Remote Control Interface for PI

Instruction manual

MICATRONIC

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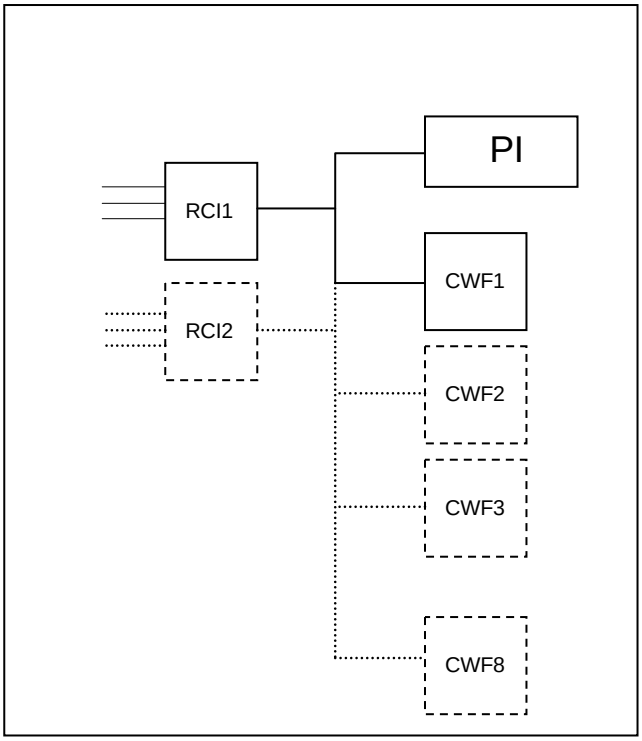
Remote Control Interface (RCI)
The Remote Control Interface is a general I/O interface for controlling and monitoring PI machines and Cold Wire Feeder (CWF) units via CAN BUS by means of external PLCs, computers or simple custom solutions.

Interface concept
PI machines and CWF have been designed to be fully configurable and controllable by means of dedicated commands sent/received via CAN BUS. All parameters of PI, PI-PLASMA and CWF like programs, functions, settings, internal alarms etc are then fully accessible from outside, and thus creation of both sophisticated or simple custom applications is possible.

The Remote Control Interface acts as “translator” between external Input/Output signals (Analog and Digital) and the machines.

The RCI can interface one PI machine and up to 8 CWF units (only one at the time can be activated): in case of dedicated applications where a lot of I/O signals are necessary, it is possible to expand the control capability by using more than one RCI.

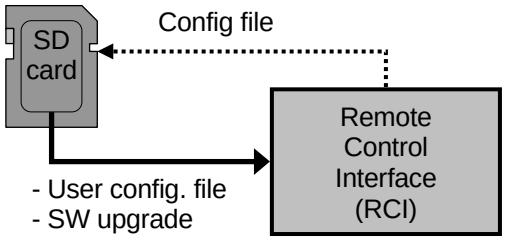


Configuration of RCI
The RCI is controlled by a microprocessor and is provided with a SD card reader used for:

- configure the device
- read the actual configuration of device
- upgrade the software

The configuration of all control signals and commands is defined inside a dedicated file. Each user application needs the proper dedicated configuration file. However, in order to help customers, MIGATRONIC has produced a collection of most common used configuration files: they are ready to be used or they can be modified, as requested by the application.

REMEMBER TO BACKUP YOUR CONFIGURATION FILE FOR FUTURE NEEDS (CHANGES ON APPLICATION OR SERVICE).



Electrical connections
Connection of the RCI to the welding machine should always be carried out with the mains supply disconnected on all units. Otherwise malfunction could occur.
The RCI is connected to the external controller (Robot, PLC or custom solutions) with a cable which shall be made by a certified electrician. It is recommended not to use cables longer than 1.5 m. Attention must be paid to avoid all possible interferences produced by HF on all communication/control cables: physical separation of power cables from other cables is mandatory!

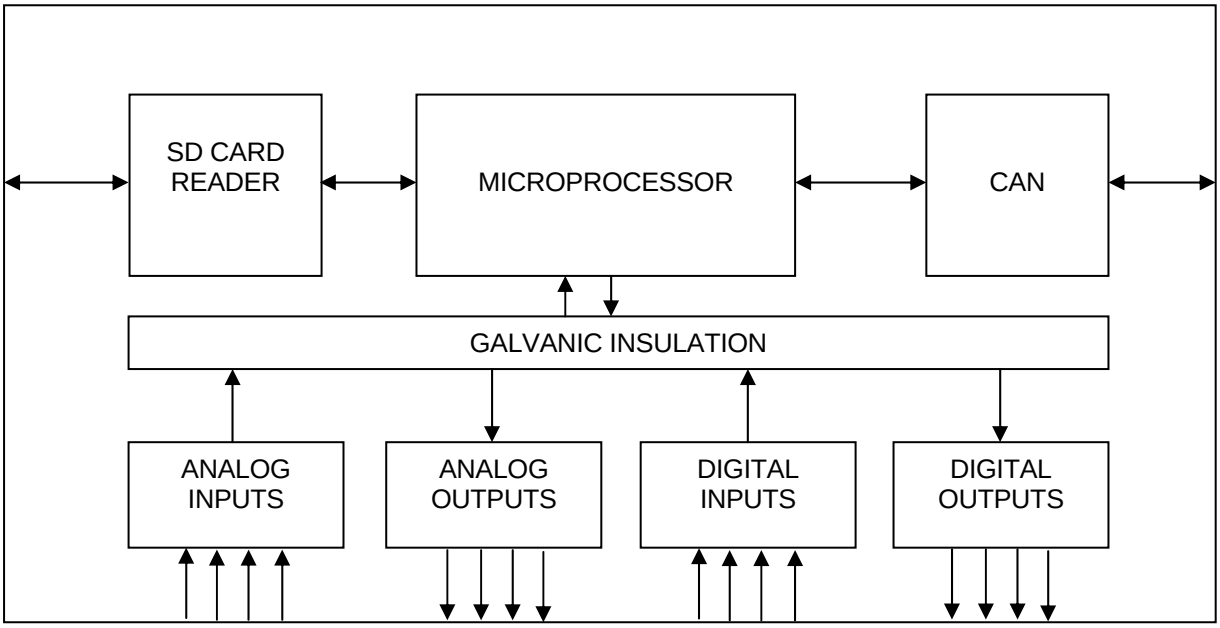
RCI programming reference manual
This document illustrates the electrical characteristics of device and indicates how to transfer the configuration files from and to RCI via SD CARD.

All technical information regarding the commands and the structure of configuration files for dedicated custom solutions are described in “**RCI programming reference**”. Ask Migatronic for more information.

Dispose of the product according to local standards and regulations.
More information can be found under Policies at www.migatronic.com

STRUCTURE OF INTERFACE

The RCI is structured as in the following block diagram:



CAN BUS (Controller Area Network)
is used to "interconnect" between welding machines, interfaces, remote controls, wire feeders etc. The LED "CAN" near the microprocessor is indicating the activity on communication channel. (see last page)

SD CARD READER
accepts standard SD cards, permitting the configuration of Inputs/Outputs, the backup of internal current configuration files and software upgrades. SD CARDS are handled to be fully compatible with standard PCs under Windows etc. Personal computers without SD CARD reader require dedicated SD CARD readers via USB. Remember to unlock the "write protect" on the card to permit the RCI write activities.
See below also:

- HOW TO TRANSFER THE CONFIGURATION FILE ON THE RCI
- HOW TO UPGRADE THE SOFTWARE VERSION OF MICROPROCESSOR

MICROPROCESSOR
is the controller of the system and is the supervisor of the status of I/Os, controller of CAN communications with external devices (PI and CWFs) and handler of READ/WRITE operations on SD CARD. The LED "RUN" indicates the status of microprocessor (see last page):

- Slow flashing: NO SOFTWARE is installed, please see HOW TO UPGRADE THE SOFTWARE VERSION
- Fast flashing: valid application software is installed

GALVANIC INSULATION
Permits the complete electrical insulation between signals from the field and the rest of structure. Maximum insulation voltage is 1000VDC

ANALOG INPUTS
There are 3 galvanic insulated differential channels, each one provided with a GREEN LED diode (AN_1 AN_2 AN_3): the intensity of light is proportional to the amplitude of input signal. By configuring the selector JMP6 it is possible to enable or disable a filter used to increase the noise immunity of inputs:

1) LOW IMMUNITY, filter disabled, faster response to input changes – JMP6 position 1-2
2) HIGH IMMUNITY, filter enabled, slower response but higher immunity – JMP6 position 2-3

It is strongly recommended to keep the digital filter enabled!

Electrical specifications:

Common mode range:	± 20 VDC
Max differential voltage:	10 VDC
Differential Input impedance:	100KOhm
Bandwidth:	100 Hz
Max.Pulse frequency (square wave):	10 Hz
Digital resolution:	10 Bit
Error:	± 2 %

ANALOG OUTPUTS
There are 2 galvanic insulated channels, no LEDs are provided for those channels.

Electrical specifications:

Maximum load:	2K Ohm
Digital resolution:	10 Bit
Bandwidth:	5 Hz
Error:	± 2 %
Remarks:	cannot be used for certification of the welding process

DIGITAL INPUTS
There are 16 galvanic insulated channels, each one provided with a GREEN LED diode to indicate the status of input (DIN_0 to DIN_15). By configuring one dedicated selector (JMP1), inputs can be driven in 2 different ways:

1) Active LOW - JMP1 position 1-2
2) Active HIGH – JMP1 position 2-3

Please note that the configuration of JMP1 affects all inputs simultaneously.

By configuring the selector JMP7 it is possible to enable or disable one digital filter used to increase the noise immunity of inputs:

1) LOW IMMUNITY, filter disabled, faster response to input changes – JMP7 position 1-2
2) HIGH IMMUNITY, filter enabled, slower response but higher immunity – JMP7 position 2-3

It is strongly recommended to keep the digital filter enabled!

Electrical specifications:

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
There are 5 galvanic insulated channels, each one made by a contact of relays and provided with a GREEN LED diode to indicate the status of output (DOUT_0 to DOUT_4). By configuring one dedicated selector (JMP3), outputs can be driven in 2 different ways:

1) Active HIGH – JMP3 position 1-2
2) Active LOW – JMP3 position 2-3

Another selector (JMP2) is provided to configure the HIGH LEVEL of outputs

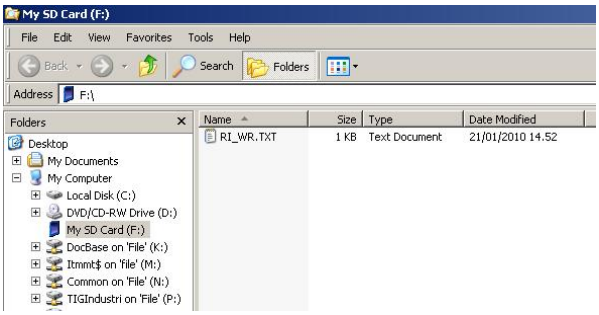
1) +20VDC provided by RCI – JMP2 position 1-2
2) +24VDC provided by external supply like robot or custom hardware – JMP2 position 2-3

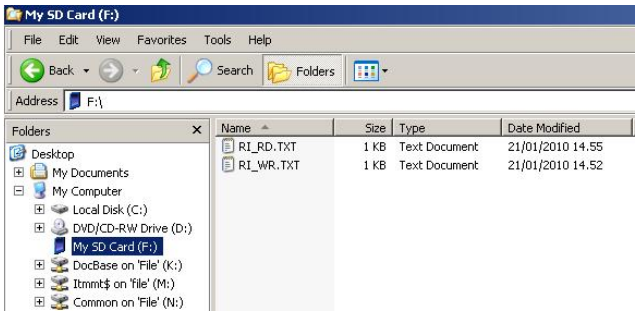
Please note that the configuration of JMP2 and JMP3 affects all outputs simultaneously.
Electrical specifications:

LOW level:	0 V
HIGH level:	depends from JMP2
Max load:	50 mA
Response time:	100 ms

HOW TO TRANSFER THE CONFIGURATION FILE ON THE RCI

The configuration file, supplied by MIGATRONIC or made by the customer must have a unique name RI_WR.TXT (Remote Interface WRITE) and must be placed on the SD card at Root level, like in the left picture. If the file has other names or is placed into other folders then it will be ignored.
If necessary, the file can be modified via PC by using standard text editors like “Notepad” or other similar programs.





The RCI has a special selector intended to protect the device against unintentional operations of downloading of configuration files: this is to protect the actual configuration of Interface.
LED_2 of RCI is used to inform about the status of task.
To transfer the configuration file into the RCI follow the steps:

1) Switch OFF the generator: also the RCI will switch OFF
2) Set selector JMP4 to position 1-2 (Enable UPLOAD of a new configuration)
3) Insert the SD CARD containing the file RI_WR.TXT in the card reader of RCI
4) Turn ON the generator: also the RCI will turn ON, indicating the status of operation. Please note that this operation is very short in time and maybe not possible to see activities on LED_2, see table below.
5) Switch OFF the generator: also the RCI will switch OFF
6) Remove the SD CARD from the card reader of RCI
7) Set selector JMP4 to position 2-3 (Disable UPLOAD, protecting the RCI against new configuration)
8) Turn ON the generator: the RCI will indicate the status, LED_2, see table below.

Messages from LED_2 of RCI about the STATUS of configuration.

OFF:	MISSING configuration present on the RCI
Slow blink	Configuration UPDATE from SD CARD is running (very short time, 1-2 sec.)
Fast blink	Syntax errors or bad parameters in the configuration file
ON	Valid Configuration is present and active

After each UPLOAD of configuration file RI_WR.TXT the RCI generates the file RI_RD.TXT on the SD CARD, as in the above right picture.
This file contains the following information:

- Copy of current device configuration present in the RCI
- Possible error messages in case of Syntax errors or bad parameters on file RI_WR.TXT

NOTE: In case the original RI_WR.TXT is missing or just for other purposes, it is possible to get the current device configuration of RCI as follows:

1) Make one EMPTY file RI_WR.TXT on the SD CARD (remember to backup the original one!)
2) Try the configuration sequence of RCI as previously described in steps 1-8
3) RCI will recognize the EMPTY file avoiding to cancel the configuration and generating the RI_RD.TXT where the current setup is copied.

Please note that the file RI_RD.TXT is generated as backup of existing configuration and then, if renamed to RI_WR.TXT, can be used to program other RCIs if necessary (SERVICE)

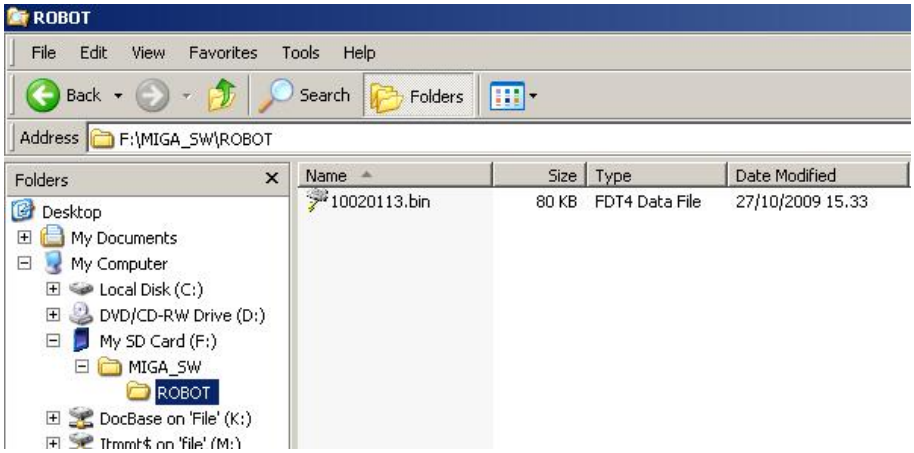
HOW TO UPGRADE THE SOFTWARE VERSION OF MICROPROCESSOR

THERE ARE NO PROTECTIONS AGAINST UNINTENTIONAL DOWNLOAD OF SOFTWARE ON RCI. However, the device will accept only dedicated software for RCI and thus ignoring other files. Please note that it is possible to download SW versions older than the one installed, permitting to restore previous general RCI behaviours.

In order to download a new SW version, please prepare one SD CARD with software as follows:

1) Make one folder called “MIGA_SW” at root level
2) Make one subfolder called “ROBOT”
3) Save the file10020113.bin inside the folder ROBOT

The following picture shows the structure of SD CARD:

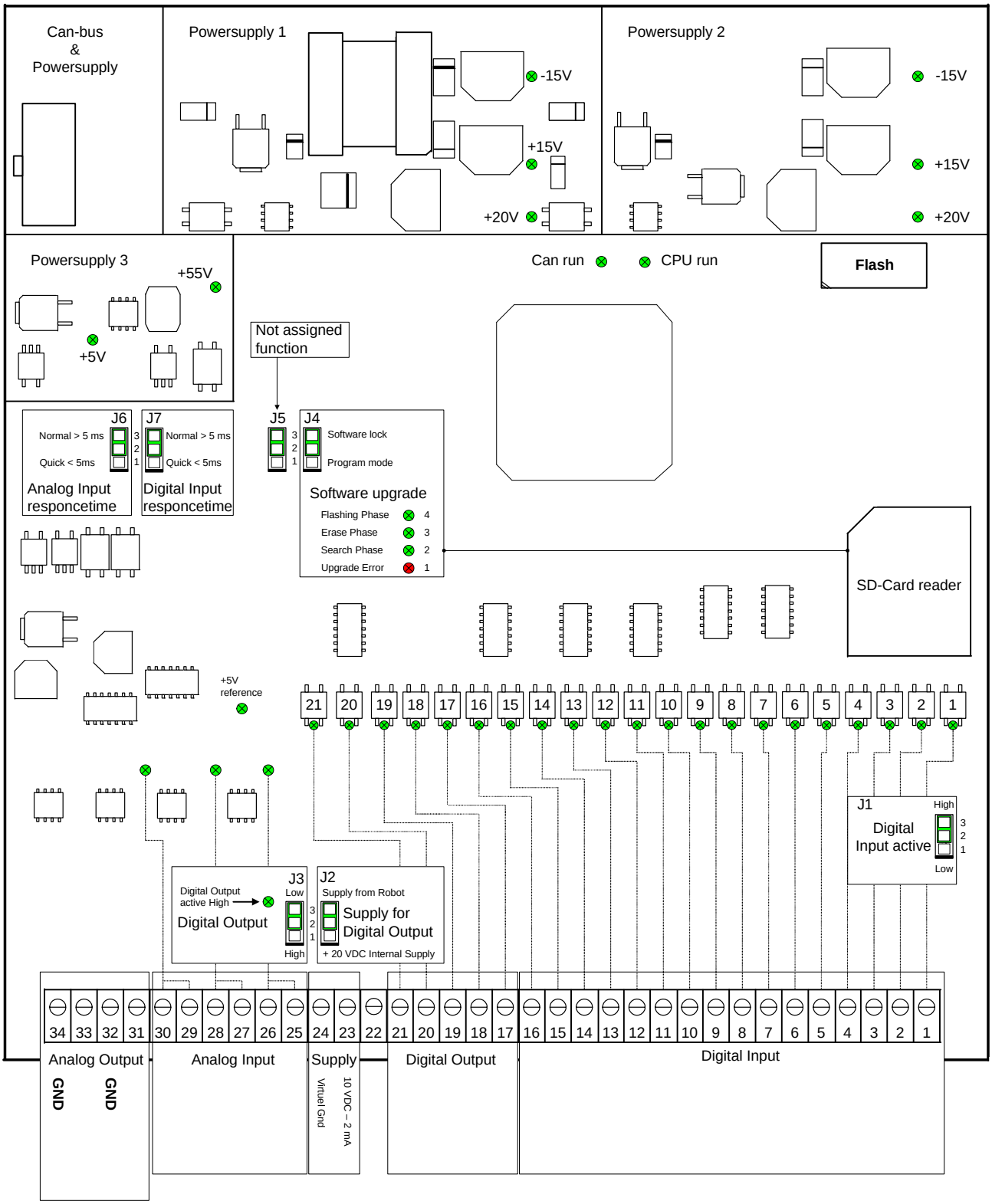


When the file “10020113.bin” has been properly saved on the SD CARD, follow the steps:

1) Turn OFF the machine: also the RCI will be turned OFF.
2) Insert the SD CARD on the card reader of RCI
3) Turn ON the machine: the microprocessor will recognize the presence of correct file and will upgrade the RCI.

The operation of UPGRADE is divided in 4 steps and can be monitored by observing the status of different LEDS:

1 - SEARCH FOR VALID SW	LED_2 (GREEN)	FLASHING = Searching on the SD card for valid file
		ON= Valid file is found
2 – ERASE OF MEMORY	LED_3 (GREEN)	FLASHING = Erase operation is running
		ON = Memory of microprocessor has been erased
3 – PROGRAM/CHECK	LED_4 (GREEN)	FLASHING = Programming operation is running
		ON = Microprocessor has been correctly programmed
4 – FINAL CHECK	LED_1 (RED)	OFF = Steps 1 to 3 have been executed with success
		ON = Some error on steps 1 to 3: see status of LEDS 2, 3, 4



TERMINAL 01 – 16	=	DIN15 – DIN 0
TERMINAL 17 – 21	=	DOUT0 – DOUT4
TERMINAL 22	=	+24V
TERMINAL 23	=	+10V
TERMINAL 24	=	GND
TERMINAL 25 – 30	=	AIN0 – AIN5
TERMINAL 31	=	AOUT0
TERMINAL 32	=	GND
TERMINAL 33	=	AOUT1
TERMINAL 34	=	GND

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