Pro-drive User Manual

(applies to Pro-drive version 1.1.0.0 and later)

Content

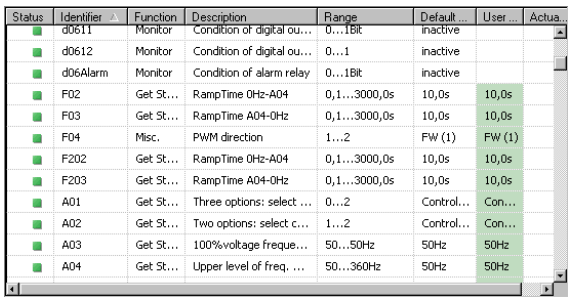
Introduction

Overview

Pro-drive is software used for maintenance of Hitachi inverters.

It is a simple, easy-to-use, but also powerful application, capable to communicate with any inverter type and to access all inverter parameters. Using the internal data base, which contains limits and dependencies, Pro-drive will not allow user to write any out-of-range value, or to write some strange combination of parameters which may render inverter unusable.

Inverter parameters are represented in spreadsheet-like form, each row corresponding to a single parameter. Values are arranged in fields, holding lower and upper range, default value, user setting and actual (current) setting.



Status	Identifier	Function	Description	Range	Default ...	User ...	Actua...
	d0611	Monitor	Condition of digital ou...	0...1Bit	inactive		
	d0612	Monitor	Condition of digital ou...	0...1	inactive		
	d06Alarm	Monitor	Condition of alarm relay	0...1Bit	inactive		
	F02	Get St...	RampTime 0Hz-A04	0,1...3000,0s	10,0s	10,0s	
	F03	Get St...	RampTime A04-0Hz	0,1...3000,0s	10,0s	10,0s	
	F04	Misc.	PWM direction	1...2	FW (1)	FW (1)	
	F202	Get St...	RampTime 0Hz-A04	0,1...3000,0s	10,0s	10,0s	
	F203	Get St...	RampTime A04-0Hz	0,1...3000,0s	10,0s	10,0s	
	A01	Get St...	Three options: select ...	0...2	Control...	Con...	
	A02	Get St...	Two options: select c...	1...2	Control...	Con...	
	A03	Get St...	100%voltage freque...	50...50Hz	50Hz	50Hz	
	A04	Get St...	Upper level of freq. ...	50...360Hz	50Hz	50Hz	

Pro-drive visual interface is highly configurable. User may select which screen elements are shown, and which columns are shown. Even the order of columns is configurable.

Because of simplicity and safety, Pro-drive may be used not only by engineers and technical experts, but also by technicians and short-trained persons.

Two main modes of operation are available: on-line mode, with inverter connected, or in off-line mode, preparing a project for later use.

off-line mode on-line mode

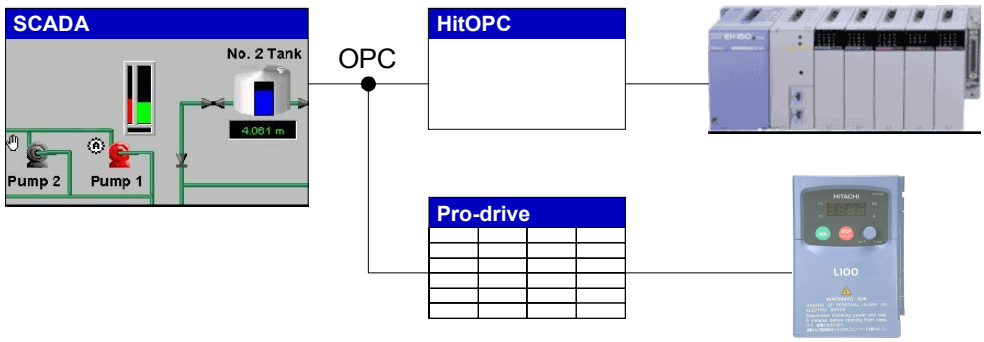
To connect PC serial port (RS232 levels) and inverter (RS422 levels), an RS232/422 converter is needed.

Pro-drive inverter

Pro-drive is also working as OPC Data Access Server.

OPC stands for "OLE for Process Control". It is a specification standardized by OPC foundation (www.opcfoundation.org) which enables OPC client applications to access hardware specific data via OPC servers in a common, well defined way.

Pro-drive OPC Data Access Server enables OPC clients (SCADA/HMI or other) to connect to Hitachi inverters, using standard serial RS422 protocol. Visualization or data logging applications may access inverter parameters in the same way as they usually access working memory of a PLC.



Using the internal data base, Pro-drive is handling all limits and dependencies between inverter parameters, so OPC client is working safe.

Hardware requirements

Any newly or recently purchased PC easily meets the minimum requirements of Pro-drive. For an older PC it can be tricky tricky working out whether it can be used or not, but generally any PC running an approved operating system shall do.

The table below lists the minimum specification required to run Pro-drive, as well as recommended specification.

Minimum hardware/software requirements:

- CPU Celeron 200MHz or higher
- SVGA monitor (800x600 resolution)
- Microsoft Windows 98SE or later
- 16Mb of available RAM memory
- 4Mb of hard drive space
- mouse or any other pointing device
- serial communication port
- RS232/422 adapter

Recommended hardware/software requirements:

- CPU Pentium III 1GHz or higher
- XGA monitor (1024x768 resolution)
- Microsoft Windows 2000 + latest available service pack
- 512Mb RAM memory
- 4Mb hard drive space
- mouse or any other pointing device
- serial communication port
- RS232/422 adapter

The minimum specification PCs may perform adequately, but it will take a long time to perform some operations, and may experience some trouble. The recommended specification should work smoothly, without delays and unnecessary waiting.

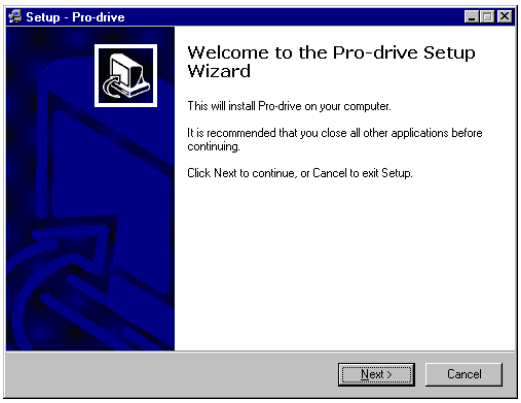
Concerning the operating system, Pro-drive may be installed on Microsoft Windows 98, Windows 98 Second Edition, Windows Millennium Edition (Me), Windows 2000, or Windows XP. Windows 95 and Windows NT4 with Service Pack 4 or greater will work, but may have some trouble.

The Pro-drive itself requires approximately 4Mb of disk space and about 16Mb or RAM. CPU load is negligible.

To connect inverter, standard serial communication port (RS232) is required. If no serial port is available, connection may be established using USB/RS232 converter.

Installation

To install Pro-drive, start the installation archive and follow the instructions.



Installation does the following:

- unpack Pro-drive files into specified directory
- create start menu group and inserts icons
- register Pro-drive OPC server

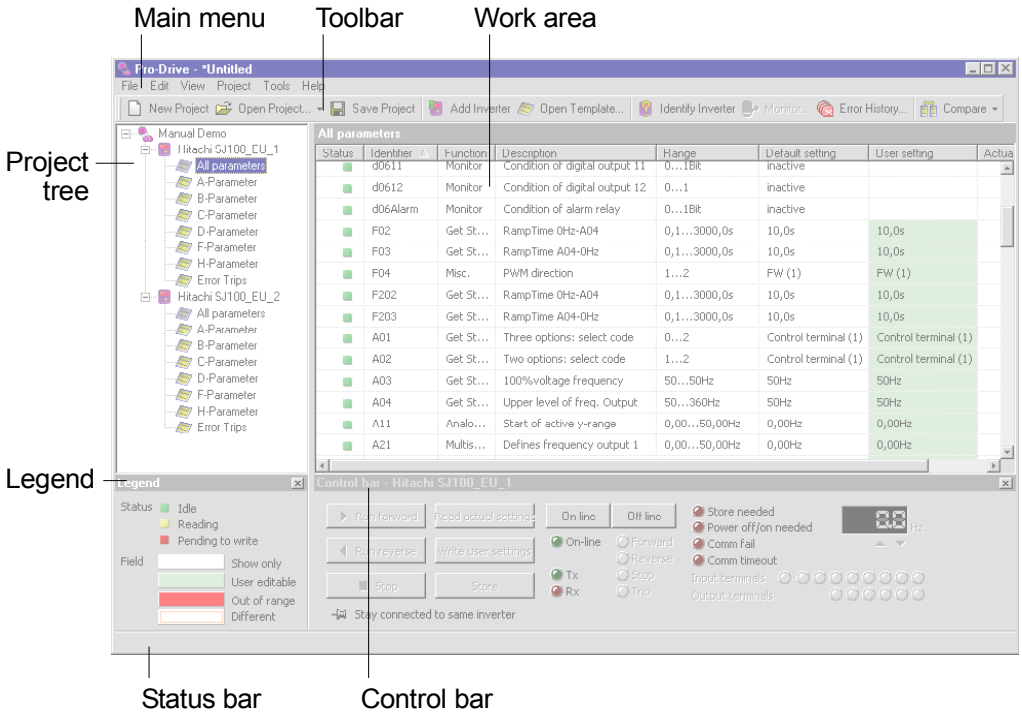
To uninstall Pro-drive first shut down server (if it is running), then start Control Panel, Add/Remove Programs, select Pro-drive and press Add/Remove button.

Uninstall procedure removes all installed components and registry entries. User created files, i.e. configuration data, will not be deleted.

User Interface

Main Window

Main window consists of Main menu, Toolbar, Project tree, Work area, Legend, Control bar and Status bar.



To turn-off or turn-on a screen element, use main menu View.

Work area is a spreadsheet-like, containing all project properties and inverter parameters. Work area consists of fields. Each field contain a value, identification or description string.

> Hint: to get quick parameter description (without scrolling), place mouse over the identifier field and wait for a second - a hint window appears, showing identifier, name and description.

Each work area field may contain different types.

field	type	description
	read-only	read-only field appears if a value is not allowed to change at the current moment
	read/write	edit field allows user to enter a new value
	out of range	field is out of allowed range, and will be ignored for write operation
	different	appears as a result of a compare operation, showing not equal fields

Field type may change dynamically, according to parameter type, inverter state (run/stop/error) and communication state (on-line/off-line), but also according to what is available for a selected inverter type.

> Hint: to change the order of parameters, click a label on top of the column. parameters may be sorted by identifier, status and function. If compare function is active, parameters may also be sorted by difference.

Toolbar

Toolbar contains buttons for most frequently used functions:

New Project ..... Start a new Pro-drive project.

Open Project ..... Open a previously saved project.

Save Project ..... Save current project. If project was not saved before, a dialog box asking for a project name and path will appear.

Add Inverter ..... Add a new inverter to the current project.

Open template ..... Open a new template for the currently selected inverter. Template type should correspond to the inverter type.

Identify Inverter ..... Start a communication cycle which will try to automatically identify connected inverter. If inverter type is already defined, identify will offer to change type or to create a new inverter.

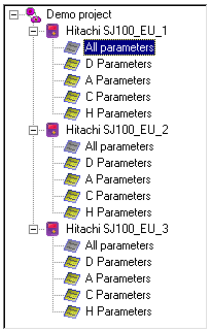
Monitor ..... Open an on-line monitor, used for a quick graphical overview of selected parameters. Monitor also have a elementary data logging capabilities.

Error History ..... Open an error history log (trip data).

Compare ..... Toggle the compare function on/off.

Project Tree

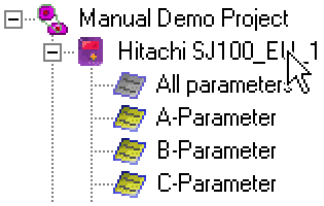
Project tree is vertical panel on the left side of the screen. It contains all project parts, and makes navigation through the project easy.



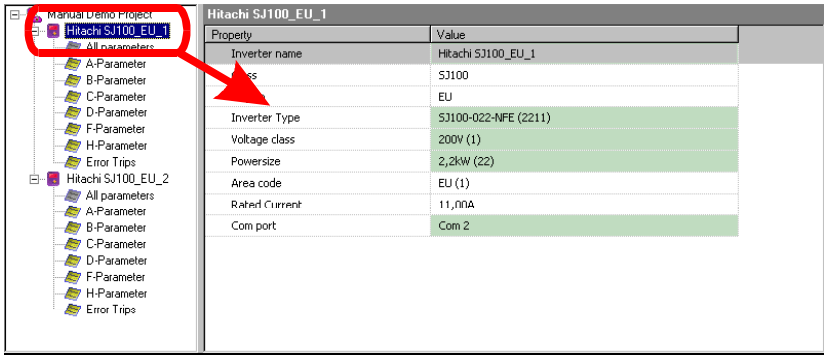
Each Project tree node has a corresponding view in the work area.

project ..... project properties
inverter ..... inverter properties
all parameters ..... inverter parameters
template ..... inverter parameters (subset)

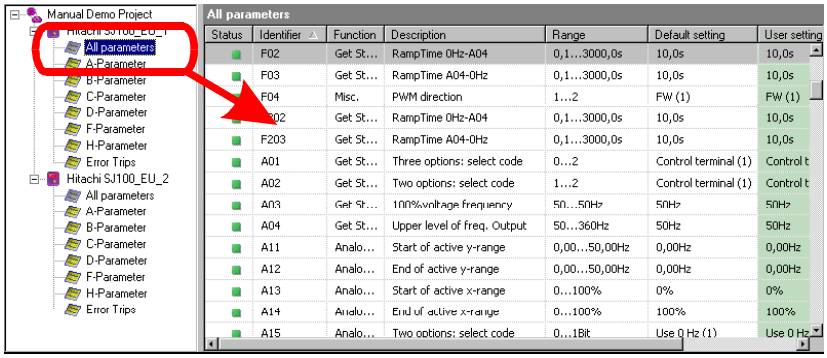
To select a view, click on a desired tree node:



Example below shows properties of the first inverter.

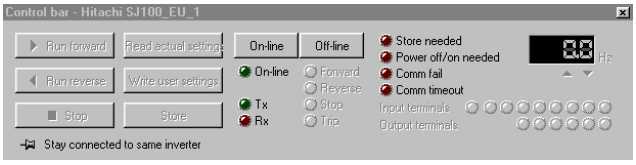


The next example shows parameters of the first inverter.



Control bar

Control bar is a gray horizontal panel at the right bottom of the main window. It allows user to control inverter the same way as from the inverter control panel.



To show or hide control bar, use menu command View/Control bar.

> Hint: Please note that all control functions are disabled in off-line mode. To make them available, the on-line mode should be selected.

Here is a list of available commands (buttons):

Run forward.....Start inverter to forward direction.

Run reverse.....Start inverter to reverse direction.

Stop ..... Stop inverter.

Read actual settings..... Read all inverter parameters to the actual settings column.

Write user settings ..... Write all parameters from user settings column to the connected inverter.

Store..... Execute inverter STORE command. All parameters are now permanently stored.

On-line..... Go to on-line mode.

Off-line..... Go to off-line mode.

Stay connected to same inverter ..... If this button is not pressed, control bar refers to inverter selected in project tree. Selecting a different inverter, control bar disconnects from the current inverter and connects to a new one. If only one inverter is actually connected, press this button to stay connected to the connected inverter, no mater which one is actually selected.

Up, Down ..... Up/down buttons set the requested frequency output.

Here is a list of available indicators:

On-line..... Display the on-line or off-line status of Pro-drive.

Tx ..... Transmitting LED, flickers when data is currently transmitted.

Rx..... Receiving LED, flickers when data is currently received.

Forward ..... Inverter is running forward.

Reverse..... Inverter is running reverse.

Stop ..... Inverter is stopped.

Trip ..... Inverter is tripped.

Store needed..... A parameter which require store command is changed.

Power off/on needed..... Inverter should be turned off and on.

Comm fail ..... Communication failed.

Comm timeout..... No response - communication timeout encountered.

Status bar

Status bar shows all system error messages and reports. If something goes wrong, status bar may be very usable to detect where the error is.

For a complete list of error messages, please refer to the appendix.

Using Pro-drive (off-line mode)

Add new inverter

1) Open Pro-drive and press New Project

2) Start Add Inverter and select the appropriate inverter type

3) Open Label combo box and select the appropriate label

Prepare set of parameters

1) Copy default settings to user settings

2) Change desired parameters

3) Save the project

Use templates

To open an existing template, use command *Project/Open Template* (Ctrl-T). Template is closely related to inverter type, so it is not possible to use template of a different type.

Create new template

To create a new template, use command *New Template*. An empty template named "Untitled" is created below All Parameters folder.

To give a name to template, right-click to template and select *Rename*.

To copy parameters to template, open All parameters folder, select desired parameters (Ctrl/Shift multiselection is available), press *Copy*, open template and then right-click and *Paste parameters*.

Templates are included (and saved) in project file, so there is no need to save separate template file, except for using template in a different project.

To save template, use command *Project/Save template*. To save all existing templates in a single multi-folder file, select inverter and then use command *Project/Save All Templates*. Template is saved as text-only file, so additional modifications may be performed using a plain text editor, like Windows Notepad.

Using Pro-drive (on-line mode)

Add new inverter

1) Connect inverter to PC using RS232/RS422 converter

2) Open Pro-drive and run New Project

3) Start Add Inverter and press Detect

Change parameter

1) Read actual settings

2) Copy actual settings to user settings

3) Change desired parameters

4) Write user settings

Compare actual and default values

1) Activate compare function (Ctrl-Q)

2) Click a small checkbox on default and actual columns

3) Make sure no other columns are selected

Different values are shown with a red outline.

> Hint: to show all differences at the top of the window, press the “User setting” label on the top of the column. To get back to default order, press the “Identifier” label.

Compare data between inverters

1) Activate compare function (Ctrl-Q)

2) Click on project tree (all parameters or template) to select the left inverter

3) From a compare drop-down menu select the right inverter

4) Click a small checkbox on top of columns which should be compared

5) Make sure no other columns are selected

6) If needed, use horizontal scroll bar to display the desired columns

> Hint: to show all differences at the top of the window, press the “User setting” or “Actual setting” label on the top of the column. To get back to default order, press the “Identifier” label.

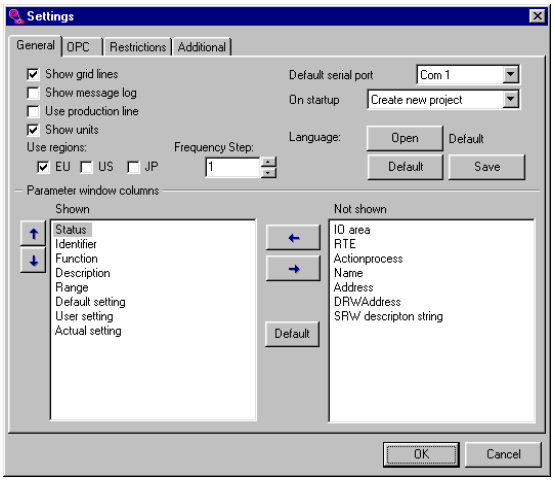
Configuring Pro-drive

To change Pro-drive settings, use command *Tools/Settings*.

Tab "General" refers mainly to appearance, and tab "OPC" refers to the OPC settings.

General settings

To show general settings dialog box, press Tools/Setting (F5), and select the “General” tab.



Show grid lines ..... Display grid lines in working area.

Show message log ..... Log file is file which contains internal messages and errors. It may be useful for debugging.

Use production line ..... Show an additional level in project tree.

Show units ..... Show measuring units together with values.

Use regions (EU, US, JP) .... Select the regional settings. Only the selected regions will be displayed in Add Inverter dialog box.

Frequency step ..... Control bar frequency setting step in Hertz.

Default serial port ..... Default port for new inverter.

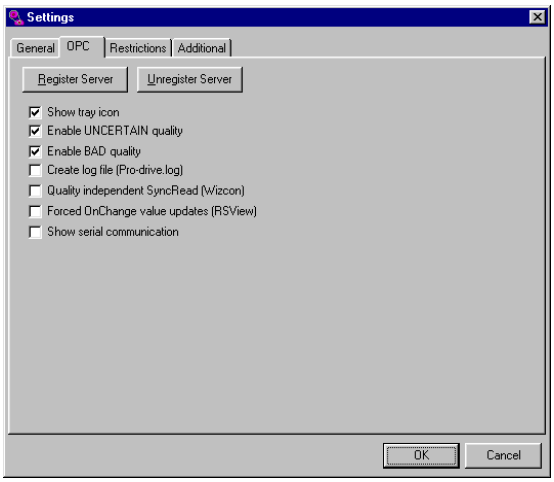
On startup ..... Define first action when Pro-drive is started.

Language ..... Language maintenance. For more details, please check chapters “Internal structure” and “Create new language”.

Parameter window columns . Define which columns are shown in the working area. Also defines the order of columns.

OPC settings

To show general settings dialog box, press Tools/Setting (F5), and select the “OPC” tab.



Register Server
Unregister Server ..... Pro-drive OPC server is automatically registered by the setup procedure. If for any reason registration is lost, this command registers server to the Windows system without the need for reinstalling. Also useful for testing.

Show tray icon..... Uncheck to disable taskbar access for unauthorized persons. Main Pro-drive window may still be accessed by starting if manually.

Enable UNCERTAIN quality
Enable BAD quality ..... Useful for testing purposes (for developing/testing SCADA system without real connection available).

Create log file ..... If checked, message log will be written to the file "Pro-drive.log", created in the Pro-drive directory ("C:\Program Files\Pro-drive\" is default). Log file may be useful to trace any OPC related problem.

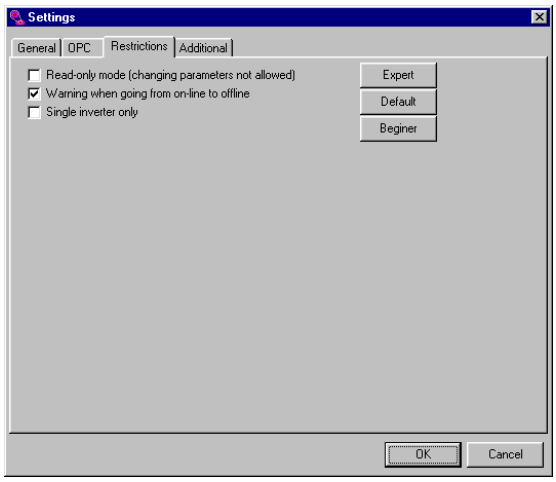
Quality independent
SyncRead..... If checked, OPC call SyncIO::Read always returns GOOD tag quality. Useful for some OPC clients (Wizcon).

Forced OnChange
value updates..... Forces callbacks to OPC client for all items, no mater if their value is changed since last callback. Useful for some OPC clients (RSView).

Show serial
communication ..... Displays and logs all communication messages. May be useful for testing and debugging.

Restrictions

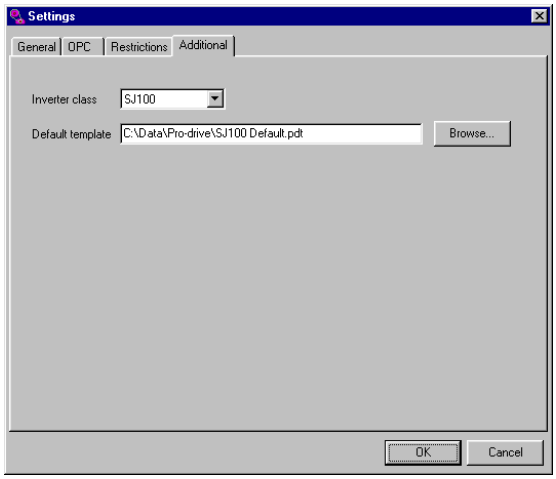
To show general settings dialog box, press Tools/Setting (F5), and select the “Restrictions” tab.



Restrictions are used to limit the functionality of Pro-drive, in order to disallow handling for unauthorized persons.

Additional settings

To show general settings dialog box, press Tools/Setting (F5), and select the “Additional” tab.



Define default templates for each available inverter type.

Create new language

To make a new translation:

1) Use command *Tools/Settings/Save* to create Custom.lng file. File contains a list of pairs <id>=<name> (i.e. btnFileNew=New Project). All names are in English (default).

2) Rename Custom.lng to Yourlanguage.lng (i.e. German.lng).

3) Using an UTF-8 text editor, translate all right sides to the appropriate language. Left side (identifier) should not be modified. String length should about the same length as English original.

4) Save the translated file (German.lng) in the same directory as Pro-drive.

5) Use Pro-drive command Tools/Settings/Open, confirm and restart Pro-drive.

If for any reason Pro-drive becomes unusable, delete the selected language file and restart Pro-drive. To make a complete translation, IDF files should be translated also.

Appendix

Keyboard shortcuts

Ctrl-N	New Project
Ctrl-O	Open Project
Ctrl-S	Save Project
Shift-Ctrl-S	Save Project As
Ctrl-F4	Close Project
Ctrl-P	Print
Ctrl-I	Add Inverter
Ctrl-T	Open Template
Ctrl-Q	Compare on/off
F5	Settings
F7	On-line
F8	Off-line
F9	Run Forward
F10	Run Reverse
F11	Stop

Error messages

Command %s completed successful
Serial port not available
No response
Communication timed out
On-line mode activated...
Off-line mode
Reading actual settings...
Reading actual settings failed
DRW block successfully read

Nothing to write
%s write successful
%s write successful (SRW)
Writing user settings...
Writing user settings canceled
User settings written
Store command failed
Store command on this inverter not possible during RUN
%s cannot be written during RUN
Failed to change RUN state, please check A02
Cannot change RUN state while inverter is in error

Reading error(s)...
Reading errors failed
Reading errors accomplished

Out of range
Error: Some settings are out of range
'%s' contains out of range value:

Inverter %s successfully identified
Identify successful, connected inverter same as currently selected
Could not identify inverter (%s)
Identification failed
Identification not supported on focused inverter
Connected inverter incompatible, communication operation canceled
Source template (%s) and target inverter (%s) not of same class. Operation is canceled

File not found %s
Values cannot be copied to itself
Values cannot be copied %s → %s
Section identifier '%s' not supported
Property identifier '%s' not supported
Parameter %s does not exist on current inverter
All user settings empty, unable to continue

Unable to open file
Unable to complete: No inverter selected
Unable to complete. Please select production line first
Unsuccessful reading of %s
Failed writing to file %s
Save operation canceled

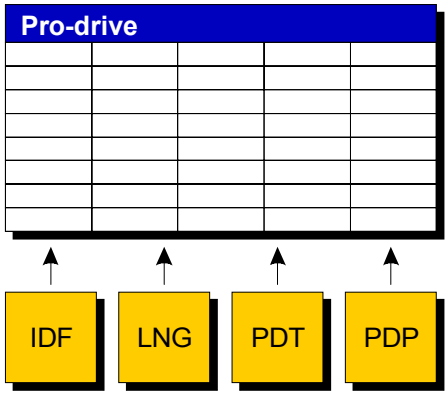
Warning: Version of project file old
Warning: Version of project file newer
Second motor parameter %s cannot be written while second motor not activated
Second motor parameter %s cannot be written with SRW while second motor mode disabled
This change will reset UserSettings to Defaults

Cannot perform this copy operation while Actual Settings not read
Parameter A01 not suitable for this operation
Inverter is on-line. Do you want to proceed?
Only one inverter allowed
Unable to automatically STOP inverter
Warning: "Store needed" pending on some inverters. Do you want to proceed?
Connected inverter does not match to selected

Language will be changed when Pro-drive is restarted
DOP PLUS file contains data for %s which is not compatible with active inverter
Unhandled exception:

Internal structure

The following picture shows the structure of Pro-drive:



Main application, Pro-drive.exe, is using external files of four different types: IDF, LNG, PDT and PDP. All external files are text-only, making possible to change using a plain text editor, such as Windows Notepad.

Such structure is used to make Pro-drive as much flexible as it is possible.

IDF (Inverter Definition File) contains knowledge about a specific inverter series, parameters, addresses, limits, restrictions. IDFs are supplied together with Pro-drive installation package, but some modified/updated files may be distributed later. IDF may also cover a new software revision of an inverter.

LNG (language) file contains menus, messages and commands used by Pro-drive user interface. Each language file contains a single language. To make a localized Pro-drive version, distributor should make a new language file, which is easy opened by Pro-drive.

PDT (Pro-drive Template) file is a list of selected parameters. Unlike the project file, template contain no inverters, but contain parameters together with their values/ranges/defaults. Template may be used to represent a specific usage, i.e. template for a pump or conveyor.

PDP (Pro-drive Project) file is used to store all user data, including inverter parameters, settings, properties, communication settings and so. To save project file, use command *File/Save Project*. To open project file, use command *File/Open Project*.

Table below summarize external file types and typical scope of usage:

supplied by	IDF	LNG	PDT	PDP
Hitachi	+	+	+	
local distributor		+	+	+
end user			+	+

Restrictions

Reducing functionality option allows one user ("expert") to prepare sets of parameters, limits, descriptive names and so (a project) to another user ("user"), including a possibility to disable some of regular Pro-drive functions, in order to not let him do something wrong.

To prepare a limiting project, expert should:

1. Create a desired project
2. Save project
3. Set functionality limits using text editor

To use the project, user should:

1. Open the project (double click)

Limiting properties reside in [Restrictions] sections. Available properties are:

EnableAllParameters
EnableAllParametersEdit
EnableInverterPropertiesEdit
EnableUserSettingEdit
EnableRangeEdit
EnableDefaultEdit

EnableWriteUserSettings

EnableFileMenu (except Print and exit)
EnableEditMenu
EnableProjectMenu
EnableMonitor
EnableErrorHistory
EnableCompare
EnableSettings