System Requirements for dSPACE Release 2017-A

If your system meets the following requirements, you can work with RCP and HIL software (containing RTI, ConfigurationDesk, MotionDesk, ModelDesk, etc.), AutomationDesk, TargetLink, Model Compare, ControlDesk, SystemDesk, and VEOS. The system requirements of the current dSPACE Release, are also available at http://www.dspace.com/go/sysreq.

Host PC Hardware

You need an x64-based personal computer as the host PC for your dSPACE software.

ControlDesk can also be installed on MicroAutoBox Embedded PC (with Intel® Core™ i7-3517UE processor).

Host Processor

All dSPACE software products require at least an Intel Core 2 Duo processor at 2 GHz (or equivalent). Intel Core i7 (for desktop PCs) or equivalent is recommended.

Main Memory

All dSPACE software products require at least 8 GB RAM (recommended: 16 GB RAM or more).

Disk Space

- For a complete installation of the DVD set, you need up to 22 GB of free hard disk space on the program partition.
- In addition you need up to 10 GB of free disk space on the system partition, for example, for run-time software like the Microsoft .NET Framework.

Disk Drives

DVD drive for the software installation from DVD.

Required Ports for Connecting Hardware

RCP and HIL Software

For communication with RapidPro hardware, you need a USB port version 2.0. dSPACE does not guarantee compatibility with USB 3.0.

TargetLink

For processor-in-the-loop (PIL) simulation, you need a serial port (RS232) or a free USB port (depending on the type of the evaluation board).

ControlDesk

- To connect DCI-CAN1 and DCI-KLine1, you need a USB port version 1.1 (compatible with USB 2.0). dSPACE does not guarantee compatibility with USB 3.0.
- To connect Calibration Hub and DCI‑GSI1, you need a USB port version 2.0 (compatible with USB 1.1). dSPACE does not guarantee compatibility with USB 3.0.
- To connect DCI-CAN2 and DCI‑CAN/LIN1, you need a USB port version 2.0 (compatible with USB 1.1 and USB 3.0).
- To use the Steering Controller instrument, you need a USB port to connect a game controller device.
- To connect a video camera to the video capturing device, you need a USB port or an Ethernet port (depending on the camera used.).
- To use the ControlDesk XIL API EESPort graphical user interface (via the RS232 interface), you need a serial port (RS232) that can run at 9.600 bit/s to connect dSPACE Simulator's Failure Insertion Unit (FIU) of PHS-bus-based HIL systems.

Graphics Adapter and Display

- To work with RCP and HIL software you need the following Windows' display property settings:
  - Windows 7: The Windows' display property "Custom Text Size (DPI)" must be set to 100 % (default setting).
  - Windows 10: The Windows' display scaling level ("Custom sizing options") must be set to 100 % (default setting).
  - Other settings are not supported.
- To work with TargetLink and/or Model Compare, you need a standard graphics adapter with a minimum resolution of 1024 x 768 pixel. In addition you need the following Windows' display property settings:
  - Windows 7: The Windows' display property "Custom Text Size (DPI)" must be set to 100 % (default setting) or to 125 %. Other settings are not supported.
  - Windows 10: The Windows' display scaling level ("Custom sizing options") is best set to 100 % (default setting) or to 125 %.
- To work with ControlDesk, you need a graphics card supporting at least Microsoft DirectX 9. If you use ControlDesk in a VMware environment, 3-D support must be enabled in VMware.

Additional Requirements for License Handling

- Dongle licenses: To connect the dongle, you need a USB port.
- Floating network licenses: All the PCs on which you want to run dSPACE software (dSPACE License Clients) must be able to establish a TCP/IP connection to the dSPACE License Server.

Required Slots

- You can install a modular system based on the DS1005, DS1006 or DS1007 in an expansion box. You cannot install these systems in the host PC.
- To install a DS1103, you need one free ISA slot and three adjacent brackets. The standard PCs currently available do not provide ISA slots. As an alternative, install a DS1103 in an expansion box. When installed directly in the host PC, the DS1103 cannot be used with the standard installation routines. In this case, contact dSPACE Support.
- To install a DS1104, you need one free 33 MHz/32-bit 5 V PCI slot or one PCIe slot, depending on the board variant.
- To connect your modular system (based on DS1005/DS1006), DS1103, MicroAutoBox, or dSPACE Simulator Mid-Size to the host PC via a bus connection, you need link boards in your host PC:
  - The DS815 Link Board (PC) requires one free PC card slot (type 2).
  - The DS817 Link Board (PC) requires one free 5 V PCI slot (up to DS817-03) or one free 3.3 V / 5 V Universal PCI slot (DS817-04 and later).
  - The DS819 Link Board (PC) requires one free PCI Express slot (x1 ... x32).
  - The DS821-34 mm Link Board (PC) requires one free ExpressCard/34 slot or one free ExpressCard/54 slot.
  - The DS821-54 mm Link Board (PC) requires one free ExpressCard/54 slot.

- The DS1007, MicroAutobox II, MicroLabBox and the SCALEXIO system require no link board. Host PC communication is established via your Ethernet network adapter.

Operating System

As of dSPACE Release 2016-A, dSPACE software supports only 64-bit operating systems. 32-bit operating systems are not supported any longer.

Operating System on Host PC
The dSPACE products support the following operating systems:
- Windows 7 (64-bit version) with Service Pack 1. Only the editions Windows 7 Professional, Ultimate, and Enterprise are supported. The editions Windows 7 Home Basic and Home Premium are not supported.
- Windows 10 with the following editions and servicing branches:
  - The 64-bit versions of the Professional, Education and Enterprise editions are supported.
  - The Windows 10 Home and Mobile editions are not supported.
  - The Long-Term Servicing Branch LTSB 2016 is supported.
  - The Current Branch for Business (CBB) with the compatibility statement of Microsoft for the Current Branch for Business is supported. The tests were executed with CBB version 1511.

Limitations for Using Windows 10
Video capturing is not possible with ControlDesk 6.1 (on dSPACE Release 2017-A) in combination with Windows 10. This is due to the discontinuation of a Microsoft base technology in Windows 10. As a consequence, Video Capturing devices in ControlDesk experiments are automatically deactivated under Windows 10. They cannot be activated. dSPACE is working on a solution.

Installing ControlDesk on MicroAutoBox
ControlDesk can also be installed on MicroAutoBox Embedded PC (with Intel® Core™ i7-3517UE processor) running under Windows 7 Professional, Ultimate, and Enterprise (64-bit versions).

Allowing Communication via Additional Firewall Rules
Additional Windows firewall rules are installed during the installation of various dSPACE software products. For example, one rule allows communication with a dSPACE expansion box such as AutoBox and another rule allows MotionDesk to receive motion data from a network channel.

Operating System on dSPACE License Server
If you purchased floating network licenses, you have to install and configure one of the networked PCs as the dSPACE License Server.
The operating system of the dSPACE License Server must be:
- Windows 7 Professional, Ultimate, or Enterprise (64-bit version) with the latest Service Pack
- Windows Server 2008 R2
- Windows Server 2012, Windows Server 2012 R2

The dSPACE License Server does not support non-Windows operating systems.

Limitations for Using Windows Features
Some limitations apply when you use dSPACE software in conjunction with features of Windows:
- **Fast user switching:** The dSPACE software does not support the fast user switching feature of Windows.
- **User Account Control:** It is recommended to disable Windows' User Account Control (UAC) during the installation of dSPACE software. If you cannot disable it, you should note the following Windows behavior: If UAC is enabled, the setup programs run with the administrator account instead of the user account. Therefore it is important that the administrator account has access to the required drives, particularly to the required network drives.
- **Long path names:** dSPACE software does not support the long path name syntax of the Windows API. If a path name that exceeds 260 characters is used directly or indirectly, the behavior of the dSPACE software is not defined.

Notes on 64-bit Compatibility of dSPACE Products

As of dSPACE Release 2016-B, all products are available only as 64-bit variants. As a consequence, dSPACE Release 2016-B and later supports only the 64-bit variants of the following software:
- Windows operating systems
- MATLAB
- Python

In general, 64-bit technology lets you handle more complex models and layouts as well as larger amounts of data than 32-bit technology. However, keep in mind the following points:
- Product extensions, e.g., ConfigurationDesk custom I/O function blocks, must be available in 64-bit.
- Python:
  - No support of 32-bit third-party extensions in the 64-bit Python installation from dSPACE.
  - No support of 64-bit dSPACE Python extensions in a parallel 32-bit Python installation.
- For some products, migration tasks are necessary. For instructions, refer to the product-specific chapters in the New Features and Migration Guide or to the user documentation of the relevant dSPACE product.

Third-Party Software

MATLAB®
Working with various dSPACE products requires that you have installed one of the following MATLAB releases: MATLAB R2015a SP1, R2015b, R2016a, R2016b, R2017a.

As of dSPACE Release 2016-A, dSPACE software supports only 64-bit MATLAB variants. 32-bit MATLAB variants are not supported any longer.

Note the following exceptions:
- R2017a is not supported by TargetLink and Model Compare.
- R2017a is not supported by the RTI FPGA Programming Blockset – FPGA Interface.
- R2015a SP1 is supported only by TargetLink and Model Compare.

For system requirements of The MathWorks software, refer to http://www.mathworks.com/support/sysreq.html.

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MATLAB Limitations
- **Restricted MAT file support:** The Signal Editor of ControlDesk supports only reading and writing MAT files of version 5.0. MAT files of this version can be created in MATLAB by using the Save command with the option '-v6'.
- **ModelDesk:** When you use MATLAB R2016a for Simulink simulation and the simulation is running, a download requires at least one minute.
  There is no limitation when the simulation is stopped or paused.

Code Generation
For code generation with RTI, RTI-MP, various RTI blocksets, ConfigurationDesk – Implementation Version (when working with Simulink models), Model Interface Package for Simulink, and for code generation of Automotive Simulation Models (ASM), you need Simulink Coder and MATLAB Coder from The MathWorks. Make sure that the MATLAB and Simulink versions are supported by the dSPACE software you intend to install. For details refer to our Web site at http://www.dspace.com/go/compatibility.

C Compiler for RCP and HIL Software
- For building MATLAB MEX files for the RTI CAN MultiMessage Blockset, RTI LIN MultiMessage Blockset, Automotive Simulation models and MotionDesk Blockset (in Simulink's RapidAccelerator simulation mode) you need one of the following C/C++ compilers and have to configure it as a MEX compiler in MATLAB: Microsoft Windows SDK 7.1 or MinGW 4.9.2.
  If you use the MinGW compiler, note the following:
  - Using MATLAB R2015b, the following MATLAB patch needs to be installed to use MinGW with dSPACE software:
  https://www.mathworks.com/support/bugreports/1271231
  - If you experience problems using MinGW as a MEX compiler, check the bug reports and solutions published by MathWorks.
- For MicroAutoBox, the DS1103, DS1104 and DS1005 boards, and the RapidPro Control Unit with MPC5554, you must install the Microtec PowerPC C/C++ Compiler Ver. 3.8.5. If you ordered the compiler together with your dSPACE system, it is installed automatically with the dSPACE software.
- For the DS1006, the dSPACE DS1006 C/C++ Compiler Ver. 3.0 (based on GNU C/C++ Compiler Ver. 4.8.3) is installed automatically together with the dSPACE software.
- For the DS1007, MicroLabBox and SCALEXIO systems, the required version of the QNX Compiler for dSPACE systems (based on a GNU C/C++ compiler) is installed automatically together with the dSPACE software.
- For compiling slave applications for the DS2302, DS2210, and DS2211 I/O boards, you must install TMS 320C3x/C4x Code Generation Tools Ver. 4.70 or 5.11 or TMS 320C3x/C4x Code Composer Tools Release 4.10 from Texas Instruments.
  Installing TMS 320C3x/C4x Code Composer Tools of Release 4.10 (containing C3x/C4x Code Generation Tools 5.11) under Windows 7 (64-bit) is not possible. For information on a workaround, refer to http://e2e.ti.com/support/development_tools/code_composer_studio/f/81/t/211223.aspx or contact dSPACE Support.
- For compiling slave applications for the DS1103, you must install Texas Instruments Code Composer Studio (CCStudio) Integrated Development Environment (IDE) v3 – for F24x/C24x devices.
- C compiler for internal bypass targets used by the RTI Bypass Blockset
  For compiling real-time applications for internal bypass targets, you need a C compiler depending on the target:
  - HighTec GNU CC compiler for the Infineon TriCore, Freescale MPCxxx and Renesas target processor families
  - GNU CC compiler for the x86 target

The compilers are part of the RCP and HIL software package and installed automatically with the dSPACE software.

C Compiler for VEOS
You must install one of the following C/C++ compilers to build software-in-the-loop (SIL) simulation applications:
- Microsoft Visual C/C++ Compiler as in Visual Studio 2010 (also provided by Microsoft Windows SDK 7.0a) or Visual Studio 2012. Express editions of these versions are also supported.
- GNU C/C++ Compiler (all versions). The GNU GCC Ver. 4.8 is shipped with the dSPACE software and installed automatically.

Third-Party Software for ControlDesk
- API and driver for CAN, LIN or FlexRay interfaces from Vector Informatik GmbH
  To use CAN, LIN or FlexRay interfaces from Vector Informatik GmbH with ControlDesk, you need the appropriate API and driver:
  - API: XL Driver Library 8.0 or later (provided by the ControlDesk installation)
  - Driver: Vector Driver Ver. 8.0 or later. You need a driver version that is compatible with the API you use. Download the driver from http://www.vector-informatik.de.
- Driver for CAN/LIN Interfaces from Kvaser
  To use Kvaser CAN/LIN interfaces with ControlDesk, you need the appropriate Kvaser driver: Kvaser CAN Ver. 4.0 or later, or Kvaser LIN Ver. 7.0 or later. Download it from http://www.kvaser.com.
- Driver for CAN, LIN or FlexRay interfaces from Eberspächer Electronics (formerly TZM)
  To use these CAN, LIN or FlexRay interfaces with ControlDesk, you need the appropriate driver Ver. 6.4 (or later). Download it from http://www.eberspaecher.com.
- Drivers for CAN interfaces from KPIT Technologies GmbH
  To use CAN interfaces from KPIT Technologies GmbH (http://www.kpit.com/engineering/automotive/vehicle-diagnostics) with ControlDesk, you need the appropriate driver version. Contact dSPACE or inquire at diagnostics@kpit.com for details.
- Driver software for K-Line interfaces
  To use K-Line interfaces from KPIT Technologies GmbH (http://www.kpit.com/engineering/automotive/vehicle-diagnostics) with ControlDesk, you need the appropriate driver version. Contact dSPACE or inquire at diagnostics@kpit.com for details.
- Driver software for video cameras
  To access video cameras from IDS (http://www.ids-imaging.com) with ControlDesk, you need to install and activate the appropriate driver software. ControlDesk requires the driver software to access these cameras via DirectShow. Contact dSPACE for details.

C Compiler for TargetLink

You must install one of the following C compilers to build MATLAB MEX files and software-in-the-loop (SIL) simulation applications:

- Microsoft Windows SDK 7.1 or Microsoft Visual C/C++ Professional 2008 (Ver. 9.0), 2010 (Ver. 10.0), 2012 (Ver. 11.0), 2012 (Ver. 12.0), or 2015 (Ver. 14.0)
- MinGW (GNU Compiler Collection (GCC 4.9.2)) (since MATLAB R2015b)
- The LCC compiler cannot be used to build 64-bit MEX files, because the shipped LCC-Win64 compiler does not support building MEX files or S-functions.

Processor-in-the-Loop (PIL) Simulation

- An evaluation board (EVB) has to be available (see table below)
- A target-specific compiler has to be available (see table below)

Compatible Evaluation Boards for PIL Simulation in TargetLink	Compatible Compilers
Emerge-Engineering ARM MEDKit	Keil 5.2
Freescale MPC5604BEVB	Green Hills 2012
	Green Hills 2014
	Wind River Diab 5.9
Freescale MPC5748GEVB	Green Hills 2014
	Wind River Diab 5.9
Freescale EVB9S12XEP100	Cosmic 4,8
	Metrowerks CodeWarrior 5.1
I+ME Promotion Package 166	Altium TASKING C166/ST10 Toolchain 8.6
Infineon TriBoard TriCore 1766 Infineon TriBoard TriCore 1766 20 MHz	Altium TASKING TriCore VX-Toolset 3.2
Infineon TriBoard TriCore 1767	Altium TASKING TriCore VX-Toolset 3.2
	Altium TASKING TriCore VX-Toolset 6.0
Infineon TriBoard TriCore 1796	Altium TASKING TriCore VX-Toolset 3.2
Infineon TriBoard TriCore 275	Altium TASKING TriCore VX-Toolset 6.0
	HighTec GNU 4.6
Infineon EasyKit XC2287	Altium TASKING VX-toolset for C166 3.0
Renesas YRH850F1L_R7F7010354	Green Hills 2015
Renesas EVB7058	Renesas 9.3
Renesas SH72513 System Development Kit	Renesas 9.4
Renesas AB_050_Fx4_70_F4012	Green Hills 2015

If your target is not listed here, refer to the TargetLink PIL Support website at http://www.dspace.com/go/tlpil.

Expansion Box Requirements

Connecting an Expansion Box and Host PC via Bus Connection
- The DS814 Link Board has to be installed in the expansion box.
- The DS815, DS817, DS819, or DS821 Link Board has to be installed in the host PC.
- You cannot connect the currently available dSPACE boards to the host PC via the DS811 or DS812 Link Board.

Connecting an Expansion Box and Host PC via Ethernet
- A slot CPU with an integrated network adapter has to be installed in the expansion box.
- Valid for DS1007 systems: The DS1007 provides an onboard Ethernet interface to connect the system installed in the expansion box to the host PC via Ethernet.
- The host PC must have a 10BASET (twisted pair, 10 Mbit/s or faster) network adapter.

Required Slots
- To install a DS1103, you need one free, full-size ISA slot and two additional, free, adjacent brackets.
- To install a modular system based on DS1005, DS1006, or DS1007, you need as many free slots in the box as the number of boards you want to install. Note that the DS2210 requires two adjacent brackets altogether. The DS5203 requires two adjacent brackets, if the DS5203M1 I/O modules are installed. The DS2202, DS2211, DS4003, and DS4004 each require a total of three adjacent brackets.
- Valid for DS1005 and DS1006:
  One free full-size ISA slot is required either by the DS814 (bus connection) or the slot CPU (Ethernet connection). Note that the slot CPU (supplied as of March 2008) requires two slots if you use it in an AutoBox with a DS1005.
- The DS1006 has special slot requirements to ensure proper cooling of the AMD Opteron™ processor:
  - In a PX20, the slot requirement depends on the board revision: Up to board revision DS1006-03, each DS1006 requires four slots (including one slot for the DS814 Link Board or the slot CPU). As of board revision DS1006-06, each DS1006 requires three slots. However, none of the slots can be used for the DS814 Link Board or the slot CPU.
  - In a PX10, the DS1006 requires either two slots (with Gigalink module) or one slot (without Gigalink module), if installed next to the box's power supply (recommended).

Installing a DS1006 in an Expansion Box
- The DS1006-based modular system must be installed in a PX10 or PX20 Expansion Box. PX10 supports one, PX20 up to two DS1006 boards.
- The expansion boxes need special power supplies and connectors which meet the DS1006 requirements. For information on whether your existing expansion box meets these requirements, refer to http://www.dspace.com/go/pxboxvers.
- You cannot insert a DS1006 in a PX4 Expansion Box, or an AutoBox/Tandem-AutoBox.

Installing DS1007 in an Expansion Box
- The DS1007-based modular system can be installed in a PX10 or PX20 Expansion Box or in an AutoBox/Tandem-AutoBox. PX10 and AutoBox support one, PX20 and Tandem-AutoBox support up to two DS1007.
- You cannot insert a DS1007 in a PX4 Expansion Box.

3-D Online Animation via MotionDesk

For 3-D online animation via MotionDesk, your system has to meet additional requirements. They are also listed at http://www.dspace.com/go/mdhwrequ.

Software Requirements
- The latest driver for the graphics adapter must be installed. This driver must support OpenGL Ver. 2.1 and OpenGL Shading Language Ver. 1.4.

Hardware Requirements
- At least an Intel Core 2 Duo processor at 2 GHz, 8 GB RAM is required. Recommended: Intel Core i7 processor, 16 GB RAM or more.
- At least 6 GB of free disk space for the initial installation.
- For a multi-PC solution with DS1005/DS1006 (not possible for DS1103 or MicroAutoBox), you need additional hardware (not required for DS1007, SCALEXIO systems, VEOS): a MotionDesk Multi-PC Interface Kit for the simulator and an Ethernet card (10 Mbit/s or faster) for each connected MotionDesk PC.
- For a Simulink simulation, the Simulation PC and each connected MotionDesk PC must have at least a 10 Mbit/s Ethernet card. If simulation and visualization run on the same PC, one 10 Mbit/s Ethernet card is sufficient for that PC.

Graphics Card Specification
- Types:
  - NVIDIA graphics accelerator (OpenGL-compliant)
  - Intel graphics accelerators as of Intel HD Graphics 530 or faster
- Supported cards: NVIDIA Quadro, Quadro FX including mobile derivatives; NVIDIA GeForce GTX family higher than GeForce GTX 285; NVIDIA GeForce GTX Ti family.
- Unsupported cards: NVIDIA GeForce GT family, GTS family, NVIDIA Quadro FX models with less than 2 GB RAM; ATI/AMD graphics accelerators (not tested); Intel graphics accelerators earlier than Intel HD Graphics 530.
- Graphics memory: At least 2 GB RAM.
  Recommended: at least 4 GB RAM and two output channels (one output channel to display MotionDesk, the other one to display ModelDesk, ControlDesk, or MATLAB).

Additional Requirements for Notebooks
- MotionDesk has high requirements with regard to graphic performance and driver quality. In some cases MotionDesk will not operate properly on notebooks.
- The notebook should be equipped with a supported NVIDIA graphics accelerator (see list above).
- MotionDesk requires the NVIDIA Optimus technology to be deactivated. The dedicated graphics accelerator must be the only active graphics accelerator.

Onboard Graphic Adapters
dSPACE does not guarantee that MotionDesk runs on computers with onboard graphic adapters for the following reasons:
- The specialized onboard graphics processing units often behave differently from high-end graphics cards.
- Even if the technical specifications of these processing units match the formal requirements, drivers are often not stable enough to satisfy the requirements of 3-D real-time applications.

For trouble-free operation, the NVIDIA graphics accelerator must be the only active graphics accelerator.

Unsupported Environments
Because it uses OpenGL software rendering, MotionDesk does not support the following environments:
- VMware or similar products utilizing software rendering
- Remote desktop software

Using MotionDesk in one of these environments might result in false rendering.

Resource Requirements of dSPACE Boards

dSPACE boards require different resources in the host PC and the expansion box, depending on the installation.

Installation in the Host PC

The following table lists the required I/O address ranges together with the default addresses and the required memory of dSPACE boards, when installed in the host PC. Some dSPACE boards support plug & play, in which case they require an interrupt request line (IRQ). However, the boards operate correctly even if no free IRQ is available.

Board	Slot Type	Required I/O Address Range	Default I/O Base Address	Required Memory Range	Required IRQ
DS1104	PCI	None	None	Two 4 KB blocks (Plug & play)	1 (PCI)
DS1104 (PCIe variant)	PCIe	None	None	Two 4 KB blocks (Plug & play)	1 (PCIe)
DS815	PCMCIA	10H	Plug & play	None	1 (ISA)
DS817	PCI	10H	Plug & play	None	1 (PCI)
DS819 [1]	PCI Express	10H	Plug & play	None	1 (PCI Express)
DS821 [1]	Express Card	10H	Plug & play	None	1 (PCI Express)
[1] Supported by the dSPACE software as of dSPACE Release 5.2.					

Installation in the Expansion Box

When installed in an expansion box, dSPACE boards require the following resources in the expansion box:

Board	Required I/O Address Range	Default I/O Base Address
DS1005	10H	300H
DS1006 up to board revision DS1006-03	10H	300H
DS1006 as of board revision DS1006-06 (multicore processor board)	40H	300H
DS1103	10H	300H
DS2302	10H	380H

The DS1007 PPC Processor Board does not need any resources in the expansion box.

Connection via DS815, DS817, DS819, or DS821 Link Board
The Link Boards require the following resources in the host PC:

Required I/O Address Range	Default I/O Base Address	Required Memory Range	Required IRQ	
10H	Plug & play	None	1	• ISA for DS815 • PCI for DS817 • PCI Express for DS819/DS821

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