iL_ISP_U

USB In Circuit Serial Programmer for PIC microcontroller

Manual

Release 1.3
July 26, 2006

Ing.Büro Stefan Lehmann
Fürstenbergstraße 8a
D-77756 Hausach
Germany
Tel. ++49 (0)7831 452
Fax ++49 (0)7831 96428
eMail: SL@iL-online.de
Internet: www.iL-online.de

Contents:

Screen shots are still in German. English text will coming soon!

PIC is a trademark of Microchip, Chandler AZ, USA

What is iL_ISP_U?

iL_ISP_U is a tiny but powerful programmer for Microchip's serial programmable PIC microcontroller. Connect to USB port, there is no external power supply needed. The software running on the computer is iL_PRG16PRO which communicate with USB via an virtual com port. The operating system on your computer must be Windows XP.

IMPORTANT!

iL_ISP_U has no ZIF socket. It is developped for In-circuit-serial-programming and your application needs some special programming interface (see Design Hints). Nevertheless, with some wiring you can build an adaptor for device programming.
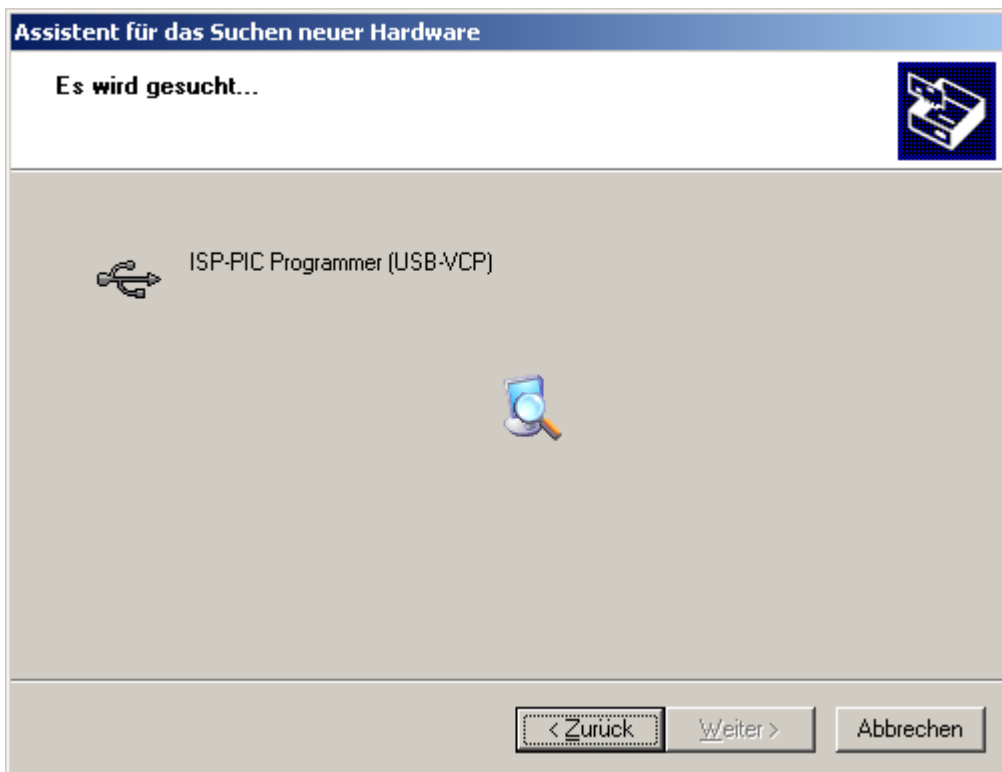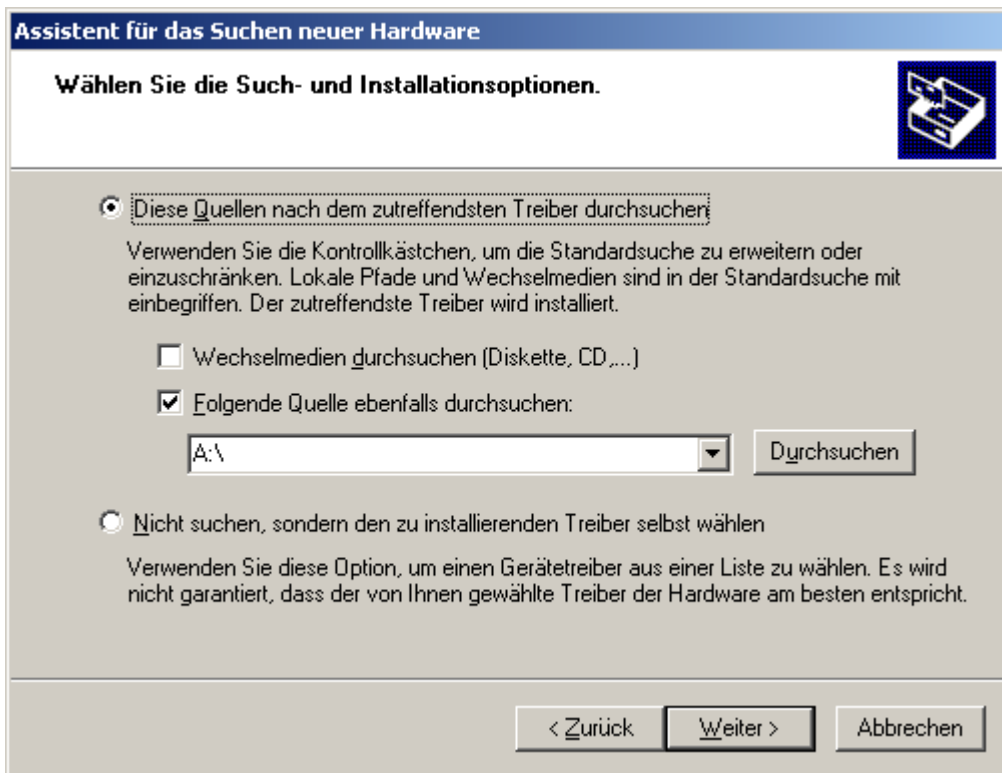
Driver installation

When connecting the programmer iL_ISP_U to USB port for first time, Windows will recognize it as a new USB device. The Hardware Assistent will appear.
Do not chose „automatic driver search" but click on manual driver installation!
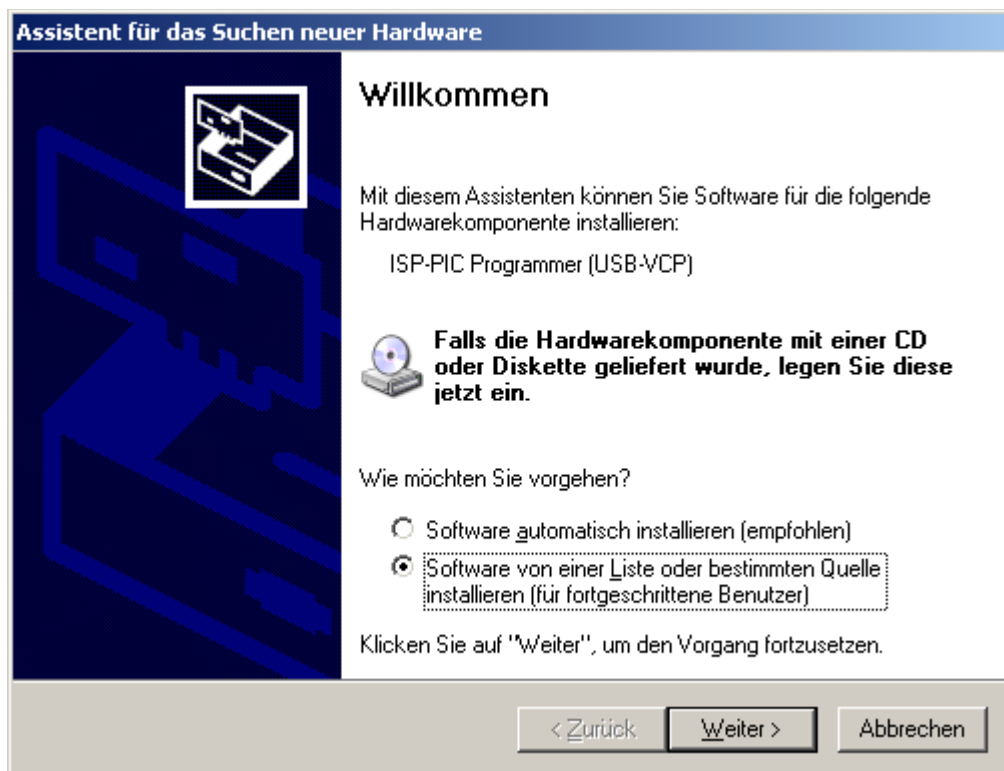
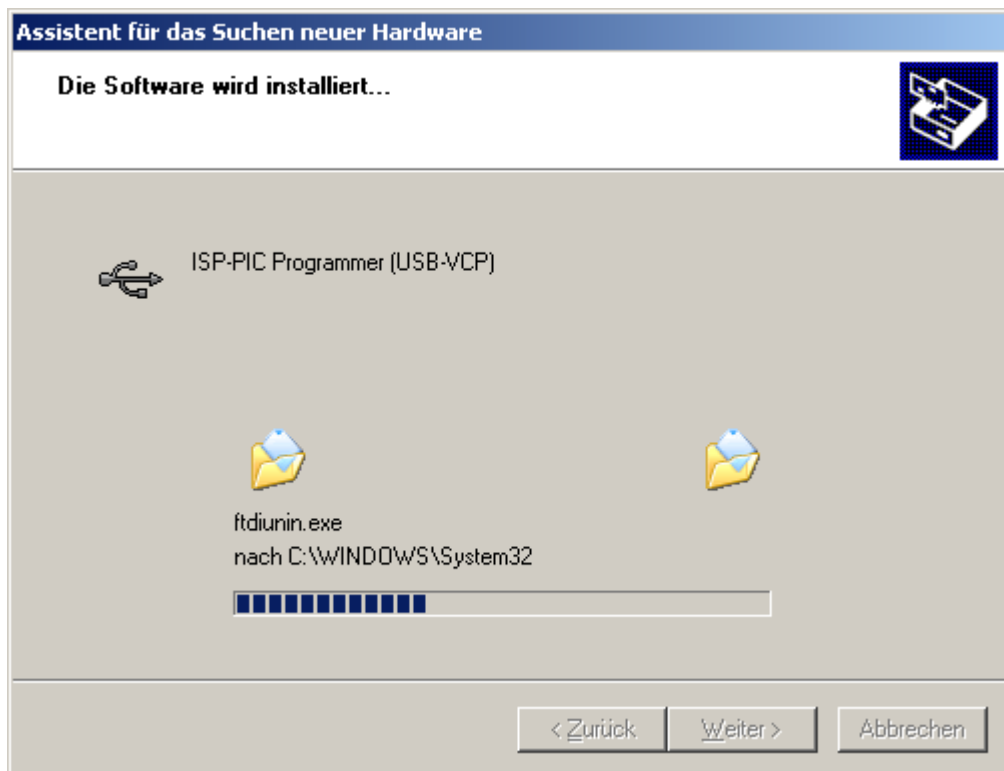
Put the drivers disk in drive A and click on „Continue>".

Windows is now searching for the driver that fits for the programmer iL_ISP_U.

If the message „Windows-Logo check failed" appears ignore it an click on button „continue installation".
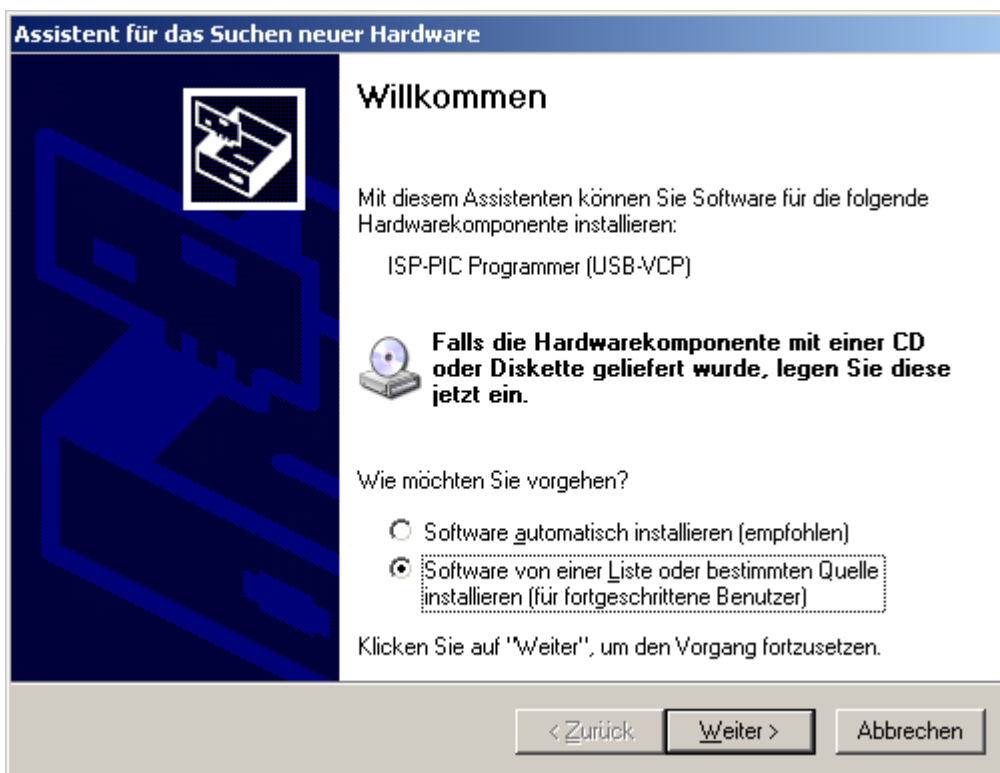
Now Windows is loading the drivers.

As soon as you click on button „finish" the Hardware Assistant starts again. This is initiate by the driver which is just loaded. This second driver which must be loaded is the so called virtual com port. With his help you can communicate with USB as it would be an standard serial communication port (RS232).

Chose again manual driver installation and following the steps as above. After loading of this driver iL_ISP_U is ready to use. To find out with COM port is the virtual port you can use "Systemsteuerung" und "Gerätemanager". Here you find the information under topic „Connections (COM and LPT) the entry "ISP-PIC Programmer (USB-VCP) (COM4). In this case COM4 is the virtual com port.
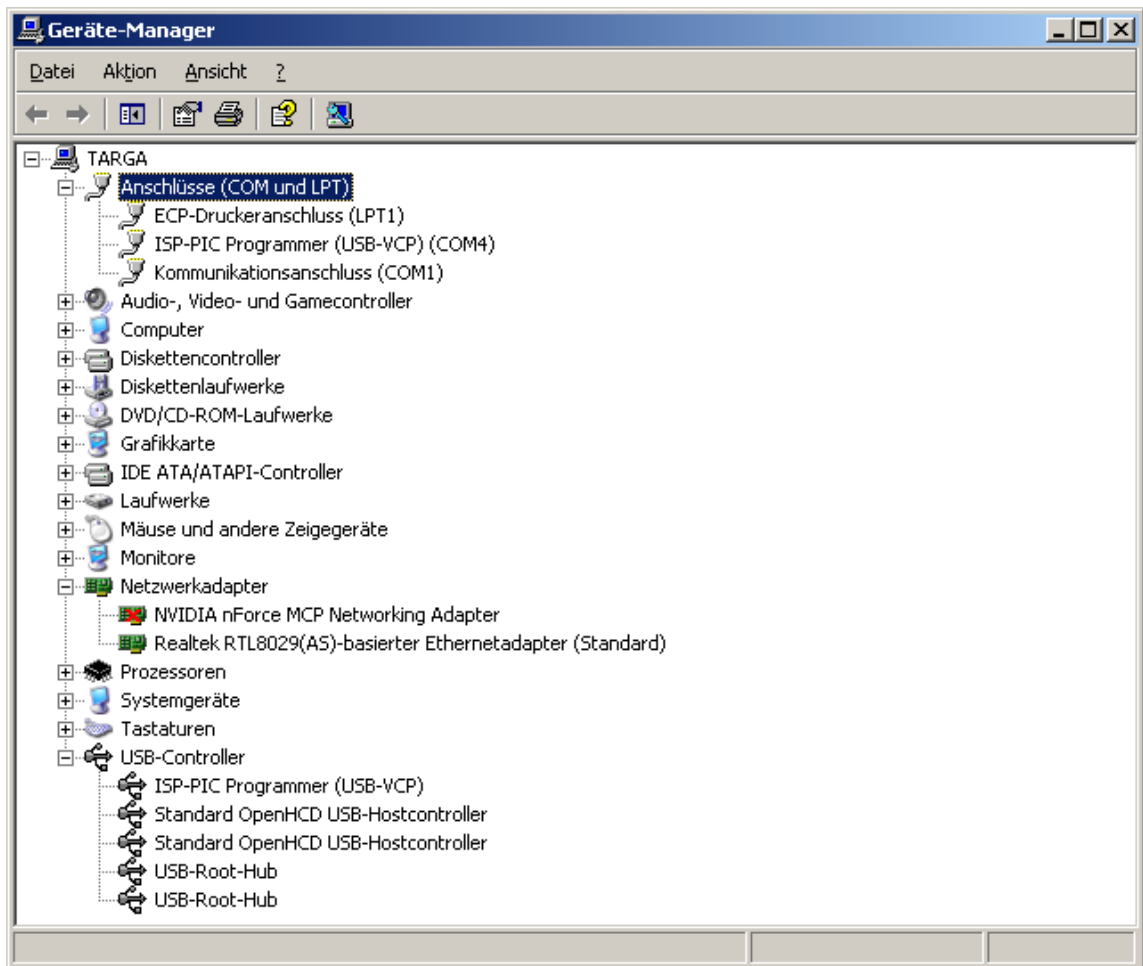
Now start iL_EDy and then click on button „Programmers". After iL_PRG16 has started select „Properties" and „COM port" and click on COM4. That's it.
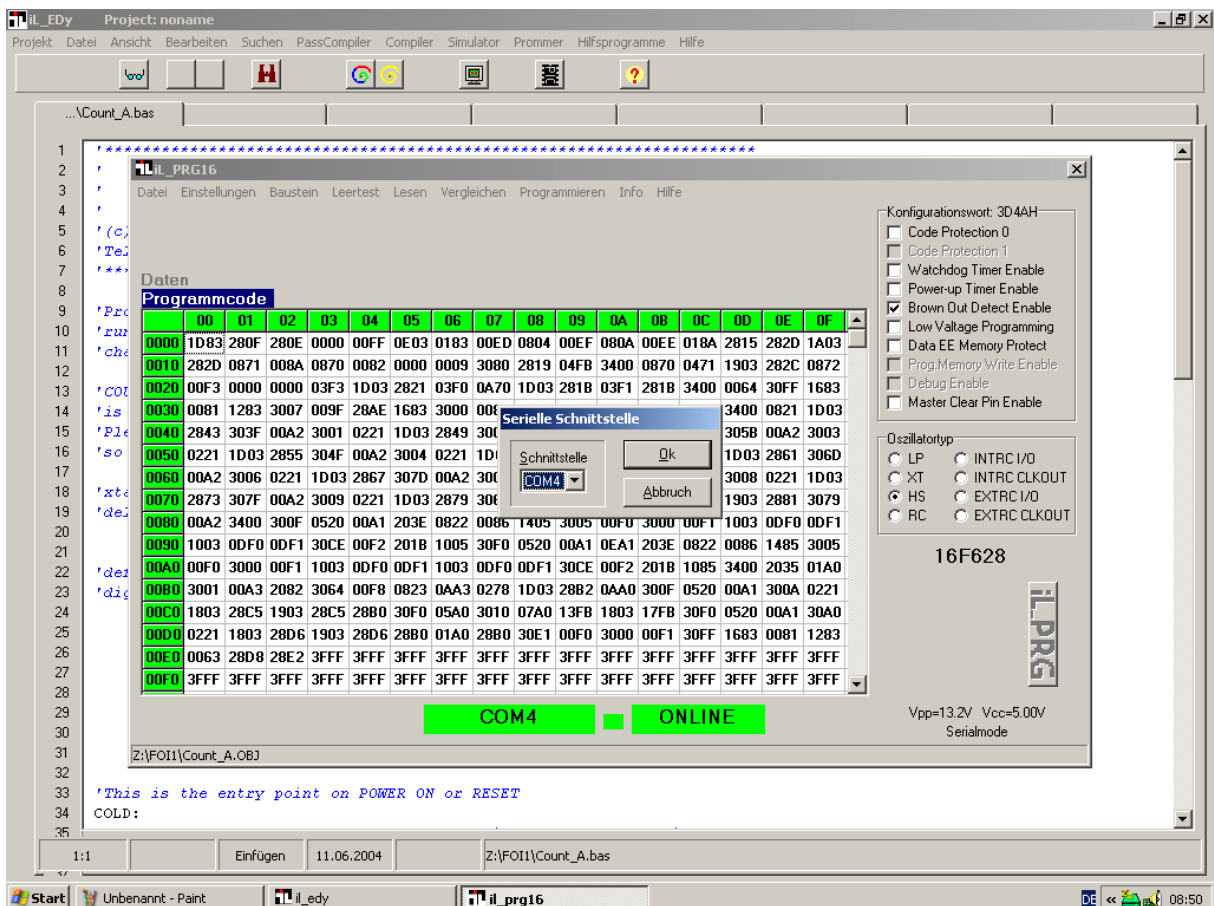
Design Hints for ICSP programming

To program the PIC microcontrollers by In-Circuit-Serial-Programming you should take care when designing your hardware. For programming the PIC you need power supply (5V), programming voltage (13.5V) and the data and clock signal. It depends on your hardware conception which schematic you should use.

General:
iL_ISP_U has a RJ45 connector to make connections to your target hardware. If you design also such an RJ connector on your hardware a simple patch cable is needed for programming. The pinning on the programmer's side is as followed:

1	5V from USB port (don't use it)
2	Data
3	Ground (Vss)
4	Clock
5	Ground (Vss)
6	Vdd (5V)
7	switch signal for relais (if necessary)
8	Vpp (13.5V), to enter program/verify mode of the PIC

Following schematic shows pin counting for the RJ45. It is the pinout seen on the pcb's component side
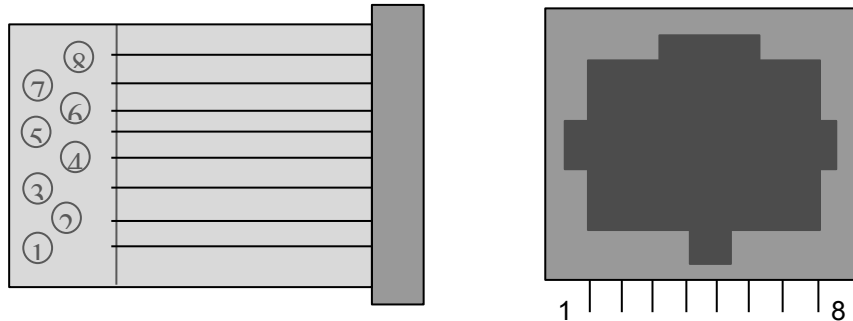
Ground
Ground of iL_ISP_U must be connect to ground of your hardware (Vss of PIC)

Vdd (PIC power 5V)
Usually the power for the PIC is from the target's power supply. In this case there is no connection between programmers Vdd and Vdd of your target hardware.

Is the target's power supply turned of while programming the PIC, the power must come from the programmer. Pay attention that the targets power consumption do not exceeds 20 mA. If it is more you must decouple both power supplies. This can be done by diodes.

Schottky diodes are recommended!!!
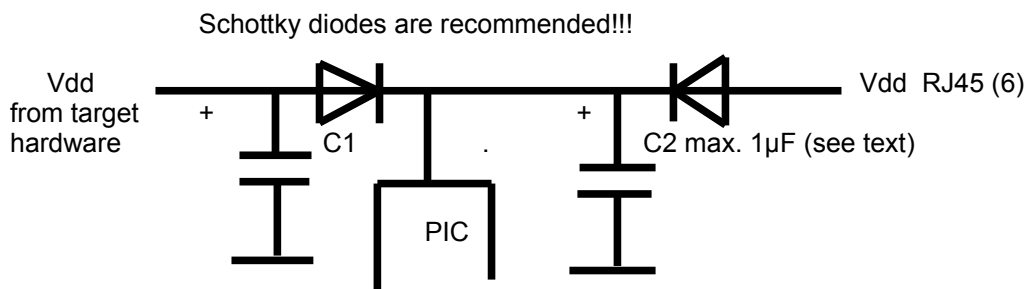
Capacitor C2, which is connected close to the PIC, may **not exceed 1µF**, because the slope becomes to flat. To enter program/verify mode the slope may not slower than 1 µsec. If EMC makes C2 greater than you must split it in to capacitors which is also recommended by EMC (e.g. C1 = 10µF and C2 = 100nF). This results in two resonants peaks.

Data and clock
Case 1:
If pins PGD and PGC are dedicated for programming no further modifications must be done. Connect these pins directly.
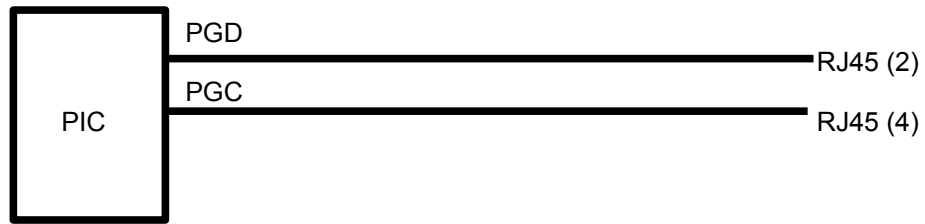

Case 2:
If pins PGD and PGC are also used for io signals in the running mode you have to decouple these signals. There are two ways o decoupling. The **most simple way** is by resistors. But it mus be garanteed that the following hardware can tolerate the programming signals, too. If PGD and PGC will be inputs then it works usually.
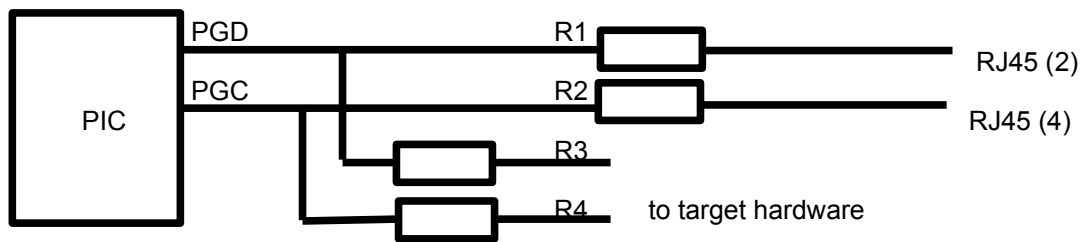
Select the value of R3 and R4 in the range of 2k ... 10k and R1, R2 in the range of 470 to 1k, then it will work, if the following hardware could sink and source the current from programmer. If programmer is in idle state (non programming state) the pins RJ45 (2) and RJ45 (4) are in tri state which is high impedance. This means that signal coming out of the targets hardware will not effect.

The **best way** is to switch all signals by a relais. Then you have no influence between iL_ISP_U and the target hardware. This way is necessary when PGD und PGC will work as outputs or bidirectional. This prevents the following hardware to be stimulated by the programmers impulses that could be ended in hardware confusion. This relais may be switched by an simple transistor stage. The signal for the transistor is generated by iL_ISP_U and is tied to RJ45 (7).
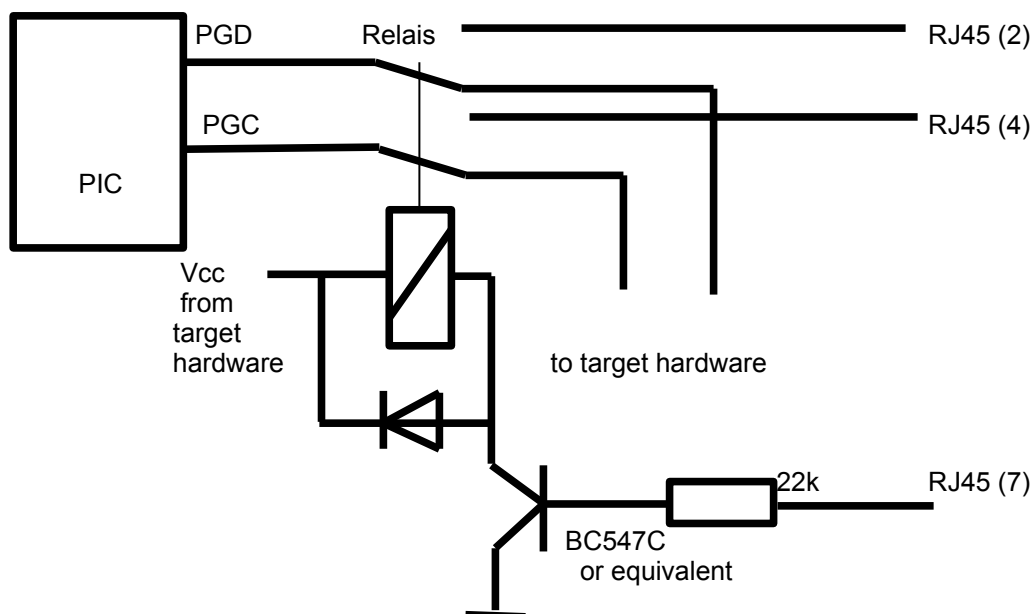
A less comfortable but also save solution is replaceing the relais by a simple switch or jumpers.

Vpp signal

Vpp enters the PIC into program/verify mode or RESET mode. To do this, this signal can be driven by low (0 V) and high (13.5 V). If none of these signals are active it is in high impedance and the target's pull-up resistor sets the PIC in run mode. The targets hardware must tolerate 13.5V at this /MCLR pin. A simple diode does this job.
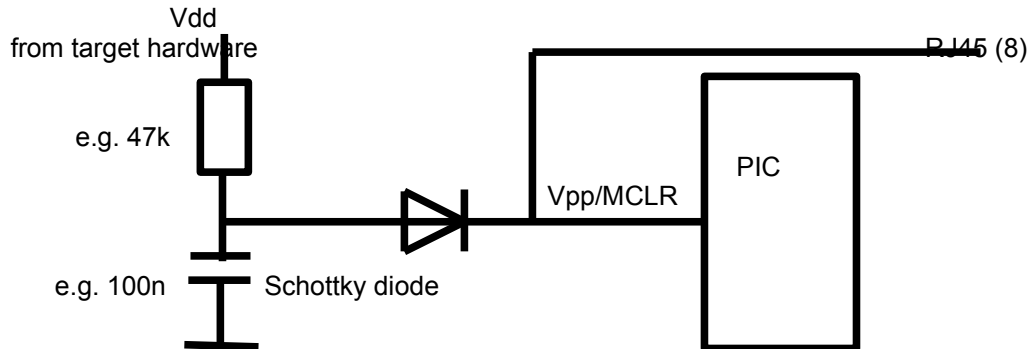
Luxury solution

Using a relais with 4 switch over contacts (or 2 relais with 2 switch over contacts) you can switch data, clock , Vdd and Vpp. This becomes a module for easy and comfortable programming your PIC build in your target hardware. As soon you start PIC programming in iL_PRG16 the relais will switch over all signals to the RJ jacket. The actual running program on the PIC will stop immediately. Then programming begins and after verifying the configuration word will be programmed. At the end the relais switch back and starts the new program. **This kind of luxuray is implemented in our new evaluation board "Flash Of Inspiration I"**.

IMPORTANT!!!

- Some PIC devices have a so called Low-Voltage-Programming (LVP) possibility. Using these PICs it could be nessecary to **tie this LVP pin to low during the RESET and PROGRAMMING/VERIFYING** mode. If not programming could be denied. The best solution to do this is to connect a resistor (220k up to 680k) to this pin and ground (Vss). This is enough, if this pin works as output. If it works as input the signal source for this pin out of your target hardware should drive a low.

- PICs with LV-programming ability are configured for this by Microchip.

- Within applications with power supply voltages less than 5 V you should take care because the programmer **i_ISP_U drives Vdd, data and clock at 5 V level**. Additional protection might be nessecary.