Driver and software installation guide

for digital thermometer and 1-wire adapter DS9097 with DS18B20 digital probe attached

1 Web mirror

All drivers and software could be downloaded from USBTEMP homepage under Software section[1].

2 Windows

The following pictures are based on Windows 7. The same procedure applies for recent versions of Windows 10 and 11.

2.1 Driver installation

2.1.1 Prolific PL2303

In Windows 10 with Windows Update enabled, system detects USB serial interface PL2303 when plugged-in and automatically installs the driver. If it does not, a manual installation of drivers is needed. Driver could also be downloaded from official Prolific webpage[2]. Start installation program.
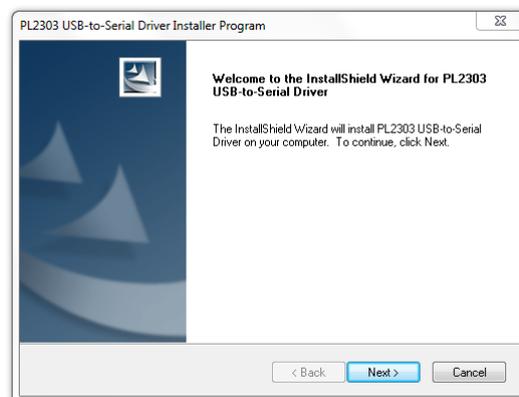
After installation open Device Manager and under Ports (COM & LPT) search for devices with label starting as **Prolific USB-to-Serial Comm Port** or **Prolific PL2303GL USB Serial COM Port**. The name of a serial port is given in round brackets. In next picture, the serial port has name COM4 and hence number 4.

---

[1] https://usbtemp.com/#software
[2] https://www.prolific.com.tw/US/ShowProduct.aspx?p_id=225&pcid=41
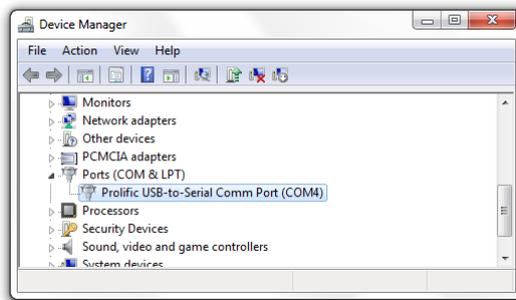
This name COMx with corresponding number x represents connected device.

2.1.2   Analog 1–wire driver (formerly Maxim Integrated)

If you're going to use LogTemp or OneWireViewer you need to install Analog 1–wire drivers[3]. There exist two releases; one 32-bit and another 64-bit. If you have 64-bit version of the Windows OS install 64-bit driver.
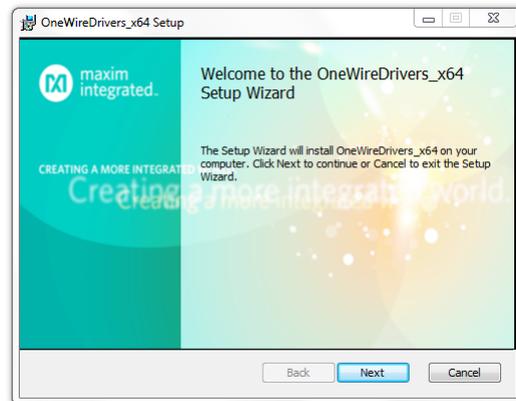
2.2   Software installation and usage

In following examples it is assumed that the device appeared under COM4 serial port name.

2.2.1   Digitemp

Digitemp software requires no installation, just download the `digitemp.exe` binary[4] or extract only mentioned file from the archive[5]. Make sure you have downloaded version 1.7. On other versions of Digitemp software USB thermometer might not get recognized.

Since Digitemp is a console only application, it should be started from Windows Command prompt. Command prompt could be found in Windows Start menu or started by run command (by pressing *Win + R* keys and then typing „cmd" in). After command prompt is started navigate to the directory where `digitemp.exe` is located.

---

[3]https://www.analog.com/en/design-center/evaluation-hardware-and-software/1-wire-sdks/download-1wire-ibutton-drivers.html
[4]https://fs3.kel.si/software/digitemp.exe
[5]http://digitemp.com/software/windows/dtdemo17.zip

Initialize probe

Before temperature acquirement, Digitemp needs an initialization.

```
digitemp.exe -i -s4
```

If your serial port (COM) has different number from 4; change this number to the number of the serial port.

Note: Digitemp can access only lower number (1-digit) serial ports, e.g. from COM1 to COM9. If you run out of 1-digit serial ports disable (in BIOS) or relocate (Properties > Port Settings > Advanced > COM Port Number) unused motherboard serial ports (in Windows Device Manager) to higher number and then relocate Prolific device to released lower number.

Output of probe initialization

```
DigiTemp v1.7 [REGISTRED] Copyright 1996-2002 by Brian C. Lane
All Rights Reserved - http://www.brianlane.com
Turning off all DS2409 Couplers
.
Searching the 1-Wire LAN
28667E060C000012 : DS18B20 Temperature Sensor
ROM #0 : 28667E060C000012
```

The last 2 lines tell that a 1-wire device (thermometer) was detected. The unique serial number is displayed as ROM, e.g. 28667E060C000012. After initialization a Digitemp configuration file (by default `digitemp.cfg` in the same directory as `digitemp.exe`) is created.

Acquire temperature

Once the configuration file is created, the temperature could be acquired.

Acquire temperature

```
digitemp.exe -q -t 0
```

The command takes about one second to output value.

Output of temperature in Celsius and Fahrenheits

```
Feb 01 10:45:36 Sensor 0 C: 22.25 F: 72.05
```

Tip: Initialization and acquiring can be done by the same command, but a Digitemp configuration file is going to be created anyway, as follows.

```
digitemp.exe -q -i -s4 -a
Turning off all DS2409 Couplers
.
Searching the 1-Wire LAN
289E808F0B0000F5 : DS18B20 Temperature Sensor
ROM #0 : 289E808F0B0000F5
Nov 03 16:20:01 Sensor 0 C: 18.00 F: 64.40
```

2.2.2 Digitemp as datalogger

Periodically save measurements to a file

Digitemp can run in foreground and periodically acquire temperature from the probe. Command in next example runs forever (`-n-1`) and takes the temperature of all sensors (`-a`) every 5 seconds (`-d 5`) and saves (appends `-l`) them to a file `temps.txt`.

Logging temperature every 5 seconds to a file `temps.txt`

```
digitemp.exe -q -a -n-1 -d 5 -l temps.txt
```

Logging could be stopped by break signal, Ctrl-C.

Content of `temps.txt`

```
...
Nov 01 10:53:55 Sensor 0 C: 20.00 F: 68.00
Nov 01 10:54:00 Sensor 0 C: 19.88 F: 67.78
Nov 01 10:54:05 Sensor 0 C: 19.88 F: 67.78
Nov 01 10:54:10 Sensor 0 C: 19.88 F: 67.78
Nov 01 10:54:15 Sensor 0 C: 20.00 F: 68.00
...
```

Tip: Initialization and logging (only temperatures `-o "%C"`) can be done by the same command.

```
digitemp.exe -q -i -s4 -a -n-1 -d 5 -o "%C" -l temps.txt
Turning off all DS2409 Couplers
.
Searching the 1-Wire LAN
289E808F0B0000F5 : DS18B20 Temperature Sensor
ROM #0 : 289E808F0B0000F5
^C
```

When more than one USB Thermometer is connected and values of all of them have to be logged, multiple Digitemp configuration files are needed as the ROM is a part of configuration file and different for each USB Thermometer. Since a Digitemp process can access (and is defined by) only one configuration file, multiple Digitemp processes are needed. This could be achived by multiple command prompts.

For help and a list of options run Digitemp binary with switch `-h`.

LogTemp (Windows)

For periodic measurements and saving values to CSV file on Windows LogTemp software[6] could be used. Additionally, this program needs 1–wire driver from Analog installed.

2.2.3   LogTemp

Download LogTemp setup executable and run it.

After installation start the appliction and in the configuration (Settings dialog) set Adapter to **COM – DS9097E** and Port COM to match your serial port name.
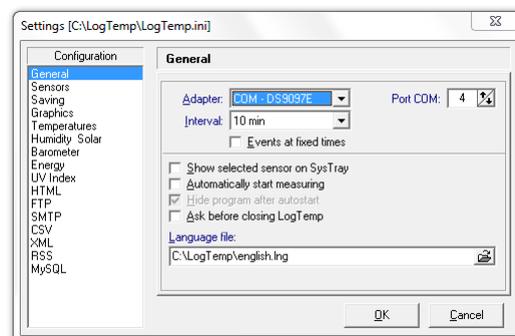
2.2.4   OneWireViewer

By installing Analog's 1–wire driver, OneWireViewer, as executable, could be found in a directory `Maxim Integrated Products\1-wire Drivers` under Program Files. This application requires at least Java RE 1.6.0_45 installed.

Another approach is installing JRE from open-source implementation of the Java Platform, Standard Edition, OpenJDK, e.g. Zulu. Unpack Zulu JRE[7] to some directory, e.g. `C:\java`.

Then extract two files from the archive[8]: `OneWireViewer.jar` and `OneWireAPI.jar` to another folder, e.g. `C:\owv`. Navigate Windows Command prompt (*cmd*) to this folder, add Zulu JRE bin path to `PATH` environment variable, i.e.

---

[6] https://www.mrsoft.fi/ohj01en.htm
[7] https://www.azul.com/downloads/?os=windows&package=jre#download-openjdk
[8] https://fs3.kel.si/software/onewireviewer.zip
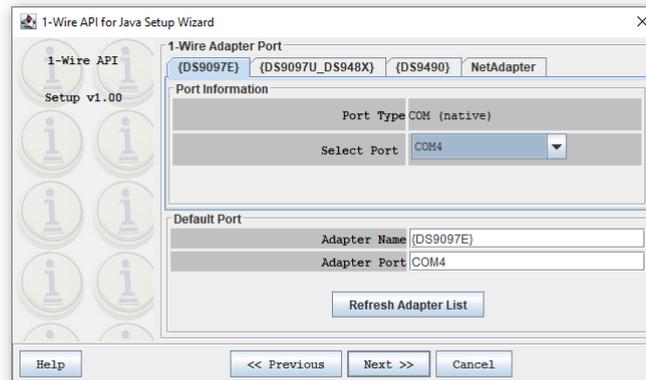
```
PATH=%PATH%;C:\java\zulu14.29.23-ca-jre14.0.2-win_x64\bin
```

and execute

```
java -classpath OneWireViewer.jar;OneWireAPI.jar;. OneWireViewer
```

Setup

In the setup window make sure **DS9097E** tab is selected and set Select Port to match your serial port name.

If you see a message box with error message `1-Wire Net not available`, it means 1-wire device has not been detected. This is usually caused by selecting wrong Port.

After two more clicks on Next button, a new window appears where connected and detected 1–wire devices are given on left pane.
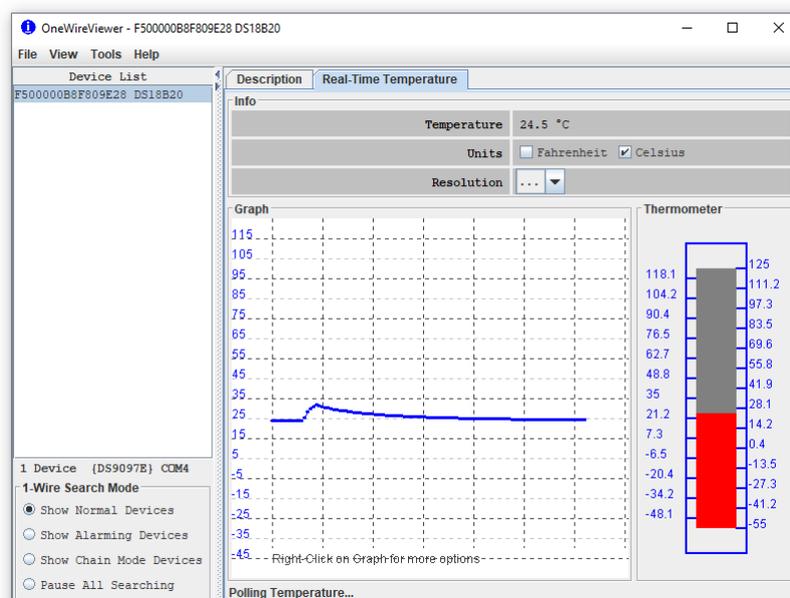
Complete OneWireViewer User guide and manual in PDF[9] is available on Analog website , a helpful tricks are also available[10].

---

[9]https://www.analog.com/media/en/technical-documentation/user-guides/onewireviewer-user-guide--maxim-integrated.pdf

[10]https://www.analog.com/en/app-notes/onewireviewer-tips-and-tricks.html

2.2.5 pydigitemp

For scripting purposes a **pydigitemp** python package[11] could be used.

Releases before version 1.4.0 use fcntl package (for exclusive locking of serial port) which is not available under Windows OS, therefore user needs to comment out one import line (namely `import fcntl`) and add early return statement as first statement in function _lock (`def _lock`) inside file `digitemp/master.py` before or after (if using pip) installation of the package.

Next code snippet acquires temperature from the probe connected at COM3.

```
from digitemp.master import UART_Adapter
from digitemp.device import DS18B20
bus = UART_Adapter('COM3')
sensor = DS18B20(bus)
print(sensor.get_temperature())
```

---

[11]https://github.com/mcsakoff/pydigitemp

3 Linux

It is assumed that `/dev/ttyUSB0` is the USB device representing USB Thermometer.

3.1 Driver installation

Driver for PL2303TA serial interface is already included in mainline Linux Kernel, and for PL2303GL in Kernel version 5.5 and newer. In most cases, after pluging the USB device into USB port, the system will automatically load a driver.

```
$ dmesg | tail
...
usb: new full-speed USB device number 24 using ehci-pci
usb: New USB device found, idVendor=067b, idProduct=2303
usb: New USB device strings: Mfr=1, Product=2, SerialNumber=0
usb: Product: USB-Serial Controller
usb: Manufacturer: Prolific Technology Inc.
pl2303: pl2303 converter detected
usb: pl2303 converter now attached to ttyUSB0
```

Right at the end of `dmesg` output you should see something like the 7 lines above. This means that the USB serial device (the thermometer) has been recognised by the `pl2303` driver.

You can check whether driver has been loaded if the last two lines appear.

```
$ lsmod |grep pl2303
pl2303                   16384  0
usbserial                28672  1 pl2303
```

3.1.1 Vanilla Linux Kernel

If the driver is not included into kernel, it has to be included and then, depending on your system, the kernel recompiled or the module compiled.

```
Device Drivers --->
        [*] USB support  --->
                <M> USB Serial Converter support  --->
                        <M> USB Prolific 2303 Single Port Serial Driver
```

Or in `.config` file:

```
CONFIG_USB_SUPPORT=y
CONFIG_USB=y
CONFIG_USB_SERIAL=m
CONFIG_USB_SERIAL_PL2303=m
```

Compile module

```
make modules_prepare
make M=drivers/usb/serial
```

Compiled module is a file (relative to source): `drivers/usb/serial/pl2303.ko`

3.1.2   Openwrt

On the configuration menu of OpenWrt the `kmod-usb-serial-pl2303` driver have to be selected.

```
Kernel modules  --->
       USB Support  --->
               <M> kmod-usb-serial
                       <M> kmod-usb-serial-pl2303
```

The `.config` file:

```
CONFIG_PACKAGE_kmod-usb-core=m
CONFIG_PACKAGE_kmod-usb-serial=m
CONFIG_PACKAGE_kmod-usb-serial-pl2303=m
```

Modules compiled into a kernel are preferred.

3.1.3   udev symlinks

Linux *udev subsystem* could be customized so that USB adapters featuring serial number, e.g. PL2303GL and CP2102, could be addressed by its serial number pointing to corresponding character special file `ttyUSBx`. This is useful in system with many connected devices.

First as superuser create a udev rule and then reload rules.

Content of `/etc/udev/rules.d/serial-short.rules`

```
SUBSYSTEM!="tty", GOTO="serial_end"

ENV{ID_SERIAL_SHORT}=="", GOTO="serial_end"
SYMLINK+="serial/by-serial/$env{ID_SERIAL_SHORT}"

LABEL="serial_end"
```

Reloading udev rules

```
$ udevadm control --reload-rules && udevadm trigger
```

Symbolic link are created in a directory `/dev/serial/by-serial`

3.2   Software installation

3.2.1   Digitemp

Debian & Ubuntu

Digitemp software is available as a software package *digitemp* in *main* repository, that could be installed by the following command.

```
Install Digitemp from package repository

$ sudo apt-get install digitemp
```

Fedora

Digitemp software is available as a software package *digitemp* and can be installed by executing the following command.

```
$ yum install -y digitemp
```

Mageia & Rosa

Digitemp software is available as a software package *digitemp* in *Core Release (distrib1)* repository and could be installed from Rpmdrake software management software or by the following command.

```
$ urpmi digitemp
```

Openwrt

Make sure you have build-in support for `pl2303` driver, otherwise kernel image (and Openwrt image) must be recompiled (and host device, e.g. router, reflashed). In some cases, installing via `opkg` might work:

```
$ opkg install kmod-usb-serial-pl2303
```

Install package *digtemp*.

```
$ opkg install digitemp
```

If the package is not available follow manual for *openwrt-packages-digitemp*[12]. Before last step make sure you have `CONFIG_PACKAGE_digitemp=y` in `.config` file and you have ran `make menuconfig`. In Openwrt source the last step must be

```
$ make package/feeds/hnw_digitemp/digitemp/compile
```

Archlinux & Manjaro

For these distributions precompiled binary is not available but a PKGBUILD is available to build the binary yourself. Make sure you have installed packages *core/gcc*, *core/fakeroot*, *core/make* and *extra/libusb-compat*.

```
$ pacman -S core/gcc core/fakeroot core/make extra/libusb-compat
```

As a user, create a building directory, clone repository and make a package.

---

[12]https://github.com/hnw/openwrt-packages-digitemp

```
$ mkdir ~/digitemp && cd ~/digitemp
$ git clone https://aur.archlinux.org/digitemp.git .
$ makepkg
```

Built binary is available in `pkg/digitemp/usr/bin` subdirectory.

Centos and others: building from official repository
Install necessary tools: `make` and `gcc`.

```
$ yum install -y git gcc
```

As a user, clone or download files from repository[13] to a folder.

```
$ mkdir ~/digitemp && cd ~/digitemp
$ git clone https://github.com/bcl/digitemp.git .
$ make ds9097
```

Built binary is available along source code.

3.2.2 OWFS 1-wire File System

Debian & Ubuntu
Install software package.

```
Install OWFS from package repository

$ sudo apt-get install owfs
```

Openwrt
Install package *owfs*.

```
$ opkg install owshell owfs
```

Archlinux & Manjaro
For these distributions precompiled binary is not available but there exists a PKGBUILD to build a binary
yourself. Make sure you have installed packages *extra/swig*.

```
$ pacman -S extra/swig
```

As a user, create a building directory, clone repository and make package.

```
$ mkdir ~/owfs && cd ~/owfs
$ git clone https://aur.archlinux.org/owfs.git .
$ makepkg
```

Built binary is available in `pkg/owfs/usr/bin` subdirectory. You may need to adjust `LD_LIBRARY_PATH`
to `~/owfs/pkg/owfs/usr/lib/`.

---

[13]https://github.com/bcl/digitemp

Centos and others: building from official repository

Install necessary tools: `fuse-devel` and `libtool`.

```
$ yum install -y fuse-devel libtool
```

As a user, clone or download files from repository[14] to a folder.

```
$ mkdir ~/owfs && cd ~/owfs
$ git clone https://github.com/owfs/owfs.git .
$ ./bootstrap
$ ./configure --enable-owfs
$ make
```

Built binaries are available along source code. For example `owfs` inside `./module/owfs/src/c`. Binaries could be installed to user specified directory (`/opt/owfs/bin/` by default) by executing `make install` as superuser.

3.3   Software usage

3.3.1   Digitemp

Prerequisite

Other commands (those starting with `digitemp_DS9097`) ought to be run as normal user as long user can access serial port, e.g. be a member of `dialout` group (group owning `/dev/ttyUSB0` device and having `rw` permissions). In most cases this could be achived as follows.

```
$ sudo usermod -a -G dialout live
```

Logout and back in, or issue `newgrp dialout` to obtain shell with new group.

> **Adding user to appropriate group manually**
>
> List group owner
>
> ```
> $ stat -c %G /dev/ttyUSB0
> ```
>
> Find a line starting with the group owner in file `/etc/group` and add your username after last colon. If there is already some username listed separate usernames by a comma.
>
> ```
> ...
> dialout:x:20:joe,youruser
> ...
> ```

Initialize probe

Before temperature acquirement Digitemp software needs an initialization, this is done by executing next command.

---

[14]https://github.com/owfs/owfs.git

```
$ digitemp_DS9097 -i -s /dev/ttyUSB0
DigiTemp v3.6.0 Copyright 1996-2007 by Brian C. Lane
GNU General Public License v2.0 - http://www.digitemp.com
Turning off all DS2409 Couplers
.
Searching the 1-Wire LAN
28667E060C000012 : DS18B20 Temperature Sensor
ROM #0 : 28667E060C000012
Wrote .digitemprc
```

Here /dev/ttyUSB0 is character special file representing serial interface (digital thermometer). After initialization a Digitemp configuration file (.digitemprc) is created. This initialization is only needed for the first time as long created configuration file is available. If you want to save configuration to a different file, use -c switch.

Acquire temperature
Then and each next time, using the same USB thermometer on the same computer, the temperature could be acquired (from first sensor -t 0) by the following command.

```
$ digitemp_DS9097 -t 0
DigiTemp v3.6.0 Copyright 1996-2007 by Brian C. Lane
GNU General Public License v2.0 - http://www.digitemp.com
Feb 01 10:45:36 Sensor 0 C: 22.25 F: 72.05
```

Text before last row (all except the line with the temperature) could be suppressed by using -q switch.

Tip: Initialization and acquiring can be done by the same command, but a Digitemp configuration file is going to be created anyway, as follows.

```
$ digitemp_DS9097 -q -i -s /dev/ttyUSB0 -a
287B474E0C000088 : DS18B20 Temperature Sensor
ROM #0 : 287B474E0C000088
Jul 04 11:10:46 Sensor 0 C: 26.38 F: 79.47
```

3.3.2   Digitemp as datalogger

Periodically save measurements to a file
Digitemp can run in foreground and periodically acquire temperature from the probe. Command in next example runs forever (-n 0) and takes the temperature of all sensors (-a) every 10 seconds (-d 10) and saves (appends) them to a file ~/temps.

```
$ digitemp_DS9097 -q -n 0 -a -d 10 -l ~/temps
```

3.3.3 OWFS 1-wire File System

Mount 1-wire filesystem

```
$ mkdir ~/1w
$ owfs --passive /dev/ttyUSB0 ~/1w
```

List all 1-wire devices

```
$ ls ~/1w/
```

The folder name (ROM) of temperature probe (DS18B20) starts with 28.:

```
$ cat ~/1w/28.667E060C0000/type
DS18B20
```

Display the temperature

```
$ cat ~/1w/28.667E060C0000/temperature
26.75
```

When using the USB thermometer with *owserver*[15], *owhttpd* … make sure you're using `passive` option (and not `serial` or `device`). The configuration file `/etc/owfs.conf` should have the following line.

```
server: passive = /dev/ttyUSB0
```

---

[15]http://owfs.org/

Contents