF also stops feeding without retract.*	L
2 / n	DIN14	!Panel-Lock	**Panel locking** *When input is H machine and CWF panels can be operated.* *When input is L panels are locked (panels can be unlocked also using "User-Menu").*	L
3 / Z	DIN13	Pulse-Mode-Bit1	**Current Pulse Mode Selection** *Select current pulse mode based on inputs combination:* *(Bit1)LL(Bit0) → No pulsation* *(Bit1)LH(Bit0) → Slow-Pulse* *(Bit1)HL(Bit0) → Fast-Pulse* *(Bit1)HH(Bit0) → Synergic-Pulse*	xx
4 / N	DIN12	Pulse-Mode-Bit0		
5 / P	DIN11	Process-Selection	**Welding Process Selection** *When input is L selects TIG-DC process.* *When input is H selects PLASMA-DC process.*	H
6 / T	DIN10	Pilot-Trigger	**Start Plasma Pilot Arc** *When input is H and Plasma process is selected the pilot-arc is turned ON. When input is L the pilot-arc is turned OFF.* *Pilot-arc can be operated also during welding.*	H
7 / C	DIN9	Program-Bit3	**Welding Program Selection** *Select program number based on inputs combination:* *(Bit3)LLLL(Bit0) → Selected from machine* *(Bit3)LLLH(Bit0) → Select program #1* *(Bit3)LLHL(Bit0) → Select program #2* *(Bit3)LLHH(Bit0) → Select program #3* *…* *(Bit3)HHHH(Bit0) → Select program #15*	xxxx
8 / D	DIN8	Program-Bit2		
9 / G	DIN7	Program-Bit1		
10 / H	DIN6	Program-Bit0		
11 / X	DIN5	Pulse-Wire	**Enable CWF Wire Pulse*** *When input is H the pulsation of wire is enabled according to the CWF settings. If Slow-Pulse with correct timings (see user manual) is enabled the wire-pulse is synchronized with current.*	H
12 / W	DIN4	Error-Reset	**Active Errors Reset** *When input makes a L-to-H transition all errors on PI, CWF and interface are cleared. If errors are not clearable error signals remain active.*	H
13 / U	DIN3	Fwd-Wire-Inch	**Forward Wire Inching*** *When arc is off wire can be jogged forward from the CWF by setting this input H.*	H
14 / V	DIN2	Rev-Wire-Inch	**Reverse Wire Inching*** *When arc is off wire can be jogged backward in the CWF by setting this input H.*	H
15 / S	DIN1	Gas-Purge	**Gas Purge Control** *Set this input H to start Shield and Plasma Gas purge. This input has no effects during welding.*	H
16 / R	DIN0	Arc-Trigger	**Start Welding Arc** *When input is H welding is started (other tasks as wire-inch, gas purge etc. are aborted).* *If Quick-Stop is active arc is not started.* *When input going H-to-L, the actual wire-speed is latched disregarding the analogue value at the analog input.*	H

PI Plasma-DC with/without CWF and analog controlled plasma gas - 10010603

Analog Configuration - 10010603 v1.02

PI Plasma-DC with/without CWF and analog controlled plasma gas

DIGITAL OUTPUTS (JMP3=Active-HIGH)				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Active**
17 / d	DOUT0	Arc-Detect	**Arc-Detect Status** *Output is H when welding arc is present.*	H
18 / j	DOUT1	Error-Shield-Gas	**Shield Gas Error** *Output is H when shield gas can not be maintained at set level (i.e. low pressure, blocked pipes, etc.).*	H
19 / k	DOUT2	Error-Plasma-Gas	**Plasma Gas Error** *Output is H when plasma gas can not be maintained at set level (i.e. low pressure, blocked pipes, etc.).*	H
20 / h	DOUT3	!Error	**Global Error Status** *Output is H when status is OK.* *Output is L when some errors are active (interface, machine or feeder).*	L
21 / e	DOUT4	Pilot-Arc-Detect	**Pilot-Arc-Detect Status** *Output is H when pilot-arc is present.*	H

ANALOG INPUTS				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Range**
25 / E	AIN0	Wire-Speed(+)	**Set CWF Wire Speed*** *Control CWF wire speed in real-time:* *0V → 0 $^{m}/_{min}$; 10V → 5 $^{m}/_{min}$*	0-10V
26 / F		Wire-Speed(-)		
27 / A	AIN1	Welding-Current(+)	**Set Welding Current** *Control welding-current in real-time:* *0V → 0A ; 10V → 500A*	0-10V
28 / B		Welding-Current(-)		
29 / f	AIN2	Plasma-Gas(+)	**Set Plasma Gas Flow** *Control plasma gas flow in real-time:* *0V → 0LPM ; 10V → 7LPM*	0-10V
30 / g		Plasma-Gas(-)		

ANALOG OUTPUTS				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Range**
31 / L	AOUT0	Welding-Current(+)	**Read Welding-Arc Current** *Measure welding arc current in real-time:* *0V → 0A ; 10V → 1000A*	0-10V
32 / M		Welding-Current(-)		
33 / J	AOUT1	Welding-Voltage(+)	**Read Welding-Arc Voltage** *Measure welding arc voltage in real-time:* *0V → 0V ; 10V → 100V*	0-10V
34 / K		Welding-Voltage(-)		

* Inputs working on selected CWF if present

All controls are available - 10010604

AnyBus Configuration – 10010604 v1.04

PI – Full Configuration

Notes regarding representation of numbers and range of values

1) ALL numbers are UNSIGNED, 1 or 2 bytes (8 or 16 bits). Control bits can be accessed at bit level.
2) The values for each parameter have to be according to the welding machine in use: they will be ignored if out of range.

INPUT BYTES to RCI[2]		
Byte#	**Bit#**	**Name – Description – Example**
1 – 2	1 – 16	**Welding Current** Set the welding current [Ampere*10]. (Example 420A → 4200)
3 – 4	17 – 32	**Wire speed** Set the speed of wire for the CWF specified on selected welding program of Pi. [mm/min] Example: 1,5 m/min → 1500
5 – 6	33 – 48	**Plasma Gas Flow Rate** Set the PLASMA gas flow rate. [Litres/min*100] (Example: 1,5 Litres/min → 150)
7 – 8	49 – 64	**Slow Pulsation - Pulse Time Hi** Time for which the current stays at high level in slow pulse mode. [1 unit = 10mSec] Example: 1,2sec → 120
9 – 10	65 – 80	**Slow Pulsation – Pulse Time Lo** Time for which the current stays at low level in slow pulse mode [1 unit = 10mSec] Example: 0,7sec → 70
11	81 – 88	**Slow Pulsation Base Current %** Level of Base current as Percent of Set current in slow pulse mode. [1 unit = 1%] Example: 35% → 35
12	89 – 96	**Fast Pulsation Base Current %** Level of Base current as Percent of Set current in fast pulse mode. [1 unit = 1%] Example: 30% → 30
13 – 14	97 – 112	**Fast Pulsation Pulse Frequency** Value of pulsation frequency in fast pulse mode. [1 unit = 1Hertz] Example: 300 Hz → 300
15 – 16	113 – 128	**AC Tig Frequency** Value of AC frequency. [1 unit = 1Hertz] Example: 100 Hz → 100
17	129 - 136	**AC Tig Time Balance %** Value of Duty Cycle. The higher the parameter, the lower the cleaning. [1 unit = 1%] Example: 65% → 65
18	137 – 144	**AC Tig Current Amplitude Balance %** Value of positive wave as percent of welding current. [1 unit = 1%] The higher the parameter, the higher the cleaning. Example: 75% → 75
19	145 – 152	**Pregas Time** Time of Gas preflow in TIG, done if gas was previously OFF [1 unit = 100mSec] Example: 0,5sec → 5
20	153 – 160	**Start Current %** Value of initial current for slope up in TIG (DC and AC) [1 unit = 1%] Example: 40% → 40
21	161 – 168	**Slope Up Time** Slope up time in TIG (DC and AC) [1 unit = 100mSec] Example: 4,5sec → 45
22	169 – 176	**Slope Down Time** Slope down time in TIG (DC and AC) [1 unit = 100mSec] Example: 3,0sec → 30
23	177 – 184	**Stop Current %(Final Current%)** Value of final current for slope down in TIG (DC and AC) [1 unit = 1%] Example: 20% → 20
24	185 – 192	**Post Gas Time** Time of Gas postflow in TIG, [1 unit = 100mSec] Example: 5,0sec → 50

All controls are available - 10010604

AnyBus Configuration – 10010604 v1.04

PI – Full Configuration

INPUT BYTES to RCI^2		
Byte#	**Bit#**	**Name – Description – Example**
25 – 26	193 – 208	**Shield Gas Flow Rate** Set the SHIELD gas flow rate. [Litres/min*100] Example: 6,0 Litres/min → 600
27 – 28	209 – 224	**Welding Time** Timer used to limit the duration of a welding spot, [1 unit = 10mSec] Example: 0,4sec → 40
29	225 – 232	**Program number.** Select program #1 - #Max by value. Maximum number depends from the machine in use. *By setting #0 the program can be selected directly on the Panel of machine or remote.* Example: Program no = #21 → 21
30	233 – 240	**Fast pulsation mode** Possibility to enable the Fast Pulsation and select its characteristics #0 = Fast Pulse Mode is Off #1 = Fast pulse Mode is On #4 = Fast pulse Mode is On – Synergic (Pulse frequency depends from the level of current) Example: Fast Pulse enabled → 1 (most common Fast pulse mode used is #1)
31	241 – 248	**Process selection** 0 = Tig DC 1 = Tig AC 2 = MMA DC 3 = MMA AC 4 = Plasma DC Example: Welding Process Plasma DC → 4
32 – 33	249 – 264	**Control Bits** Bit #249 – Quick-Stop (1 = stops the welding process) Bit #250 – E-box Key Lock (1 = lock the box to prevent changes of parameters) Bit #251 – Arc Start (trigger for Welding Arc) Bit #252 – Start Pilot Arc (trigger for Pilot Arc). Plasma gas must be purged manually prior to starting Pilot arc. (Set Plasma gas value in byte 5&6, and purge Plasma gas Bit #256 Bit #253 – (not used) Bit #254 – (not used) Bit #255 – Shield Gas Purge Bit #256 – Plasma Gas Purge Bit #257 – Slow Pulse Enable Bit #258 – LIFTIG Bit #259 – Touch Sense Bit #260 – (not used) Bit #261 – (not used) Bit #262 – (not used) Bit #263 – (not used) Bit #264 – Tack Welding Enable
34	265 – 272	**Control Bits (Control of CWF)** Bit #265 – Wire Hold/Pause Bit #266 – Wire Inch + Bit #267 – Wire Inch - Bit #268 – Disable Pulse Wire Bit #269 – (not used) Bit #270 – (not used) Bit #271 – (not used) Bit #272 – (not used)
35	273 – 280	**Control Bits** Bit #273 – Reset Error – To clear pending errors on the machine, Cold wire feeder or interface … Bit #274 - #280 (not used)

All controls are available - 10010604

AnyBus Configuration – 10010604 v1.04

PI – Full Configuration

OUTPUT BYTES from RCI[2]		
Byte#	**Bit#**	**Name – Description – Example**
1 – 2	1 – 16	**Actual Welding Voltage** Returns the value of arc voltage [1 unit = 0,1Volt] Example: 325 → 32,5Volts
3 – 4	17 – 32	**Actual Welding Current** Returns the value of Welding Current [1 unit = 0,1Amp] Example: 1900 → 190,0 Amp
5 – 6	33 – 48	**Actual Welding Voltage – for AVC** Returns the arc voltage when current is slow pulsating: indicated for AVC [1 unit = 0,1Volt] Example: 325 → 32,5Volts
7 – 8	49 – 64	**Actual Shield Gas flow rate** Returns the SHIELD gas flow rate. [Litres/min*100] Example: 600 → 6,0 Litres/min
9 – 10	65 – 80	**Actual Plasma gas flow** Returns the PLASMA gas flow rate. [Litres/min*100] Example: 450 → 4,5 Litres/min
11 – 12	81 – 96	**Actual Wire speed** Returns the speed of wire for the CWF in use on Pi. [mm/min] Example: 2500 → 2,5m/min
13 – 14	97 – 112	**Error Code** Low Byte= Error Module ; High Byte= Error Code Example: #14=01 and #13=03 → E 03-01 *Error codes can be found in the manual for the machine*
15	113 – 120	**Actual program number selected** Returns the welding program number in use on machine Example: 21 → Program #21
16	121 – 128	**Status bits** Bit #121 – Arc Detect. ON when Arc is established Bit #122 – (not used) Bit #123 – Touch Sense. ON when the Touch Sense input is on, and the electrode is touching the work piece Bit #124 – Stick Control. ON when the electrode is touching the work piece. Bit #125 – Pilot Arc Detect. ON when Pilot Arc is established. Bit #126 – Process Active. Machine is welding, or purging shield gas. Bit #127 – Shield Gas Fault. There is an error in flow of the Shield gas. Bit #128 – Plasma Gas Fault. There is an error in the flow of the Plasma gas.
17	129 - 136	**Status bits** Bit #129 – Machine Ready. Machine is ready to weld. … Bit #130 - #136 – (not used)

Program change from RCI² and current setting from PI control box - 10010605

AnyBus Configuration – 10010605 v1.04

PI – Program Select

Notes regarding representation of numbers and range of values

1) ALL numbers are UNSIGNED, 1 or 2 bytes (8 or 16 bits). Control bits can be accessed at bit level.
2) In case of 2 bytes, for example bytes 1&2, then MSB=Byte#2 and LSB=Byte#1
3) The values for each parameter have to be according to the welding machine in use: they will be ignored if out of range.

INPUT BYTES to RCI²		
Byte#	**Bit#**	**Name – Description – Example**
1	1 – 8	**Program number.** Select program #1 - #Max by value. Maximum number depends from the machine in use. *By setting #0 the program can be selected directly on the Panel of machine or remote.* Example: Program no = #21 → 21
2	9 – 16	**Fast pulsation mode** Possibility to enable the Fast Pulsation and select its characteristics #0 = Fast Pulse Mode is Off #1 = Fast pulse Mode is On #4 = Fast pulse Mode is On - Synergic (Pulse frequency depends from the level of current) Example: Fast Pulse enabled → 1 (most common Fast pulse mode used is #1)
3	17 – 24	**Process selection** 0 = Tig DC 1 = Tig AC 2 = MMA DC 3 = MMA AC 4 = Plasma DC Example: Welding Process Plasma DC → 4
4 – 5	25 – 40	**Control Bits** Bit #25 – Quick-Stop (1 = stops the welding process) Bit #26 – E-box Key Lock (1 = lock the box to prevent changes of parameters) Bit #27 – Arc Start (trigger for Welding Arc) Bit #28 – Start Pilot Arc (trigger for Pilot Arc). Plasma gas must be purged manually prior to starting Pilot arc. (Set Plasma gas value on the Pi front panel, and purge Plasma gas Bit #32 Bit #29 – (not used) Bit #30 – (not used) Bit #31 – Shield Gas Purge Bit #32 – Plasma Gas Purge Bit #33 – Slow Pulse Enable Bit #34 – LIFTIG Bit #35 – Touch Sense Bit #36 – (not used) Bit #37 – (not used) Bit #38 – (not used) Bit #39 – (not used) Bit #40 – Tack Welding Enable
6	41 – 48	**Control Bits (Control of CWF)** Bit #41 – Wire Hold/Pause Bit #42 – Wire Inch + Bit #43 – Wire Inch - Bit #44 – Disable Pulse Wire Bit #45 – (not used) Bit #46 – (not used) Bit #47 – (not used) Bit #48 – (not used)
7	49 - 56	**Control Bits** Bit #49 – Reset Error – To clear pending errors on the machine, Cold wire feeder or interface … Bit #50 - #56 (not used)

Program change from RCI² and current setting from PI control box - 10010605

AnyBus Configuration – 10010605 v1.04

PI – Program Select

OUTPUT BYTES from RCI²		
Byte#	**Bit#**	**Name – Description – Example**
1 – 2	1 – 16	**Actual Welding Voltage** Returns the value of arc voltage [1 unit = 0,1Volt] Example: 325 → 32,5Volts
3 – 4	17 – 32	**Actual Welding Current** Returns the value of Welding Current [1 unit = 0,1Amp] Example: 1900 → 190,0 Amp
5 – 6	33 – 48	**Actual Welding Voltage – for AVC** Returns the arc voltage when current is slow pulsating: indicated for AVC [1 unit = 0,1Volt] Example: 325 → 32,5Volts
7 – 8	49 – 64	**Actual Shield Gas flow rate** Returns the SHIELD gas flow rate. [Litres/min*100] Example: 600 → 6,0 Litres/min
9 – 10	65 – 80	**Actual Plasma gas flow** Returns the PLASMA gas flow rate. [Litres/min*100] Example: 450 → 4,5 Litres/min
11 – 12	81 – 96	**Actual Wire speed** Returns the speed of wire for the CWF in use on Pi. [mm/min] Example: 2500 → 2,5m/min
13 – 14	97 – 112	**Error Code** Low Byte= Error Module ; High Byte= Error Code Example: #14=01 and #13=03 → E 03-01 *Error codes can be found in the manual for the machine*
15	113 – 120	**Actual program number selected** Returns the welding program number in use on machine Example: 21 → Program #21
16	121 – 128	**Status bits** Bit #121 – Arc Detect. ON when Arc is established Bit #122 – (not used) Bit #123 – Touch Sense. ON when the Touch Sense input is on, and the electrode is touching the work piece Bit #124 – Stick Control. ON when the electrode is touching the work piece. Bit #125 – Pilot Arc Detect. ON when Pilot Arc is established. Bit #126 – Process Active. Machine is welding, or purging shield gas. Bit #127 – Shield Gas Fault. There is an error in flow of the Shield gas. Bit #128 – Plasma Gas Fault. There is an error in the flow of the Plasma gas.
17	129 - 136	**Status bits** Bit #129 – Machine Ready. Machine is ready to weld. … Bit #130 - #136 – (not used)

Program change and current setting from RCI² - 10010606

AnyBus Configuration – 10010606 v1.04

PI – Standard

Notes regarding representation of numbers and range of values

1) ALL numbers are UNSIGNED, 1 or 2 bytes (8 or 16 bits). Control bits can be accessed at bit level.
2) In case of 2 bytes, for example bytes 1&2, then MSB=Byte#2 and LSB=Byte#1
3) The values for each parameter have to be according to the welding machine in use: they will be ignored if out of range.

INPUT Bytes to RCI²		
Byte#	**Bit#**	**Name – Description – Example**
1 – 2	1 – 16	**Welding Current** Set the welding current. [Ampere*10] *Example 420A → 4200*
3 - 4	17 – 32	**Wire speed** Set the speed of wire for the CWF specified on selected welding program of PI. [mm/min] *Example: 1,5 m/min → 1500*
5 – 6	33 – 48	**Plasma Gas Flow Rate** Set the PLASMA gas flow rate. [Litres/min*100] *Example: 4,5 Litres/min → 450*
7	49 – 56	**Programme number.** Select program #1 - #Max by value. Maximum number depends from the machine in use. *By setting #0 the program can be selected directly on the Panel of machine or remote.* Example: Program no = #21 → 21
8	57 – 64	**Fast pulsation mode** Possibility to enable the Fast Pulsation and select its characteristics #0 = Fast Pulse Mode is Off #1 = Fast pulse Mode is On #4 = Fast pulse Mode is On - Synergic (Pulse frequency depends from the level of current) Example: Fast Pulse enabled → 1 (most common Fast pulse mode used is #1)
9	65 – 72	**Process selection** 0 = Tig DC 1 = Tig AC 2 = MMA DC 3 = MMA AC 4 = Plasma DC Example: Welding Process Plasma DC → 4
10 - 11	73 – 88	**Control Bits** Bit #73 – Quick-Stop (1 = stops the welding process) Bit #74 – E-box Key Lock (1 = lock the box to prevent changes of parameters) Bit #75 – Arc Start (trigger for Welding Arc) Bit #76 – Start Pilot Arc (trigger for Pilot Arc). Plasma gas must be purged manually prior to starting Pilot arc. (Set Plasma gas value in byte 5&6, and purge Plasma gas Bit #80 Bit #77 – (not used) Bit #78 – (not used) Bit #79 – Shield Gas Purge Bit #80 – Plasma Gas Purge Bit #81 – Slow Pulse Enable Bit #82 – LIFTIG Bit #83 – Touch Sense Bit #84 – (not used) Bit #85 – (not used) Bit #86 – (not used) Bit #87 – (not used) Bit #88 – Tack Welding Enable

Program change and current setting from RCI² - 10010606

AnyBus Configuration – 10010606 v1.04

PI – Standard

INPUT Bytes to RCI²		
Byte#	**Bit#**	**Name – Description – Example**
12	89 – 96	**Control Bits (Control of CWF)** Bit #89 – Wire Hold/Pause Bit #90 – Wire Inch + Bit #91 – Wire Inch - Bit #92 – Disable Pulse Wire Bit #93 – (not used) Bit #94 – (not used) Bit #95 – (not used) Bit #96 – (not used)
13	97 - 104	**Control Bits** Bit 97 – Reset Error – To clear pending errors on the machine, Cold wire feeder or interface … Bit #98 - #104 (not used)

Program change and current setting from RCI² - 10010606

AnyBus Configuration – 10010606 v1.04

PI – Standard

OUTPUT BYTES from RCI²		
Byte#	**Bit#**	**Name – Description – Example**
1 – 2	1 – 16	**Actual Welding Voltage** Returns the value of arc voltage [1 unit = 0,1Volt] Example: 325 → 32,5Volts
3 – 4	17 – 32	**Actual Welding Current** Returns the value of Welding Current [1 unit = 0,1Amp] Example: 1900 → 190,0 Amp
5 – 6	33 – 48	**Actual Welding Voltage – for AVC** Returns the arc voltage when current is slow pulsating: indicated for AVC [1 unit = 0,1Volt] Example: 325 → 32,5Volts
7 – 8	49 – 64	**Actual Shield Gas flow rate** Returns the SHIELD gas flow rate. [Litres/min*100] Example: 600 → 6,0 Litres/min
9 – 10	65 – 80	**Actual Plasma gas flow** Returns the PLASMA gas flow rate. [Litres/min*100] Example: 450 → 4,5 Litres/min
11 – 12	81 – 96	**Actual Wire speed** Returns the speed of wire for the CWF in use on Pi. [mm/min] Example: 2500 → 2,5m/min
13 – 14	97 – 112	**Error Code** Low Byte= Error Module ; High Byte= Error Code Example: #14=01 and #13=03 → E 03-01 *Error codes can be found in the manual for the machine*
15	113 – 120	**Actual program number selected** Returns the welding program number in use on machine Example: 21 → Program #21
16	121 – 128	**Status bits** Bit #121 – Arc Detect. ON when Arc is established Bit #122 – (not used) Bit #123 – Touch Sense. ON when the Touch Sense input is on, and the electrode is touching the work piece Bit #124 – Stick Control. ON when the electrode is touching the work piece. Bit #125 – Pilot Arc Detect. ON when Pilot Arc is established. Bit #126 – Process Active. Machine is welding, or purging shield gas. Bit #127 – Shield Gas Fault. There is an error in flow of the Shield gas. Bit #128 – Plasma Gas Fault. There is an error in the flow of the Plasma gas.
17	129 - 136	**Status bits** Bit #129 – Machine Ready. Machine is ready to weld. … Bit #130 - #136 – (not used)

Program change and current setting from RCI² - 10010607

AnyBus Configuration – 10010607 v1.20

PI – Standard for Motoman

Notes regarding representation of numbers and range of values

1) ALL numbers are UNSIGNED, 1 or 2 bytes (8 or 16 bits). Control bits can be accessed at bit level.
2) In case of 2 bytes, for example bytes 1&2, then MSB=Byte#2 and LSB=Byte#1
3) The values for each parameter have to be according to the welding machine in use: they will be ignored if out of range.

INPUT Bytes to RCI²		
Byte#	**Bit#**	**Name – Description – Example**
1 – 2	1 – 16	**Welding Current** Set the welding current. [Ampere*10] *Example 420A → 4200*
3 – 4	17 – 32	**Wire speed** Set the speed of wire for the CWF specified on selected welding program of PI. [mm/min] *Example: 1,5 m/min → 1500*
5 - 6	33 – 48	**Plasma Gas Flow Rate** Set the PLASMA gas flow rate. [Litres/min*100] *Example: 4,5 Litres/min → 450*
7	49 – 56	**Programme number.** Select program #1 - #Max by value. Maximum number depends from the machine in use. *By setting #0 the program can be selected directly on the Panel of machine or remote.* Example: Program no = #21 → 21
8	57 – 64	**Fast pulsation mode** Possibility to enable the Fast Pulsation and select its characteristics #0 = Fast Pulse Mode is Off #1 = Fast pulse Mode is On #4 = Fast pulse Mode is On - Synergic (Pulse frequency depends from the level of current) Example: Fast Pulse enabled → 1 (most common Fast pulse mode used is #1)
9	65 – 72	**Process selection** 0 = Tig DC 1 = Tig AC 2 = MMA DC 3 = MMA AC 4 = Plasma DC Example: Welding Process Plasma DC → 4
10	73 – 80	**Reserved for future use**
11	81 – 88	**Reserved for future use**
12	89 - 96	**Reserved for future use**

Program change and current setting from RCI² - 10010607

AnyBus Configuration – 10010607 v1.20

PI – Standard for Motoman

INPUT Bytes to RCI²		
Byte#	**Bit#**	**Name – Description – Example**
13 – 14	97 – 112	**Control Bits** Bit #97 – Quick-Stop (1 = stops the welding process) Bit #98 – E-box Key Lock (1 = lock the box to prevent changes of parameters) Bit #99 – Arc Start (trigger for Welding Arc) Bit #100 – Start Pilot Arc (trigger for Pilot Arc). Plasma gas must be purged manually prior to starting Pilot arc. (Set Plasma gas value in byte 5&6, and purge Plasma gas Bit #80 Bit #101 – (not used) Bit #102 – (not used) Bit #103 – Shield Gas Purge Bit #104 – Plasma Gas Purge (Interlock - Gas) Bit #105 – Slow Pulse Enable Bit #106 – Liftig Bit #107 – Touch Sense Bit #108 – (not used) Bit #109 – (not used) Bit #110 – (not used) Bit #111 – (not used) Bit #112 – Tack Welding Enable
15	113 – 120	**Control Bits (Control of CWF)** Bit #113 – Wire Hold/Pause Bit #114 – Wire Inch + Bit #115 – Wire Inch - Bit #116 – Disable Pulse Wire Bit #117 – (not used) Bit #118 – (not used) Bit #119 – (not used) Bit #120 – (not used)
16	121 – 128	**Control Bits** Bit 121 – Reset Error – To clear pending errors on the machine, Cold wire feeder or interface … Bit #122 - #128 (not used)
17-18	129 – 144	**Reserved for future use**

Program change and current setting from RCI² - 10010607

AnyBus Configuration – 10010607 v1.20

PI – Standard for Motoman

OUTPUT BYTES from RCI²		
Byte#	**Bit#**	**Name – Description – Example**
1 – 2	1 – 16	**Actual Welding Voltage – for AVC** Returns the arc voltage when current is slow pulsating: indicated for AVC [1 unit = 0,1Volt] Example: 325 → 32,5Volts
3 – 4	17 – 32	**Actual Welding Current** Returns the value of Welding Current [1 unit = 0,1Amp] Example: 1900 → 190,0 Amp
5 – 6	33 – 48	**Actual Shield Gas flow rate** Returns the SHIELD gas flow rate. [Litres/min*100] Example: 600 → 6,0 Litres/min
7 – 8	49 – 64	**Actual Plasma gas flow** Returns the PLASMA gas flow rate. [Litres/min*100] Example: 450 → 4,5 Litres/min
9 – 10	65 – 80	**Actual Wire speed** Returns the speed of wire for the CWF in use on Pi. [mm/min] Example: 2500 → 2,5m/min
11	81 – 88	**Reserved for system**
12	89 – 96	**Actual program number selected** Returns the welding program number in use on machine Example: 21 → Program #21
13	97 – 104	**Status bits** Bit #97 – Arc Detect. ON when Arc is established Bit #98 – (not used) Bit #99 – Touch Sense. ON when the Touch Sense input is on, and the electrode is touching the work piece Bit #100 – Stick Control. ON when the electrode is touching the work piece. Bit #101 – Pilot Arc Detect. ON when Pilot Arc is established. Bit #102 – Process Active. Machine is welding, or purging shield gas. Bit #103 – Shield Gas Fault. There is an error in flow of the Shield gas. Bit #104 – Plasma Gas Fault. There is an error in the flow of the Plasma gas.
14	105 - 112	**Status bits** Bit #105 – Machine Ready. Machine is ready to weld. … Bit #106 - #112 – (not used)

Sigma Galaxy - Welding program selection and analog input - 10010201

Analog Configuration – 10010201 v1.0

Sigma Galaxy – Welding program selection and analog input

DIGITAL INPUTS (JMP1=Active-HIGH)				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Active**
1 / m	DIN15	!Quick-Stop	**Emergency stop** *When input is H the machine can operate.* *When input is L the welding will stop instantly without slope down and the machine cannot start welding.*	L

12 / W
14 / V
	DIN4
	DIN2
		Wirefeeder-Bit0
		Wirefeeder-Bit1
			Wirefeeder Selection
			Select wirefeeder based on inputs combination:
			`(Bit1)LL(Bit0)` → `Internal wirefeeder`
			`(Bit1)LH(Bit0)` → `Wirefeeder 2`
			`(Bit1)HL(Bit0)` → `Wirefeeder 1`
			`(Bit1)HH(Bit0)` → `Internal wirefeeder`
				xx

4 / N
5 / P
2 / n
7 / C
8 / D
9 / G
10 / H
	DIN12
	DIN11
	DIN14
	DIN9
	DIN8
	DIN7
	DIN6
		Program-Bit6
		Program-Bit5
		Program-Bit4
		Program-Bit3
		Program-Bit2
		Program-Bit1
		Program-Bit0
			Welding Program Selection
			Select program number based on inputs combination:
			`(Bit6)LLLLLLL(Bit0)` → `Selected from machine`
			`(Bit6)LLLLLLH(Bit0)` → `Select program #1`
			`(Bit6)LLLLLHL(Bit0)` → `Select program #2`
			`(Bit6)LLLLLHH(Bit0)` → `Select program #3`
			…
			`(Bit6)HHHHHHH(Bit0)` → `Select program #127`
			Program cannot be set from interface, if the machine is in job mode.
				xxxxx
				xx

6 / T	DIN10	Tack	**Tack Mode On/Off** *Set this input H to activate tack. When this input has been activated once, tack mode is controlled from the interface, and cannot be controlled from the welding machine.*	H
3 / Z	DIN13	Duo Plus	**Duo Plus Mode On/Off** *Set this input H to activate duo plus. When this input has been activated once, duo plus mode is controlled from the interface, and cannot be controlled from the welding machine.* *Duo plus mode cannot be set from interface, if machine is in job mode.*	H
11 / X	DIN5	Pulse	**Pulse Mode On/Off** *Set this input H to activate pulse. When this input has been activated once, pulse mode is controlled from the interface, and cannot be controlled from the welding machine.* *Pulse mode cannot be set from interface, if machine is in job mode.*	H
13 / U	DIN3	Wire Inch	**Wire Inch On/Off** *Set this input H to activate wire inching.*	H
15 / S	DIN1	Gas Test	**Start Gas Test** *Set this input H to start gas test.*	H
16 / R	DIN0	Arc Trigger	**Start Welding Arc** *When input is H welding is started (other tasks as wire-inch, gas purge etc. are aborted).* *If Quick-Stop is active arc is not started.*	H

Sigma Galaxy - Welding program selection and analog input - 10010201

Analog Configuration – 10010201 v1.0

Sigma Galaxy – Welding program selection and analog input

DIGITAL OUTPUTS (JMP3=Active-HIGH)				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Active**
17 / d	DOUT0	Arc-Detect	**Arc-Detect Status** *Output is H when welding arc is present.*	H
18 / j	DOUT1	Pulse	**Pulse Status** *Output is H when pulse is activated.*	H
19 / k	DOUT2	Duo Plus	**Duo Plus Status** *Output is H when duo plus is activated.*	H
20 / h	DOUT3	!Error	**Global Error Status** *Output is H when status is OK.* *Output is L when some errors are active (interface, machine or feeder).*	L
21 / e	DOUT4			

ANALOG INPUTS				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Range**
25 / E	AIN0	Welding Current(+)	**Set Welding Current / Wire Inch Speed** *Control welding current in real-time. Welding current cannot be controlled from interface, if machine is in job mode. This input is scaled with the maximum power module size. For 500A power source this means:* *0V → 0A ; 5V → 250A ; 10V → 500A* *For 400A power source:* *0V → 0A ; 5V → 200A ; 10V → 400A* *If wire inch is active, this input controls the wire inch speed:* *0V → 0m/min ; 10V → maximum wirespeed of the selected wirefeeder.*	0-10V
26 / F		Welding Current(-)		
27 / A	AIN1	Welding Voltage Trim(+)	**Set Welding Voltage Trim** *Control welding voltage trim in real-time. Voltage trim cannot be controlled from interface, if machine is in job mode:* *0V → -9.9V ; 5V → 0V ; 10V → +9.9V*	0-10V
28 / B		Welding Voltage Trim(-)		
29 / f	AIN2			
30 / g				

ANALOG OUTPUTS				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Range**
31 / L	AOUT0	Measured Current(+)	**Read Measured Welding Current** *Measure welding current in real-time:* *0V → 0A ; 10V → 1000A*	0-10V
32 / M		Measured Current(-)		
33 / J	AOUT1	Measured Voltage(+)	**Read Measured Welding Voltage** *Measure welding voltage in real-time:* *0V → 0V ; 10V → 100V*	0-10V
34 / K		Measured Voltage(-)		

Sigma Galaxy – Sequence selection and analog input - 10010202

Analog Configuration – 10010202 v1.0

Sigma Galaxy – Sequence selection and analog input

DIGITAL INPUTS (JMP1=Active-HIGH)				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Active**
1 / m	DIN15	!Quick-Stop	**Emergency stop** *When input is H the machine can operate.* *When input is L the welding will stop instantly without slope down and the machine cannot start welding.*	L
12 / W	DIN4	Wirefeeder-Bit0	**Wirefeeder Selection** *Select wirefeeder based on inputs combination:* *(Bit1)LL(Bit0) → Internal wirefeeder* *(Bit1)LH(Bit0) → Wirefeeder 2* *(Bit1)HL(Bit0) → Wirefeeder 1* *(Bit1)HH(Bit0) → Internal wirefeeder*	xx
14 / V	DIN2	Wirefeeder-Bit1		
4 / N	DIN12	-	**Sequence Selection** *Select sequence number based on inputs combination:* *(Bit3)LLLL(Bit0) → Normal (not sequence) mode* *(Bit3)LLLH(Bit0) → Select sequence #1* *(Bit3)LLHL(Bit0) → Select sequence #2* *(Bit3)LLHH(Bit0) → Select sequence #3* *…* *(Bit3)HLLH(Bit0) → Select sequence #9* *When this input has activated sequence mode, sequences are controlled from the interface, and cannot be controlled from the welding machine.*	xxxx
5 / P	DIN11	-		
2 / n	DIN14	-		
7 / C	DIN9	Sequence-Bit3		
8 / D	DIN8	Sequence-Bit2		
9 / G	DIN7	Sequence-Bit1		
10 / H	DIN6	Sequence-Bit0		
6 / T	DIN10	Tack	**Tack Mode On/Off** *Set this input H to activate tack. When this input has been activated once, tack mode is controlled from the interface, and cannot be controlled from the welding machine.*	H
3 / Z	DIN13	Duo Plus	**Duo Plus Mode On/Off** *Set this input H to activate duo plus. When this input has been activated once, duo plus mode is controlled from the interface, and cannot be controlled from the welding machine.* *Duo plus mode cannot be set from interface, if machine is in job mode.*	H
11 / X	DIN5	Pulse	**Pulse Mode On/Off** *Set this input H to activate pulse. When this input has been activated once, pulse mode is controlled from the interface, and cannot be controlled from the welding machine.* *Pulse mode cannot be set from interface, if machine is in job mode.*	H
13 / U	DIN3	Wire Inch	**Wire Inch On/Off** *Set this input H to activate wire inching.*	H
15 / S	DIN1	Gas Test	**Start Gas Test** *Set this input H to start gas test.*	H
16 / R	DIN0	Arc Trigger	**Start Welding Arc** *When input is H welding is started (other tasks as wire-inch, gas purge etc. are aborted).* *If Quick-Stop is active arc is not started.*	H

Sigma Galaxy – Sequence selection and analog input - 10010202

Analog Configuration – 10010202 v1.0

Sigma Galaxy – Sequence selection and analog input

DIGITAL OUTPUTS (JMP3=Active-HIGH)				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Active**
17 / d	DOUT0	Arc-Detect	**Arc-Detect Status** *Output is H when welding arc is present.*	H
18 / j	DOUT1	Pulse	**Pulse Status** *Output is H when pulse is activated.*	H
19 / k	DOUT2	Duo Plus	**Duo Plus Status** *Output is H when duo plus is activated.*	H
20 / h	DOUT3	!Error	**Global Error Status** *Output is H when status is OK.* *Output is L when some errors are active (interface, machine or feeder).*	L
21 / e	DOUT4			

ANALOG INPUTS				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Range**
25 / E	AIN0	Welding Current(+)	**Set Welding Current / Wire Inch Speed** *Control welding current in real-time. Welding current cannot be controlled from interface, if machine is in job mode. This input is scaled with the maximum power module size. For 500A power source this means:* *0V → 0A ; 5V → 250A ; 10V → 500A* *For 400A power source:* *0V → 0A ; 5V → 200A ; 10V → 400A* *If wire inch is active, this input controls the wire inch speed:* *0V → 0m/min ; 10V → maximum wirespeed of the selected wirefeeder.*	0-10V
26 / F		Welding Current(-)		
27 / A	AIN1	Welding Voltage Trim(+)	**Set Welding Voltage Trim** *Control welding voltage trim in real-time. Voltage trim cannot be controlled from interface, if machine is in job mode:* *0V → -9.9V ; 5V → 0V ; 10V → +9.9V*	0-10V
28 / B		Welding Voltage Trim(-)		
29 / f	AIN2			
30 / g				

ANALOG OUTPUTS				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Range**
31 / L	AOUT0	Measured Current(+)	**Read Measured Welding Current** *Measure welding current in real-time:* *0V → 0A ; 10V → 1000A*	0-10V
32 / M		Measured Current(-)		
33 / J	AOUT1	Measured Voltage(+)	**Read Measured Welding Voltage** *Measure welding voltage in real-time:* *0V → 0V ; 10V → 100V*	0-10V
34 / K		Measured Voltage(-)		

Sigma Galaxy – Welding program selection from RCI² and current/voltage settings from control box - 10010203

Analog Configuration – 10010203 v1.0

Sigma Galaxy – Welding program selection

DIGITAL INPUTS (JMP1=Active-HIGH)				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Active**
1 / m	DIN15	!Quick-Stop	**Emergency stop** *When input is H the machine can operate.* *When input is L the welding will stop instantly without slope down and the machine cannot start welding.*	L

12 / W	DIN4	Wirefeeder-Bit0	**Wirefeeder Selection**
			Select wirefeeder based on inputs combination:
			`(Bit1)LL(Bit0)` → `Internal wirefeeder`
			`(Bit1)LH(Bit0)` → `Wirefeeder 2`
			`(Bit1)HL(Bit0)` → `Wirefeeder 1`
			`(Bit1)HH(Bit0)` → `Internal wirefeeder`
				xx

14 / V	DIN2	Wirefeeder-Bit1		

4 / N	DIN12	Program-Bit6	**Welding Program Selection**
			Select program number based on inputs combination:
			`(Bit6)LLLLLLL(Bit0)` → `Selected from machine`
			`(Bit6)LLLLLLH(Bit0)` → `Select program #1`
			`(Bit6)LLLLLHL(Bit0)` → `Select program #2`
			`(Bit6)LLLLLHH(Bit0)` → `Select program #3`
			…
			`(Bit6)HHHHHHH(Bit0)` → `Select program #127`
			Program cannot be set from interface, if the machine is in job mode.
				xxxxx
				xx

5 / P	DIN11	Program-Bit5		
2 / n	DIN14	Program-Bit4		
7 / C	DIN9	Program-Bit3		
8 / D	DIN8	Program-Bit2		
9 / G	DIN7	Program-Bit1		
10 / H	DIN6	Program-Bit0		
6 / T	DIN10	Tack	**Tack Mode On/Off** *Set this input H to activate tack. When this input has been activated once, tack mode is controlled from the interface, and cannot be controlled from the welding machine.*	H
3 / Z	DIN13	Duo Plus	**Duo Plus Mode On/Off** *Set this input H to activate duo plus. When this input has been activated once, duo plus mode is controlled from the interface, and cannot be controlled from the welding machine.* *Duo plus mode cannot be set from interface, if machine is in job mode.*	H
11 / X	DIN5	Pulse	**Pulse Mode On/Off** *Set this input H to activate pulse. When this input has been activated once, pulse mode is controlled from the interface, and cannot be controlled from the welding machine.* *Pulse mode cannot be set from interface, if machine is in job mode.*	H
13 / U	DIN3	Wire Inch	**Wire Inch On/Off** *Set this input H to activate wire inching.*	H
15 / S	DIN1	Gas Test	**Start Gas Test** *Set this input H to start gas test.*	H
16 / R	DIN0	Arc Trigger	**Start Welding Arc** *When input is H welding is started (other tasks as wire-inch, gas purge etc. are aborted).* *If Quick-Stop is active arc is not started.*	H

Sigma Galaxy – Welding program selection from RCI² and current/voltage settings from control box - 10010203

Analog Configuration – 10010203 v1.0

Sigma Galaxy – Welding program selection

DIGITAL OUTPUTS (JMP3=Active-HIGH)				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Active**
17 / d	DOUT0	Arc-Detect	**Arc-Detect Status** *Output is H when welding arc is present.*	H
18 / j	DOUT1	Pulse	**Pulse Status** *Output is H when pulse is activated.*	H
19 / k	DOUT2	Duo Plus	**Duo Plus Status** *Output is H when duo plus is activated.*	H
20 / h	DOUT3	!Error	**Global Error Status** *Output is H when status is OK.* *Output is L when some errors are active (interface, machine or feeder).*	L
21 / e	DOUT4			

ANALOG INPUTS				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Range**
25 / E	AIN0			
26 / F				
27 / A	AIN1			
28 / B				
29 / f	AIN2			
30 / g				

ANALOG OUTPUTS				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Range**
31 / L	AOUT0	Measured Current(+)	**Read Measured Welding Current** *Measure welding current in real-time:* *0V → 0A ; 10V → 1000A*	0-10V
32 / M		Measured Current(-)		
33 / J	AOUT1	Measured Voltage(+)	**Read Measured Welding Voltage** *Measure welding voltage in real-time:* *0V → 0V ; 10V → 100V*	0-10V
34 / K		Measured Voltage(-)		

Sigma Galaxy – Sequence selection from RCI² and current/voltage selection from control box - 10010204

Analog Configuration – 10010204 v1.0

Sigma Galaxy – Sequence selection

DIGITAL INPUTS (JMP1=Active-HIGH)				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Active**
1 / m	DIN15	!Quick-Stop	**Emergency stop** *When input is H the machine can operate.* *When input is L the welding will stop instantly without slope down and the machine cannot start welding.*	L
12 / W 14 / V	DIN4 DIN2	Wirefeeder-Bit0 Wirefeeder-Bit1	**Wirefeeder Selection** *Select wirefeeder based on inputs combination:* *(Bit1)LL(Bit0) → Internal wirefeeder* *(Bit1)LH(Bit0) → Wirefeeder 2* *(Bit1)HL(Bit0) → Wirefeeder 1* *(Bit1)HH(Bit0) → Internal wirefeeder*	xx
4 / N 5 / P 2 / n 7 / C 8 / D 9 / G 10 / H	DIN12 DIN11 DIN14 DIN9 DIN8 DIN7 DIN6	- - - Sequence-Bit3 Sequence-Bit2 Sequence-Bit1 Sequence-Bit0	**Sequence Selection** *Select sequence number based on inputs combination:* *(Bit3)LLLL(Bit0) → Normal (not sequence) mode* *(Bit3)LLLH(Bit0) → Select sequence #1* *(Bit3)LLHL(Bit0) → Select sequence #2* *(Bit3)LLHH(Bit0) → Select sequence #3* *…* *(Bit3)HLLH(Bit0) → Select sequence #9* *When this input has activated sequence mode, sequences are controlled from the interface, and cannot be controlled from the welding machine.*	xxxx
6 / T	DIN10	Tack	**Tack Mode On/Off** *Set this input H to activate tack. When this input has been activated once, tack mode is controlled from the interface, and cannot be controlled from the welding machine.*	H
3 / Z	DIN13	Duo Plus	**Duo Plus Mode On/Off** *Set this input H to activate duo plus. When this input has been activated once, duo plus mode is controlled from the interface, and cannot be controlled from the welding machine.* *Duo plus mode cannot be set from interface, if machine is in job mode.*	H
11 / X	DIN5	Pulse	**Pulse Mode On/Off** *Set this input H to activate pulse. When this input has been activated once, pulse mode is controlled from the interface, and cannot be controlled from the welding machine.* *Pulse mode cannot be set from interface, if machine is in job mode.*	H
13 / U	DIN3	Wire Inch	**Wire Inch On/Off** *Set this input H to activate wire inching.*	H
15 / S	DIN1	Gas Test	**Start Gas Test** *Set this input H to start gas test.*	H
16 / R	DIN0	Arc Trigger	**Start Welding Arc** *When input is H welding is started (other tasks as wire-inch, gas purge etc. are aborted).* *If Quick-Stop is active arc is not started.*	H

Sigma Galaxy – Sequence selection from RCI² and current/voltage selection from control box - 10010204

Analog Configuration – 10010204 v1.0

Sigma Galaxy – Sequence selection

DIGITAL OUTPUTS (JMP3=Active-HIGH)				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Active**
17 / d	DOUT0	Arc-Detect	**Arc-Detect Status** *Output is H when welding arc is present.*	H
18 / j	DOUT1	Pulse	**Pulse Status** *Output is H when pulse is activated.*	H
19 / k	DOUT2	Duo Plus	**Duo Plus Status** *Output is H when duo plus is activated.*	H
20 / h	DOUT3	!Error	**Global Error Status** *Output is H when status is OK.* *Output is L when some errors are active (interface, machine or feeder).*	L
21 / e	DOUT4			

ANALOG INPUTS				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Range**
25 / E	AIN0			
26 / F				
27 / A	AIN1			
28 / B				
29 / f	AIN2			
30 / g				

ANALOG OUTPUTS				
Pin# / Military Plug	**Symbol**	**Name**	**Description**	**Range**
31 / L	AOUT0	Measured Current(+)	**Read Measured Welding Current** *Measure welding current in real-time:* *0V → 0A ; 10V → 1000A*	0-10V
32 / M		Measured Current(-)		
33 / J	AOUT1	Measured Voltage(+)	**Read Measured Welding Voltage** *Measure welding voltage in real-time:* *0V → 0V ; 10V → 100V*	0-10V
34 / K		Measured Voltage(-)		

Sigma Galaxy - 10010205

AnyBus Configuration – 10010205 v1.02

Sigma – Standard

Notes regarding representation of numbers and range of values

1) ALL numbers are UNSIGNED, 1 or 2 bytes (8 or 16 bits). Control bits can be accessed at bit level.
2) The values for each parameter have to be according to the welding machine in use: they will be ignored if out of range.

INPUT BYTES to RCI[2]		
Byte#	**Bit#**	**Name – Description – Example**
1 – 2	1 - 16	**Set Welding Voltage Trim** *Set the value of the welding voltage trim [V*50 + 500].* *Example: 400 → -2.0V; 500 → 0.0V; 860 → +7.2V* *Welding voltage trim cannot be controlled from interface, if machine is in job mode.* *Range: 0 – 100 = -9.9 to +9.9V*
3 - 4	17 – 32	**Set Welding Current** *Set the value of the welding current [A*10].* *Example: 0 → 0A; 500 → 50A; 3620 → 362A* *Welding current cannot be controlled from interface, if machine is in job mode.* *Range: 0A to Imax for the actual programme*
5 - 6	33 – 48	**Set Wire Inch Speed** *Set the value of the wire inch speed [cm/min*10].* *Example: 5 → 0.5cm/min; 125 → 12.5cm/min* *Minimum inch speed is 0.5cm/min.* *Range: 0 to 30m/Min*
7 - 8	49 – 64	**Job Number Index** *Set the job number index* *#0 = Normal mode (not job mode)* *#1 - #255 = Selecting job with index number #xxx* *Example: 3 → job index 3* *If an index with no associated job is chosen, the welding machine will show an error (E29-05). Selecting a valid index will clear this error.* *Range: 1 to 255*
9 - 10	65 - 80	**Welding Program** *Set the welding program* *#005 - #999 = Selecting welding program Pxxx* *Example: 112 → P112* *If a non-existent or non-licensed welding program is chosen, the welding machine will show an error (E07-14). Selecting a valid program will clear this error.* *Welding program cannot be controlled from interface, if machine is in job mode.* *Range: Please look at the program table for the actual machine*
11 - 12	81 – 96	**Sequence Number** *Set sequence* *#0 = Sequence mode not selected* *#01 - #99 = Selecting sequence number #xx* *Example: 3 → sequence 3* *Range: If not running in job mode it is only possible to select up to 9 sequences.* *If running in job mode, the maximum number of sequences is defined in the job (up to 99).* *If a non-valid sequence is chosen, the welding machine will show an error (E07-13). Selecting a valid sequence will clear this error.*
13 - 14	97 – 112	**Wire feeder** *Select wire feeder* *#0 = Internal wire feeder* *#xx = External wire feeder xx. At the moment only #1 and #2 are valid feeders.* *If a second feeder is present, it must be set as No #2 with a jumper inside the feeder.* *Example: 1 → wire feeder 1. External Wire feeders are standard delivered as No#1.* *If a non-existing wire feeder is chosen, the welding machine will show an error (E07-03). Selecting a valid program will clear this error.*

Sigma Galaxy - 10010205

AnyBus Configuration – 10010205 v1.02

Sigma – Standard

INPUT BYTES to RCI[2]		
Byte#	**Bit#**	**Name – Description – Example**
15	113 – 120	**Control bits** *Bit #113* ***Quick-Stop:*** *If ON, it is not possible to start welding. If set ON during welding, the welding is stopped immediately, and the welding machine will show an error (E07-12).* *Bit #114* ***Lock Panel:*** *If ON, the panel on the welding machine is locked, and the robot interface controls all settings. When OFF settings (pulse on/off, welding current, sequence, etc.) can be done on both robot interface and welding machine panel. The value of a specific parameter will be the last incoming set value. When this bit is changed from OFF to ON, all settings will be according to the robot interface.* *Bit #115* ***Arc Start:*** *If ON the welding machine starts welding (if 'Quick-Stop' is OFF).* *Bit #116* ***Torch Cleaning:*** *If ON the welding machine opens the compressed air valve on the active wire feeder.* *Bit #117 not used* *Bit #118 not used* *Bit #119* ***Shield Gas Purge:*** *If ON the welding machine opens the gas valve on the active wire feeder. Can be overruled by 'Arc Start'.* *Bit #120 not used*
16	121 - 128	**Control bits** *Bit #121* ***Pulse Enable:*** *Set this input ON to enable pulse. Pulse can only be set if the active welding program supports pulse mode. Pulse mode cannot be set from interface, if machine is in job mode.* *Bit #122* ***Duo Plus Enable:*** *Set this input ON to enable duo plus. Duo plus mode cannot be set from interface, if machine is in job mode.* *Bit #123* ***Touch Sense Enable:*** *Set this input ON to enable touch sense. While touch sense is active, the welding machine can detect if the wire is touching the work piece. If a wire feeder RWF[2] is used, the welding machine can also detect if the gas cup is touching the work piece. Touch sense is disabled by setting this input OFF, or is automatically disabled after 60 seconds.* *Bit #124 not used* *Bit #125 not used* *Bit #126 not used* *Bit #127 not used* *Bit #128* ***Tack Welding Enable:*** *Set this input ON to enable tack welding.*
17	129 - 136	**Control bits** *Bit #129 not used* *Bit #130* ***Wire Inch Forward:*** *Set this input ON to activate the wire drive and inch the wire forward. The speed is set from the robot interface with the 'Set Wire Inch Speed' command.* *Bit #131* ***Wire Inch Retract:*** *Set this input ON to activate the wire drive and retract the wire. The speed is set from the robot interface with the 'Set Wire Inch Speed' command. 'Wire Inch Retract' is not possible on all wire feeders. NOTE that the wire is only retracted in the wire feeder, it is NOT respooled.* *Bit #132 not used* *Bit #133 not used* *Bit #134 not used* *Bit #135 not used* *Bit #136 not used*
18	137 - 144	**Control bits** *Bit #137* ***Reset Error:*** *Set this input ON to reset the current active error.* *Bit #138 not used* *Bit #139 not used* *Bit #140 not used* *Bit #141 not used* *Bit #142 not used* *Bit #143 not used* *Bit #144 not used*

Sigma Galaxy - 10010205

AnyBus Configuration – 10010205 v1.02

Sigma – Standard

OUTPUT BYTES from RCI[2]		
Byte#	**Bit#**	**Name – Description – Example**
1 - 2	1 - 16	**Actual Welding Voltage** *Returns the measured value of arc voltage [V*10].* *Example: 325 → 32.5 V*
3 – 4	17 – 32	**Actual Welding Current** *Returns the measured value of welding current [A*10].* *Example: 1900 → 190.0 Amp*
5 – 6	33 – 48	**Actual Gas Flow** *Returns the measured value of the gas flow [litres/min*10].* *Example: 113 → 11.3 litres/min*
7 – 8	49 – 64	**Actual Wire Speed** *Returns the measured value of the wire speed [m/min*10].* *Example: 62 → 6.2 m/min*
9 – 10	65 – 80	**Error Code** *Returns the error of the welding machine.* *Low Byte= Error Module ; High Byte= Error Code* *Example1: #9=00 and #10=00 → E00-00 = No faults* *Example2: #9=01 and #10=04 → E01-04 = Gas pressure too low* *Error codes can be found in the manual for the machine*
11 – 12	81 - 96	**Actual Job Index** *Returns the index of the job in use on the machine.* *Example1: 0 → Machine running in normal mode, or the actual job has no index assigned* *Example2: 5 → Job with index 5 is chosen* *Note: Job index must be set up at the Welding Machine before use*
13 – 14	97 – 112	**Actual Welding Program Number** *Returns the welding program number in use on machine.* *Example: 113 → Program P113 is selected*
15 – 16	113 – 128	**Actual Sequence Number** *Returns the sequence number in use on machine.* *Example1: 0 → Machine is not running in sequence mode* *Example2: 5 → Sequence 5 is selected*
17 – 18	129 – 144	**Actual Wire Feeder** *Returns the active wire feeder in use on machine* *Example1: 0 → Internal wire feeder is active* *Example2: 1 → Wire feeder #1 is active*
19	145 - 152	**Status bits** *Bit #145* ***Arc Detect:*** *Bit #146* *not used* *Bit #147* ***Touch Sense:*** *If touch sense is active this status reflects if the wire (or for RWF² also the gas cup) has contact with the work piece. If status is ON there is contact.* *Bit #148* ***Wire Stick:*** *After each welding, wire stick detection is activated automatically. If the wire is sticking (touching the work piece) this output will be high. Wire stick will automatically disable, when the wire is not sticking anymore.* *Bit #149* ***Pulse Enabled:*** *Reflects the pulse mode status of the welding machine.* *Bit #150* ***Duo Plus Enabled:*** *Reflects the duo plus mode status of the welding machine.* *Bit #151* ***Gas Fault:*** *If the welding machine has a gas fault, this status will be ON.* *Bit #152* ***Water Cooler:*** *Reflects the status of the internal water cooler of the welding machine. If ON the water cooler is running. Can be used to turn on an external water cooler.*
20	153 - 160	**Status bits** *Bit #153* **Machine Ready***: Reflects the status of the welding machine. When ON the welding machine will be ready to weld. If the welding machine has an error, this status will be set to OFF.* *Bit #154 - #160* *not used*

Sigma Galaxy - 10010206

AnyBus Configuration – 10010206 v1.00

Sigma Galaxy – Standard for Motoman

Notes regarding representation of numbers and range of values

1) ALL numbers are UNSIGNED, 1 or 2 bytes (8 or 16 bits). Control bits can be accessed at bit level.
2) The values for each parameter have to be according to the welding machine in use: they will be ignored if out of range.

INPUT BYTES to RCI[2]		
Byte#	**Bit#**	**Name – Description – Example**
1 – 2	1 - 16	**Set Welding Voltage Trim** *Set the value of the welding voltage trim [V*50 + 500].* *Example: 400 → -2.0V; 500 → 0.0V; 860 → +7.2V* *Welding voltage trim cannot be controlled from interface, if machine is in job mode.* *Range: 0 – 100 = -9.9 to +9.9V*
3 - 4	17 – 32	**Set Welding Current** *Set the value of the welding current [A*10].* *Example: 0 → 0A; 500 → 50A; 3620 → 362A* *Welding current cannot be controlled from interface, if machine is in job mode.* *Range: 0A to Imax for the actual programme*
5 - 6	33 – 48	**Set Wire Inch Speed** *Set the value of the wire inch speed [cm/min*10].* *Example: 5 → 0.5cm/min; 125 → 12.5cm/min* *Minimum inch speed is 0.5cm/min.* *Range: 0 to 30m/Min*
7 - 8	49 – 64	**Job Number Index** *Set the job number index* *#0 = Normal mode (not job mode)* *#1 - #255 = Selecting job with index number #xxx* *Example: 3 → job index 3* *If an index with no associated job is chosen, the welding machine will show an error (E29-05). Selecting a valid index will clear this error.* *Range: 1 to 255*
9 - 10	65 - 80	**Welding Program** *Set the welding program* *#005 - #999 = Selecting welding program Pxxx* *Example: 112 → P112* *If a non-existent or non-licensed welding program is chosen, the welding machine will show an error (E07-14). Selecting a valid program will clear this error.* *Welding program cannot be controlled from interface, if machine is in job mode.* *Range: Please look at the program table for the actual machine*
11 - 12	81 – 96	**Sequence Number** *Set sequence* *#0 = Sequence mode not selected* *#01 - #99 = Selecting sequence number #xx* *Example: 3 → sequence 3* *Range: If not running in job mode it is only possible to select up to 9 sequences.* *If running in job mode, the maximum number of sequences is defined in the job (up to 99).* *If a non-valid sequence is chosen, the welding machine will show an error (E07-13). Selecting a valid sequence will clear this error.*

Sigma Galaxy - 10010206

AnyBus Configuration – 10010206 v1.00

Sigma Galaxy – Standard for Motoman

INPUT BYTES to RCI[2]		
Byte#	**Bit#**	**Name – Description – Example**
13	97 – 104	**Control bits** *Bit #97* ***Quick-Stop:*** *If ON, it is not possible to start welding. If set ON during welding, the welding is stopped immediately, and the welding machine will show an error (E07-12).* *Bit #98* ***Lock Panel:*** *If ON, the panel on the welding machine is locked, and the robot interface controls all settings. When OFF settings (pulse on/off, welding current, sequence, etc.) can be done on both robot interface and welding machine panel. The value of a specific parameter will be the last incoming set value. When this bit is changed from OFF to ON, all settings will be according to the robot interface.* *Bit #99* ***Arc Start:*** *If ON the welding machine starts welding (if 'Quick-Stop' is OFF).* *Bit #100* ***Torch Cleaning:*** *If ON the welding machine opens the compressed air valve on the active wire feeder.* *Bit #101* *not used* *Bit #102* *not used* *Bit #103* ***Shield Gas Purge:*** *If ON the welding machine opens the gas valve on the active wire feeder. Can be overruled by 'Arc Start'.* *Bit #104* *not used*
14	105 – 112	**Control bits** *Bit #105* ***Pulse Enable:*** *Set this input ON to enable pulse. Pulse can only be set if the active welding program supports pulse mode. Pulse mode cannot be set from interface, if machine is in job mode.* *Bit #106* ***Duo Plus Enable:*** *Set this input ON to enable duo plus. Duo plus mode cannot be set from interface, if machine is in job mode.* *Bit #107* ***Touch Sense Enable:*** *Set this input ON to enable touch sense. While touch sense is active, the welding machine can detect if the wire is touching the work piece. If a wire feeder RWF[2] is used, the welding machine can also detect if the gas cup is touching the work piece. Touch sense is disabled by setting this input OFF, or is automatically disabled after 60 seconds.* *Bit #108* *not used* *Bit #109* *not used* *Bit #110* *not used* *Bit #111* *not used* *Bit #112* ***Tack Welding Enable:*** *Set this input ON to enable tack welding.*
15	113 – 120	**Control bits** *Bit #113* *not used* *Bit #114* ***Wire Inch Forward:*** *Set this input ON to activate the wire drive and inch the wire forward. The speed is set from the robot interface with the 'Set Wire Inch Speed' command.* *Bit #115* ***Wire Inch Retract:*** *Set this input ON to activate the wire drive and retract the wire. The speed is set from the robot interface with the 'Set Wire Inch Speed' command. 'Wire Inch Retract' is not possible on all wire feeders. NOTE that the wire is only retracted in the wire feeder, it is NOT respooled.* *Bit #116* *not used* *Bit #117* *not used* *Bit #118* *not used* *Bit #119* *not used* *Bit #120* *not used*
16	121 – 128	**Control bits** *Bit #121* ***Reset Error:*** *Set this input ON to reset the current active error.* *Bit #122 - 128* *not used*

Sigma Galaxy - 10010206

AnyBus Configuration – 10010206 v1.00

Sigma Galaxy – Standard for Motoman

17 - 18	129 - 144	**Wire feeder** *Select wire feeder* *#0 = Internal wire feeder* *#xx = External wire feeder xx. At the moment only #1 and #2 are valid feeders.* *If a second feeder is present, it must be set as No #2 with a jumper inside the feeder.* *Example: 1 → wire feeder 1. External Wire feeders are standard delivered as No#1.* *If a non-existing wire feeder is chosen, the welding machine will show an error (E07-03). Selecting a valid program will clear this error.*

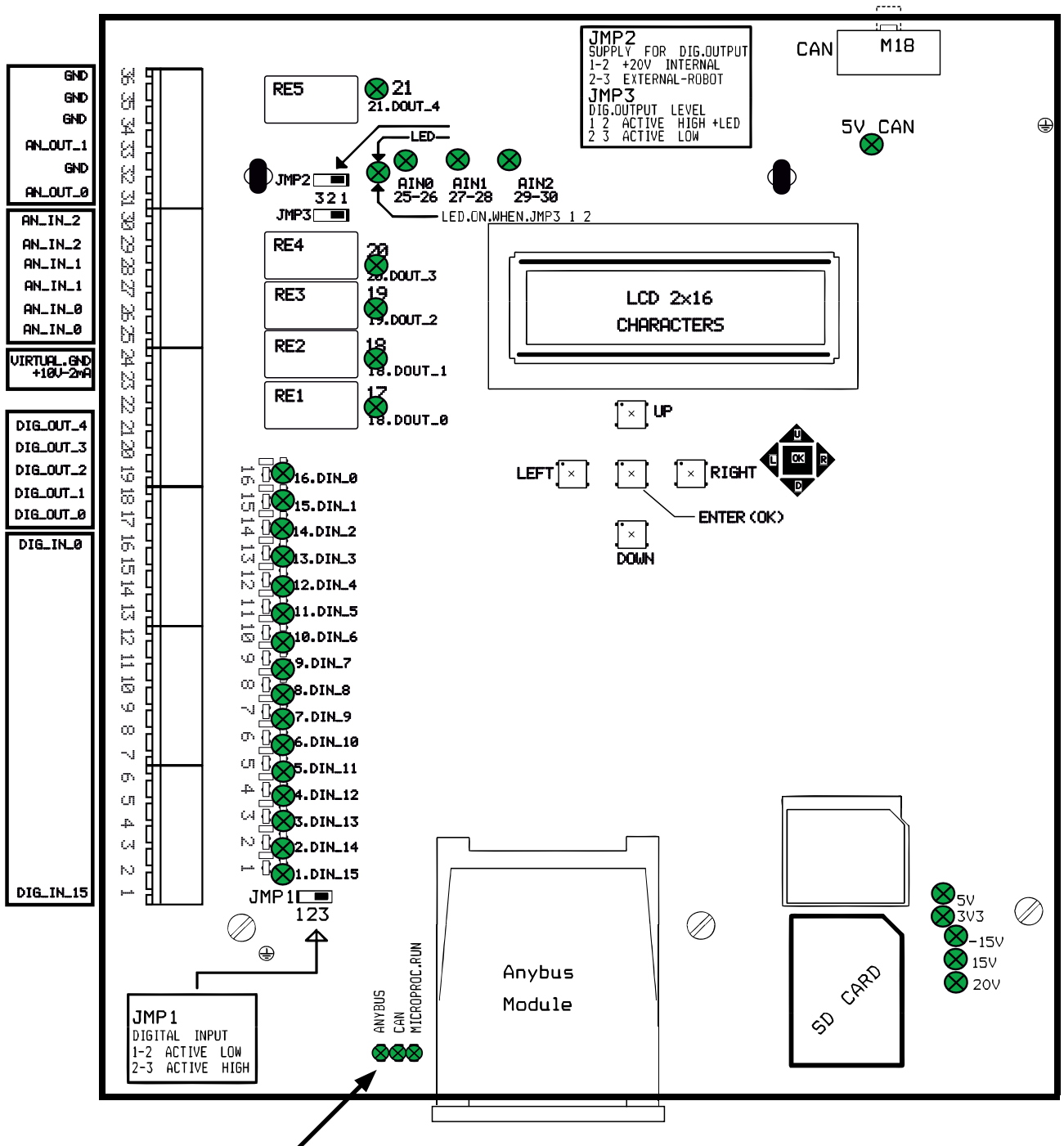
Sigma Galaxy - 10010206

AnyBus Configuration – 10010206 v1.00

Sigma Galaxy – Standard for Motoman

OUTPUT BYTES from RCI[2]		
Byte#	**Bit#**	**Name – Description – Example**
1 - 2	1 - 16	**Actual Welding Voltage** *Returns the measured value of arc voltage [V*10].* *Example: 325 → 32.5 V*
3 – 4	17 – 32	**Actual Welding Current** *Returns the measured value of welding current [A*10].* *Example: 1900 → 190.0 Amp*
5 – 6	33 – 48	**Actual Gas Flow** *Returns the measured value of the gas flow [litres/min*10].* *Example: 113 → 11.3 litres/min*
7 - 8	49 – 64	**Actual Job Index** *Returns the index of the job in use on the machine.* *Example1: 0 → Machine running in normal mode, or the actual job has no index assigned* *Example2: 5 → Job with index 5 is chosen* *Note: Job index must be set up at the Welding Machine before use*
9 – 10	65 – 80	**Actual Welding Program Number** *Returns the welding program number in use on machine.* *Example: 113 → Program P113 is selected*
11 – 12	81 - 96	**Actual Sequence Number** *Returns the sequence number in use on machine.* *Example1: 0 → Machine is not running in sequence mode* *Example2: 5 → Sequence 5 is selected*
13	97 – 104	**Status bits** *Bit #97* ***Arc Detect:*** *Bit #98* *not used* *Bit #99* ***Touch Sense:*** *If touch sense is active this status reflects if the wire (or for RWF² also the gas cup) has contact with the work piece. If status is ON there is contact.* *Bit #100* ***Wire Stick:*** *After each welding, wire stick detection is activated automatically. If the wire is sticking (touching the work piece) this output will be high. Wire stick will automatically disable, when the wire is not sticking anymore.* *Bit #101* ***Pulse Enabled:*** *Reflects the pulse mode status of the welding machine.* *Bit #102* ***Duo Plus Enabled:*** *Reflects the duo plus mode status of the welding machine.* *Bit #103* ***Gas Fault:*** *If the welding machine has a gas fault, this status will be ON.* *Bit #104* ***Water Cooler:*** *Reflects the status of the internal water cooler of the welding machine. If ON the water cooler is running. Can be used to turn on an external water cooler.*
14	105 – 112	**Status bits** *Bit #105* **Machine Ready***: Reflects the status of the welding machine. When ON the welding machine will be ready to weld. If the welding machine has an error, this status will be set to OFF.* *Bit #106 - #112* *not used*

Detailed Interface Layout



Anybus	Anybus communication activity
CAN	CAN bus communication activity
MICROPROC. RUN	Slow blinking = OK Fast blinking = General error. See error log

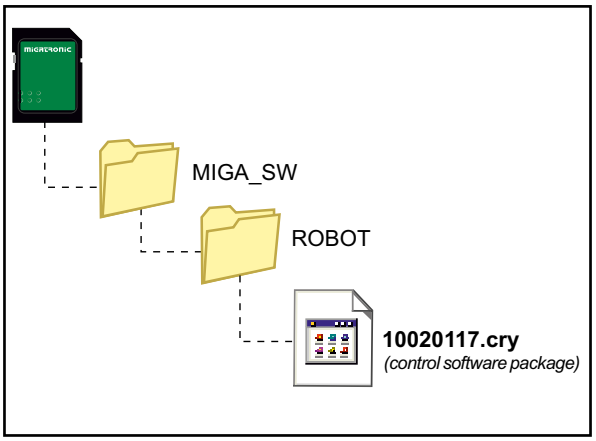
Software upgrade

The software of microprocessor that controls the whole interface can be upgraded via SD CARD.

Latest software can be downloaded under Product software at
www.migatronic.com/MY MIGATRONIC
Save the software on an SD card containing the folders and one or more of the files shown below.

To order empty SD card, use item no. 12646000.

Valid software for this Robot Interface is stored into the folder ROBOT.



Software reading

- Insert the SD card in the SD card reader.
- Turn on the welding machine.
- Wait until the display writes REMOVE SD CARD.
- Turn off the machine and remove the SD card
- The machine is now ready for use.
- Insert the Configuration SD cards again.

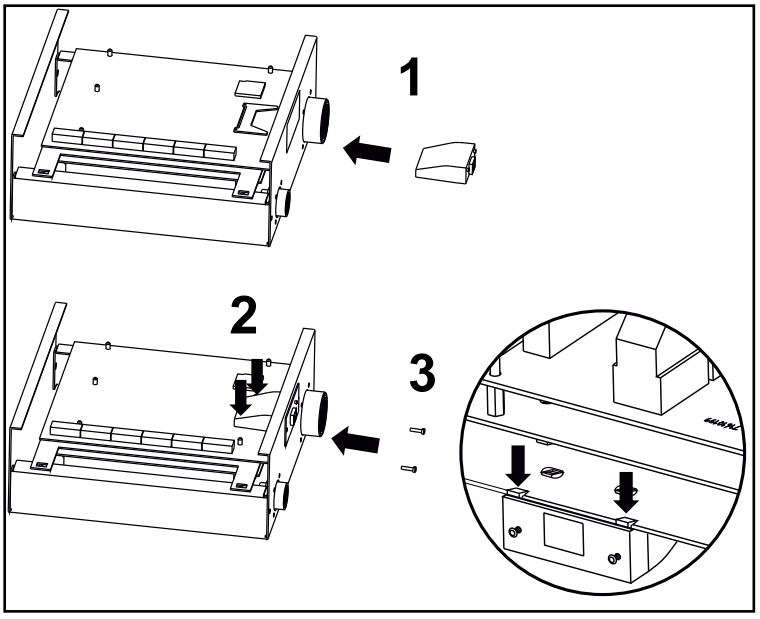
Note: This operation does not affect the global configuration of interface (no configuration parameters are lost).

Installing the Anybus module

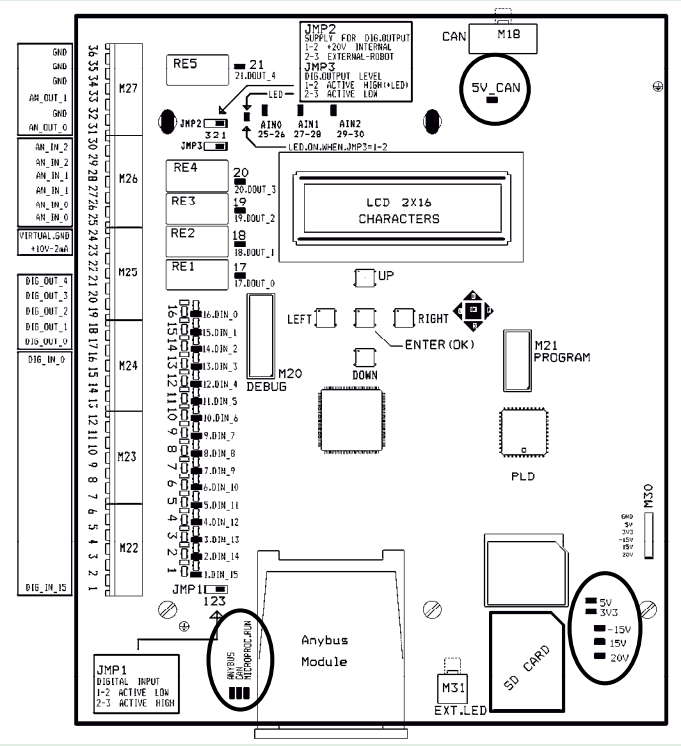
1. Important! Once you have installed the Anybus module, insert the plug straight into the hole.
2. Press the plug slightly into position.
3. Tighten the Anybus module using the screws.

NOTE:
DEFECTIVE CONNECTORS ARE NOT COVERED BY WARRANTY!!!

Setup of Fieldbus communication.
See page 11.



Troubleshooting

PROBLEM	SOLUTION
The welding current and voltage are instable	It is strongly recommended to keep the digital filter enabled, Analog Sens=Low. See Setup Menu – IOs Options. LOW IMMUNITY, filter disabled, faster response to input changes – Analog Sens=High HIGH IMMUNITY, filter enabled, slower response but higher immunity – Analog Sens=Low
The digital input are instable	It is strongly recommended to keep the digital filter enabled, Digital Sens=Low. See Setup Menu – IOs Options LOW IMMUNITY, filter disabled, faster response to input changes – Digital Sens=High HIGH IMMUNITY, filter enabled, slower response but higher immunity – Digital Sens=Low
No functionality 	Check all supply and status LEDs. 5V_CAN. ON=OK OFF= 11V CAN supply coming from the power source is missing. Check CAN cable 5 x supply LEDs OK=OK OFF= PCB 71617074 is defect. Status LESs. Anybus – Anybus communication activity CAN – CAN bus communication activity MICROPROC. RUN – Slow blinking = OK; Fast blinking = General error
Network error	Check all setups on RCI2 Check all setups on robot/PLC Check Anybus module
Device error	This information is sent to RCI², because there is a “legal” error on the welding machine or wire feeder. Like GAS or TEMP error or Emergency stop is activated. Check input LED 1. Correct the error on the welding machine or emergency stop.

ERROR LIST

Error code	Problem	Solution
E.70	[BOOT] Invalid or no software in RCi²	- Install firmware via SD/smart-card. - Check PLD
E.71	[BOOT] Invalid or no software on SD card or SD card is defect	- Check reader connection, remove and reinsert smart-card - Replace or rewrite SDcard - Check PLD
E.72	[BOOT] Error flashing software	- Retry flashing removing and reinsert SD card - On persistent error exchange RCI² PCB.
E.73	[BOOT] Fatal hardware error	- Exchange RCI² PCB 71617074
E.74	[BOOT] The bootloader is unable to find a valid application on the SD card	- Check that file \MIGA_SW\ROBOT\10020117.cry is present on the SD card - Check PLD
E.75	[BOOT] The bootloader found more than one valid application on the SD card	- Check that only one file with the name 10020117.cry is placed in the SD card folder \MIGA_SW\ROBOT
E.02-02	CAN receive buffer overrun because of missing CAN connection	Check all CAN connections
E.02-03	CAN gone to BUS-OFF state because of missing CAN connection	Check all CAN connections - 11V CAN supply is missing
E.02-13	CAN gone to BUS-WARNING state because of missing CAN connection	Check all CAN connections
E.02-19	CAN interrupt error	- Check the setup of RCI²
E.02-20	CAN task unknown state	- Check the setup of RCI²
E.06-50	Memory hardware error	- Exchange RCI² PCB 71617074
E.06-51	Lost settings and programs. Error on Memory data checksum	- Try to recall factory setting - check Ur option and recalibrate. - Exchange RCI² PCB 71617074
E.06-52	Real-Time-Clock hardware error.	- Exchange RCI² PCB 71617074
E.06-53	This error shows up the first time a new PCB is powered up. Error on date/time setting	- Set the date and time. See page 26 - Exchange the lithium battery CR2031 - Exchange RCI² PCB 71617074
E.07-30	Accessed PCB test mode	Information only
E.07-31	Executed factory-reset from PCB test	Information only
E.12-10	User has accessed service menu	Information only
E.12-13	User has executed Factory-Reset from service menu	Information only
E.12-19	Error in user interface	- Check the setup of RCI²
E.12-56	Accessed PCB test mode	Information only
E.12-57	Executed factory-reset from PCB test	Information only

ERROR LIST

Error code	Problem	Solution
E.33-00	CAN MigaOpen - Device initialization timeout	- Error in configuration file - CAN bus error - Check CAN connection to welding machine
E.33-01	CAN MigaOpen - Device response error	- CAN bus error - Check CAN connection to welding machine
E.33-02	CAN MigaOpen - Device watchdog	One of the connected CAN controlled units has stopped sending Alive signal. Exchange the defective unit. - Check all connected units
E.33-03	CAN MigaOpen - Device status error	This information is send to the Robot controller, because there is a "legal" error on the welding machine or wire feeder. Like GAS or TEMP error - Correct the error on the welding machine
E.33-04	CAN MigaOpen - Rule initialization timeout	- Check the setup of RCI² - Exchange RCI² PCB 71617074
E.33-05	CAN MigaOpen - Network initialization timeout	Unable to connect to MIGANET, - Check CAN connection to welding machine and all connected devices
E.33-20	Analog I/O - Rule initialization error	- Error in configuration file - Check/Reload configuration file - Check connected devices
E.33-21	Analog I/O - Error on received output message	- Error in configuration file - Check/Reload configuration file - Check connected devices
E.33-22	Analog I/O - Task unknown state	- Check the setup of RCI²
E.33-40	Fieldbus- Anybus - module not present	- A configuration file for an Anybus module is loaded in to RCI² but the Anybus module is not mounted. - Place the Anybus module in the socket
E.33-41	Fieldbus- Anybus - unsupported module type	- The installed software version does not support the mounted Anybus module
E.33-42	Fieldbus- Anybus - Driver information	- Anybus module is defective. See also next pages "Anybus – Error list
E.33-43	Fieldbus- Anybus - Driver warning	- Anybus module is defective. See also next pages "Anybus – Error list
E.33-44	Fieldbus- Anybus - Driver fatal error	- Anybus module is defective. See also next pages "Anybus – Error list
E.33-45	Fieldbus- Anybus - Module communication timeout	- Anybus module is defective. See also next pages "Anybus – Error list
E.33-46	Fieldbus- Anybus - Network configuration error	- Anybus module is defective. See also next pages "Anybus – Error list
E.33-47	Fieldbus- Anybus - Process-data configuration error	- Anybus module is defective. See also next pages "Anybus – Error list
E.33-48	Fieldbus- Anybus - Activation error	- Anybus module is defective. See also next pages "Anybus – Error list
E.33-49	Fieldbus- Anybus - Module error	- There is at least one serious network error. - Check network cable - Check robot/PLC setup - Exchange the Anybus module if a restart is not solving the problem See next page
E.33-50	Fieldbus- Anybus - Module exception	- The Anybus module has ceased all network participation due to a host application-related error. This state is unrecoverable, i.e. the module must be restarted in order to be able to exchange network data. - Exchange the Anybus module if a restart is not solving the problem See next page
E.33-51	Fieldbus- Anybus - Too many listen objects	- Error in configuration file - Check/Reload configuration file
E.33-52	Fieldbus- Anybus - Task unknown state	- Check the setup of RCI²
E.34-00	CAN MigaOpen Network Error	- Check IDs settings of connected devices.
E.80-00	Class A trap	- Check the setup of RCI²
E.80-01	Class B trap	- Check the setup of RCI²
E.80-02	Vector trap	- Check the setup of RCI²

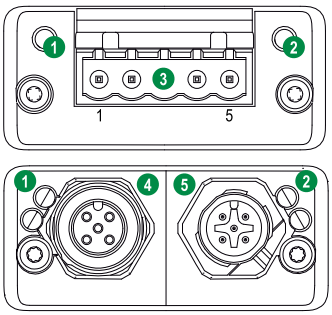
ERROR LIST

Error code	Problem	Solution
E.90-00	User has cleared logs	- Information only
E.90-01	Invalid logs header	- Clear the log. - If error continues then exchange the RCI² PCB 71617074
E.90-02	Undefined error	- Check the setup of RCI²
E.90-04	Too many active errors	- Check the setup of RCI²

ANYBUS - ERROR LIST

DeviceNet

#	Item
1	Network status LED
2	Module status LED
3	DeviceNet connector
4	M12 Female connector
5	M12 Male connector



Network Status

State	Indication
Off	Not online / No power
Green	On-line, one or more connections are established
Flashing Green (1 Hz)	On-line, no connections established
Red	Critical link failure
Flashing Red (1 Hz)	One or more connections timed-out
Alternating Red/Green	Self test

Module Status

State	Indication
Off	No power
Green	Operating in normal condition
Flashing Green (1 Hz)	Missing or incomplete configuration, device needs commissioning
Red	Unrecoverable Fault(s)
Flashing Red (1 Hz)	Recoverable Fault(s)
Alternating Red/Green	Self test

DeviceNet Connector

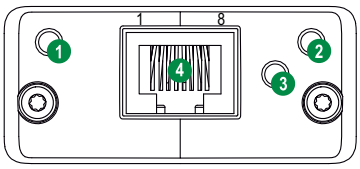
This connector provides DeviceNet connectivity

Pin	Signal	Description
1	V-	Negative bus supply voltage
2	CAN_L	CAN low bus line
3	SHIELD	Cable shield
4	CAN_H	CAN high bus line
5	V+	Positive bus supply voltage

ANYBUS - ERROR LIST

EtherNet IP

#	Item
1	Network status LED
2	Module status LED
3	Link/Activity
4	Ethernet Interface



Network Status LED

LED State	Description
Off	No power or no IP address
Green	On-line, one or more connections established (CIP Class 1 or 3)
Green, flashing	On-line, no connections established
Red	Duplicate IP address, FATAL error
Red, flashing	One or more connections timed out (CIP Class 1 or 3)

Module Status LED

Note: A test sequence is performed on this LED during startup

LED State	Description
Off	No power
Green	Controlled by a Scanner in Run state
Green, flashing	Not configured, or Scanner in Idle state
Red	Major fault (EXCEPTION-state, FATAL error etc.)
Red, flashing	Recoverable Fault(s)

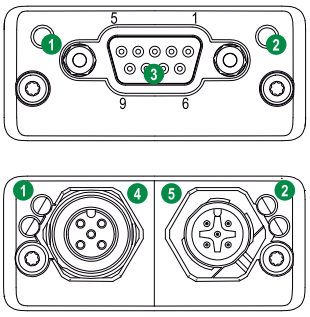
LINK/Activity LED

LED State	Description
Off	No link, no activity
Green	Link established
Green, flickering	Activity

ANYBUS - ERROR LIST

PROFIBUS

#	Item
1	Operation Mode
2	Status
3	PROFIBUS Connector
4	M12 Female Connector
5	M12 Male connector



Operation Mode

State	Indication
Off	Not online / No power
Green	Data exchange
Flashing Green	Clear
Flashing Red (1 flash)	Parametrization error
Flashing Red (2 flashes)	PROFIBUS Configuration error

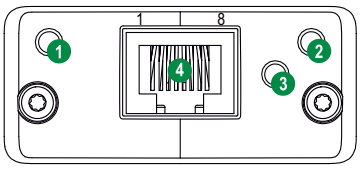
Status

State	Indication	Comments
Off	Not initialized	Anybus state = 'SETUP" or 'NW_INIT'
Green	Initialized	Anybus module has left the 'NW_INIT' state
Flashing Green	Initialized, diagnostic event(s) present	Extended diagnostic bit is set
Red	Exception error	Anybus state = 'EXCEPTION'

ANYBUS - ERROR LIST

ProfiNet IP

#	Item
1	Network status LED
2	Module status LED
3	Link/Activity LED
4	Ethernet Interface



Network Status LED

Note: A test sequence is performed on this LED during startup

LED State	Description	Comments
Off	Offline	- No power - No connection with IO Controller
Green	Online (RUN)	- Connection with IO Controller established - IO Controller in RUN state
Green, flashing	Online (STOP)	- Connection with IO Controller established - IO Controller in STOP state

Module Status LED

Note: A test sequence is performed on this LED during startup

LED State	Description	Comments
Off	Not Initialized	No power - or - Module in 'SETUP' or 'NW_INIT' state
Green	Normal Operation	Module has shifted from the 'NW_INIT' state
Green, 1 flash	Diagnostic Event(s)	Diagnostic event(s) present
Green, 2 flashes	Blink	Used by engineering tools to identify the node on the network
Red	Exception Error	Module in state 'EXCEPTION'
Red, 1 flash	Configuration Error	Expected Identification differs from Real Identification
Red, 2 flashes	IP Address Error	IP address not set
Red, 3 flashes	Station Name Error	Station Name not set
Red, 4 flashes	Internal Error	Module has encountered a major internal error

LINK/Activity LED

LED State	Description	Comments
Off	No link	No link, no communication present
Green	Link	Ethernet link established, no communication present
Green, flickering	Activity	Ethernet link established, communication present

Ethernet Interface

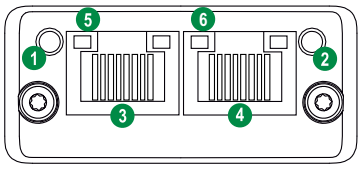
The Ethernet interface operates at 100 Mbit, full duplex, with autonegotiation enabled as default.

ANYBUS - ERROR LIST

EtherCAT

Ethernet Connector

#	Item
1	RUN LED
2	ERROR LED
3	EtherCAT (port 1)
4	EtherCAT (port 2)
5	Link/Activity (port 1)
6	Link/Activity (port 2)



RUN LED

This LED reflects the status of the CoE (CANopen over EtherCAT) communication

LED State	Indication	Description
Off	INIT	CoE device in 'INIT'-state (or no power)
Green	OPERATIONAL	CoE device in 'OPERATIONAL'-state
Green, blinking	PRE-OPERATIONAL	CoE device in 'PRE-OPERATIONAL'-state
Green, single flash	SAFE-OPERATIONAL	CoE device in 'SAFE-OPERATIONAL'-state
Red[a]	(Fatal Event)	-

a. If RUN and ERR turns red, this indicates a fatal event, forcing the bus interface to a physically passive state. Contact HMS technical support

ERR LED

This LED indicates EtherCAT communication errors etc.

LED State	Indication	Description
Off	No error	No error (or no power)
Red, blinking	Invalid configuration	State change received from master is not possible due to invalid register or object settings
Red, double flash	Application watchdog timeout	Sync manager watchdog timeout
Red[a]	Application controller failure	Anybus module in EXCEPTION

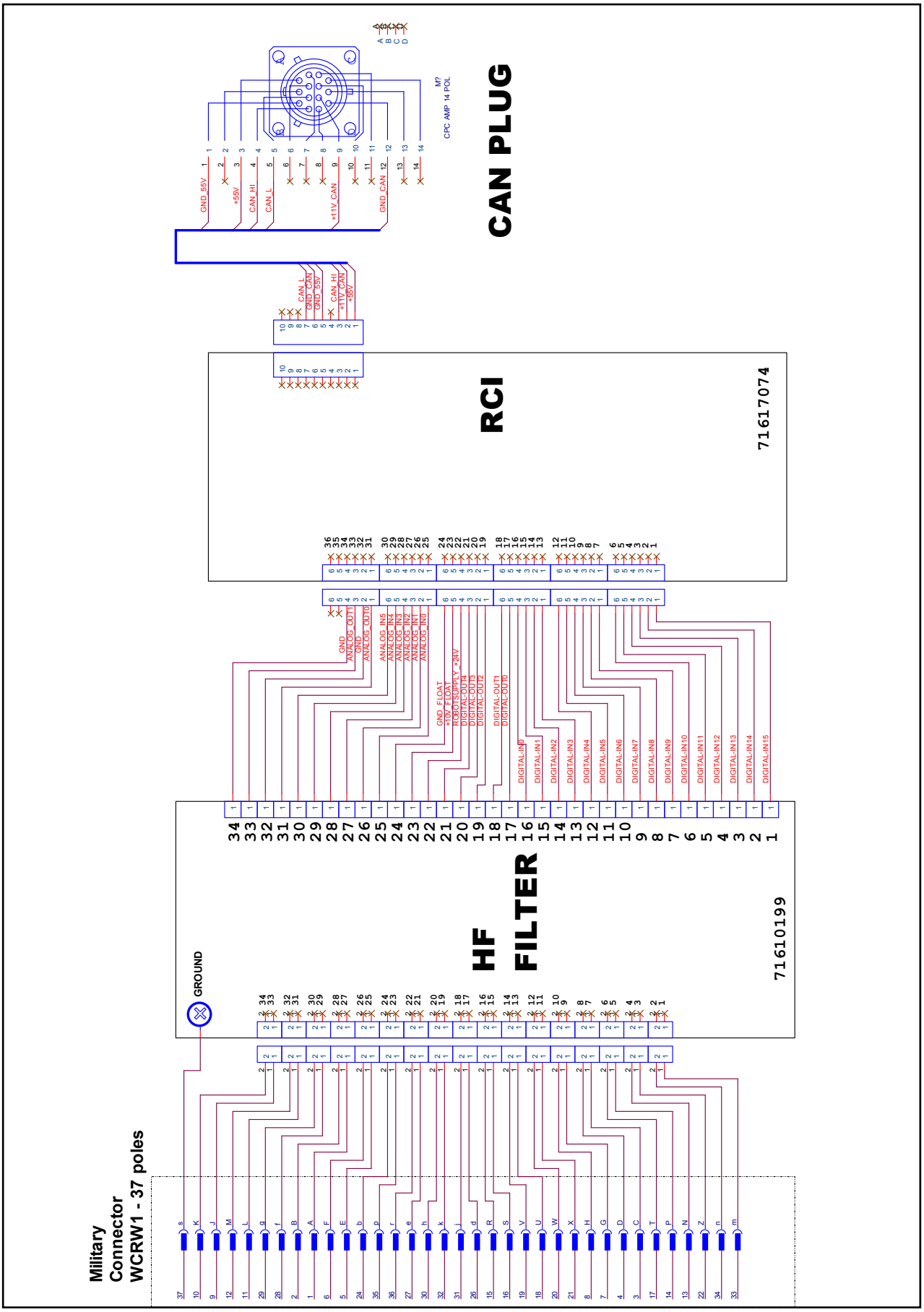
a. If RUN and ERR turns red, this indicates a fatal event, forcing the bus interface to a physically passive state. Contact HMS technical support

LINK/Activity

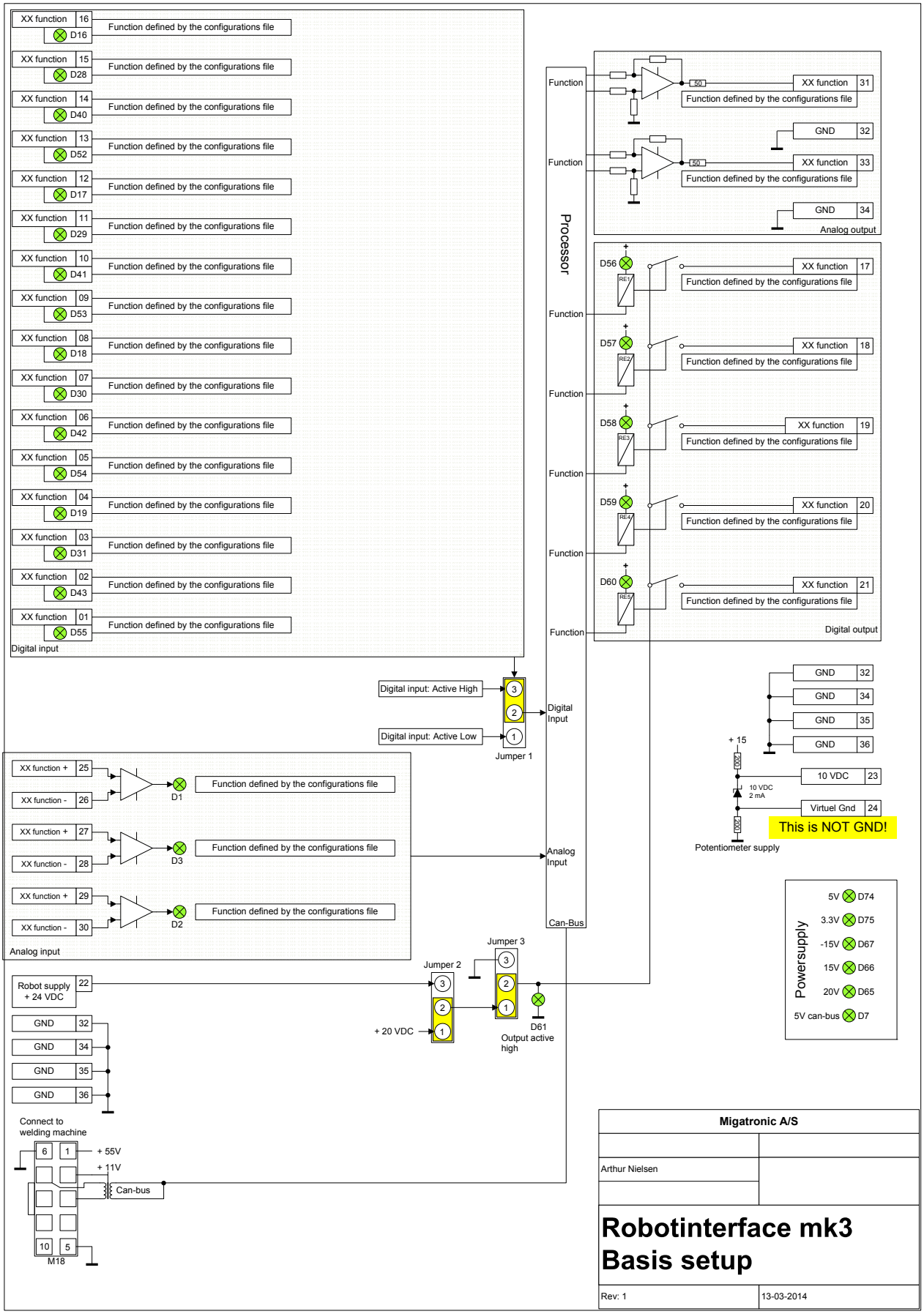
These LEDs indicate the EtherCAT link status and activity

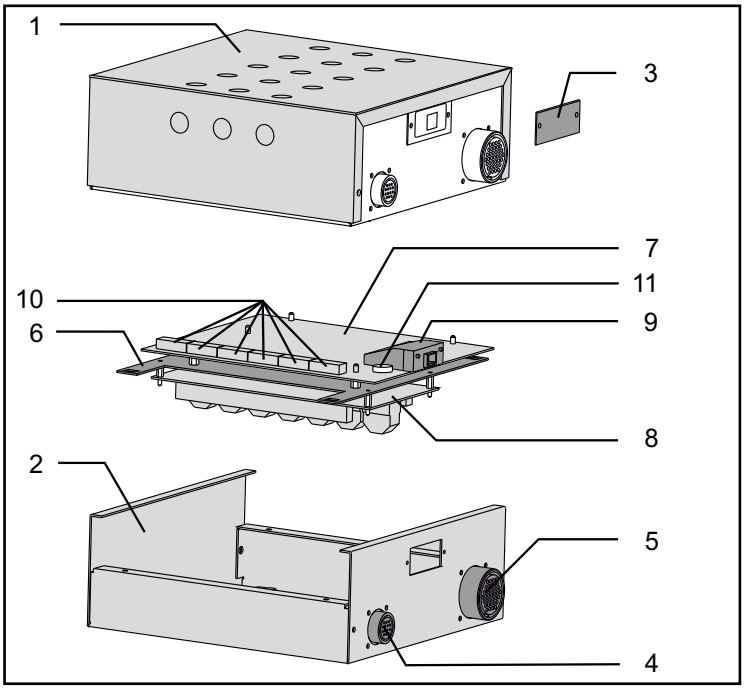
LED State	Indication	Description
Off	No link	Link not sensed (or no power)
Green	Link sensed, no activity	Link sensed, no traffic detected
Green, flickering	Link sensed, activity detected	Link sensed, traffic detected

ELECTRIC DIAGRAM



SIGMA Robot interface basic setup





Pos.	No.	Varebetegnelse Warenbezeichnung	Description of goods Désignation des pièces
	78865026	Robot Control Interface RCI²	Robot Control Interface RCI²
		Robot Control Interface RCI²	Robot Control Interface RCI²
1	24433719	Låg	Cover
		Deckel	Couvercle
2	70210693	Bundplade	Sole plate
		Bodenplatte	Plaque de fond
3	24510565	Afdækningsplade	Cover plate
		Abdeckungsplatte	Couvrir
4	74471227	Ledningssæt, CAN-filter stik	Wire harness, CAN filter plug
		Leitungssatz, CAN-Filter Stecker	Ensemble de filerie
5	74471349	Kabel med 37-polet stik	Cable with 37-pole plug
		Kabel mit Stecker 37-polig	Câble avec prise 37-pôle
6	24510563	Printplade	PCB plate
		Printplatte	Plaque de carte de circuits imprimé
7	71617074	Print CAN Interface	PCB, CAN Interface
		Platine, CAN-Interface	Carte de circuits imprimé, CAN-Interface
8	71610199	Print, RCI HF filter	PCB, RCI HF filter
		Platine, RCI HF Filter	Carte de circuits imprimé
9a	17200069	Anybus modul PROFIBUS	Anybus module PROFIBUS
		Anybus Modul PROFIBUS	Anybus module de PROFIBUS
9b	17200070	Anybus modul DEVICENET	Anybus module DEVICENET
		Anybus Modul DEVICENET	Anybus module de DEVICENET
9c	17200071	Anybus modul ETHERNET/IP	Anybus module ETHERNET/IP
		Anybus Modul ETHERNET/IP	Anybus module d'ETHERNET/IP
9d	17200072	Anybus modul PROFINET IO	Anybus module PROFINET IO
		Anybus Modul PROFINET IO	Anybus module de PROFINET IO
9e	17200073	Fieldbus modul EtherCAT	Fieldbus module EtherCAT
		Fieldbus Modul EtherCAT	Fieldbus module d'EtherCAT
10	18190061	Stik, hun	Plug 6 ways, female
		Stecker, weiblich	Prise, femelle
11	17280000	Lithium batteri, 3V ø20x3,2mm	Lithium battery, 3V ø20x3,2mm
		Lithium Batterie, 3V ø20x3,2mm	Battery au lithium , 3V ø20x3,2mm
	78861376	Konfigurationskort	Configuration Card
		Konfigurierungskarte	Carte de configuration
	74340015	Motorstyrings-/fjernreguleringskabel, 6m	Motor control-/remote control cable, 6m
		Motorsteuerungs-/Fernregelungskabel, 6m	Câble contrôle moteur/câble de commande, 6m
	17210139	Multistik, 37-pol han for kabel	Multiplug, 37-pole male for cable
		Vielfachstecker, 37-Polig männlich für Kabel	Prise multibroche mâle, 37-pôle
	18480039	Kabelaflastning for 37-polet stik	Cable clamp for 37-pole plug
		Kabelschutz für Stecker 37-polig	Verrou pour câble et prise 37 pôles

DENMARK

Main office
MIGATRONIC A/S
Aggersundvej 33, DK-9690 Fjerritslev, Denmark
Tel. +45 96 500 600, www.migatronic.com

MIGATRONIC AUTOMATION A/S
Knøsgårdvej 112, DK-9440 Aabybro, Denmark
Tel. +45 96 96 27 00, www.migatronic-automation.com

MIGATRONIC EUROPE:

Great Britain
MIGATRONIC WELDING EQUIPMENT LTD
1 Sarah Court, Armthorpe
GB-Doncaster DN3 3FD, Great Britain
Tel. +44 2080730100, www.migatronic.com

France
MIGATRONIC EQUIPEMENT DE SOUDURE S.A.R.L.
Parc Avenir II, 313 Rue Marcel Merieux
FR-69530 Brignais, France
Tel. +33 04 78 50 65 11, www.migatronic.com

Italy
MIGATRONIC s.r.l. IMPIANTI PER SALDATURA
Via Dei Quadri 40, IT-20871 Vimercate (MB), Italy
Tel. +39 039 9278093, www.migatronic.com

Norway
MIGATRONIC NORGE AS
Langmyra 10, N-4344 Bryne, Norway
Tel. +47 32 25 69 00, www.migatronic.com

Czech Republic
MIGATRONIC CZ a.s.
Tolstého 451, CZ-415 03 Teplice 3, Czech Republic
Tel. +420 411 135 600, www.migatronic.com

Sweden
MIGATRONIC SVETSMASKINER AB
Tomasgårdsvägen 13 B, ,S-441 39 Alingsås, Sweden
Tel. +46 031 44 00 45, www.migatronic.com

Germany
MIGATRONIC SCHWEISSMASCHINEN GMBH
Sandusweg 12, D-35435 Wettenberg-Launsbach, Germany
Tel. +49 0641/98284-0, www.migatronic.com

MIGATRONIC ASIA:

India
MIGATRONIC INDIA PRIVATE LTD.
No.22 & 39/20H Sowri Street,
IN-Alandur, Chennai – 600 016, India
Tel. +91 44 2233 0074 www.migatronic.com

MIGATRONIC