



## Revision history

Date	Release	Text	Author
20/08/2020	Version 1.0	First release aligned with PPS version 3.0.5	SRN

## 4512 Data Logging and Supplemental information

The PR 4512 data logging enables you to store process values in an efficient and cost-effective way directly at individual measurement points.

To support users of 4512 we have developed this guide with tips and tricks for how to manage your logfiles with standard tools, typical available to the user. The guide answers common questions not addressed by the product manual, guidelines for import of data and interpretation of datasets.

### Data logging capacity

The 4512 Bluetooth communication enabler contains 100 MB NAND flash memory exclusively for data logging. Best in class features as error correction, and flash wear out management have been implemented to secure the integrity of data and ensure the lifetime of memory matches the high quality of PR 4512.

To calculate data logging capacity, a tool to calculate timespan vs logging interval for a specific product is available:

Log point calculator: <https://www.prelectronics.com/support/pr-knowledge-library/tips-and-tricks/log-point-calculator/>

Please note: For multichannel products, equal storage capacity is observed for 1 or 2 channel products due to the internal data structure.

### Collecting process values

With PR 4512 you can start and stop data logging at any point in time from 4512-display or PPS application. Further Data logging will also be suspended in case of:

- PR 4512 being moved to new host (any PR 4000 or PR 9000 device)
- Host configuration changed
- Power loss

And resume if:

- PR 4512 is moved back to original host where log was initiated
- Power resumes

Only one logfile can be saved in PR 4512. If you change configuration, previous logged data will be preserved. When data logging is manually stopped, you cannot restart data logging without deleting previous data.

## Retrieve data from 4512

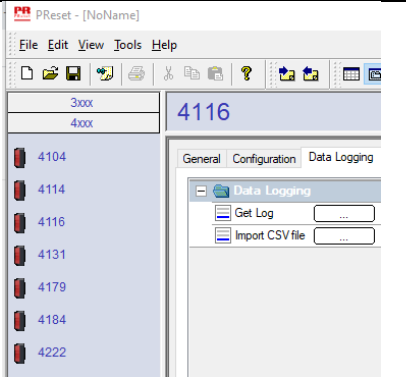
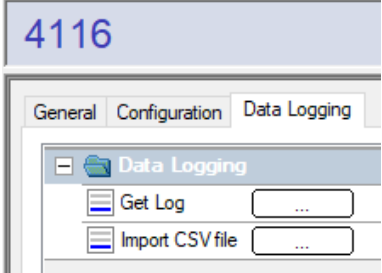
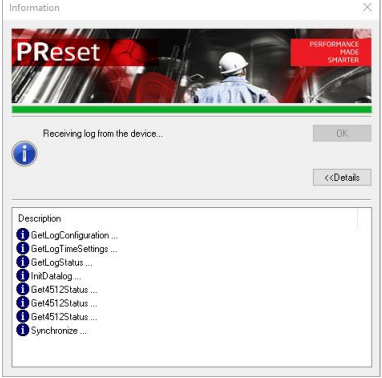
There are two ways to retrieve logged data from 4512 data log memory.

- Use the PR PPS application on your Android or iOS device to retrieve the CSV data
- Use the PR Preset software for Windows with ConfigMate 4590 to retrieve CSV data to your local PC.

With the limited download speed of PPS with Bluetooth it is recommended to use PReset to retrieve larger datasets. The datasets will be downloaded as CSV files - an industry wide 'de facto' standard for datasets in an easy to read format. PPS generated csv files can be imported into Preset.

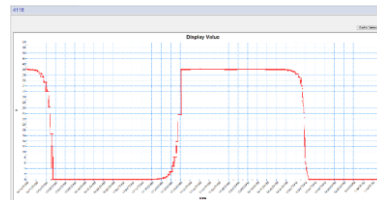
### 1 Retrieve data from Preset


Prerequisites: PReset version 9.01.1001 or later and Configmate 4590.

<p>1. Select correct host module type, ie. 4116</p>	
<p>2. Select datalogging tab and 'Get Log'</p>	
<p>3. Preset retrieves information about logged data.</p>	

4. Select timespan to be downloaded. By default, the last hour of timespan is selected.

5. Now you can review the data retrieved from 4512.



Please note: In the datalogging tab, 'Configuration' is the configuration stored in the CSV dataset associated with the logged data, it is NOT the configuration stored via MEM-SAVE. To retrieve MEM-SAVE configurations you will – as previously – use the receive/transmit buttons in Preset: 

With Preset, you can export a CSV file for a later review or further investigation, or for import into a third-party data analysis platform

The expected upload speed for PReset is 13000 datapoints in 60 seconds. A maximum full log with approx 3.5 million datapoints you can expect a download time of < 4 hours.

## 2 Retrieve data from PPS

With the PR electronics PPS you can retrieve logged data via Bluetooth communication. Your smart device typically has the performance to retrieve 1000 datapoints in 60 seconds. With PPS it is recommended to disable automatic screen lock when downloading data, to prevent issues with PPS application being forced to run as a background process and thus reduce or halt Bluetooth communication.

Expected load times:

Sample size: 24 hours of data, intervals 60 sec. = 3600 datapoints ~ 200 seconds

Sample size: 1 week of data, intervals 60 sec = 25200 datapoints ~ 25 minutes

Sample size: 30 days intervals 1 sec = 2.592.000 datapoints ~ 43 hours \*

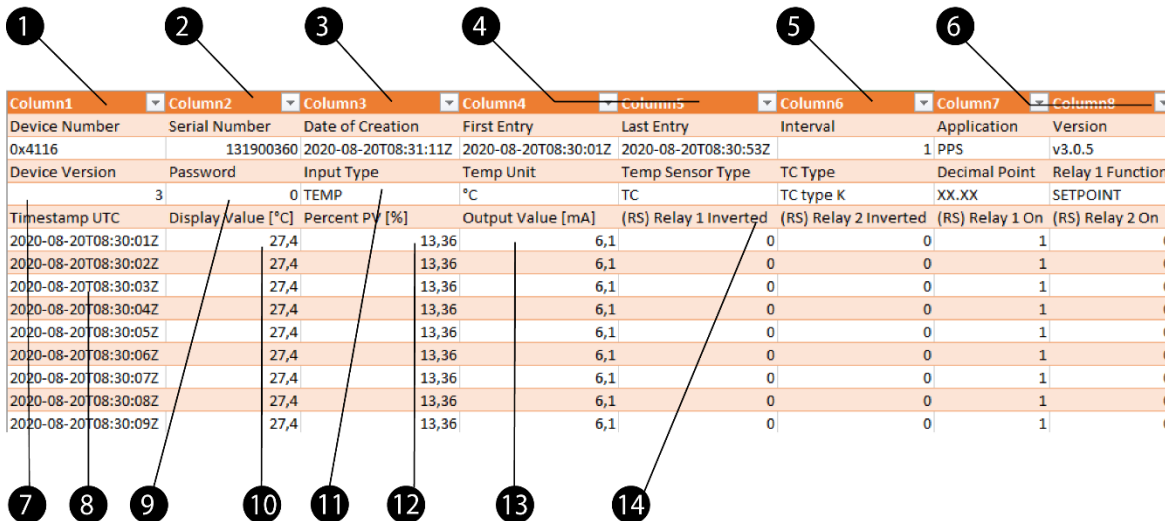
\*Recommendation: Download via Preset and Configmate 4590

Downloading a Datalog file from PPS will generate 2 different file formats:

- 1 \*.csv file, in a condensed version with values equal to display values for input and output, relay etc.
- 2 \*.PRESET file with RAW datasets for all available dataregisters according to the modbus specifications for individual host devices. The file can be imported into PReset for full compatibility with CSV file import. \* For PRESET version 9.01.1001 and earlier, you must rename \*.PRESET to \*.CSV for import. Newer versions of PReset will preselect import from files with \*.PRESET fextension.

## Understanding the csv. dataset

A complete data log is available as a \*.csv with a condensed file format, consisting of logged measurement values and host status. The log interval can be as low as 1 second. In this guide we will look at PR 4116. Other hosts have a similar structure. Export of data from PR 4512 always includes the current configuration valid for the dataset.



Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8
Device Number	Serial Number	Date of Creation	First Entry	Last Entry	Interval	Application	Version
0x4116	131900360	2020-08-20T08:31:11Z	2020-08-20T08:30:01Z	2020-08-20T08:30:53Z		1 PPS	v3.0.5
Device Version	Password	Input Type	Temp Unit	Temp Sensor Type	TC Type	Decimal Point	Relay 1 Function
3		0 TEMP	°C	TC	TC type K	XX.XX	SETPOINT
Timestamp UTC	Display Value [°C]	Percent PV [%]	Output Value [mA]	(RS) Relay 1 Inverted	(RS) Relay 2 Inverted	(RS) Relay 1 On	(RS) Relay 2 On
2020-08-20T08:30:01Z	27,4	13,36	6,1	0	0	1	0
2020-08-20T08:30:02Z	27,4	13,36	6,1	0	0	1	0
2020-08-20T08:30:03Z	27,4	13,36	6,1	0	0	1	0
2020-08-20T08:30:04Z	27,4	13,36	6,1	0	0	1	0
2020-08-20T08:30:05Z	27,4	13,36	6,1	0	0	1	0
2020-08-20T08:30:06Z	27,4	13,36	6,1	0	0	1	0
2020-08-20T08:30:07Z	27,4	13,36	6,1	0	0	1	0
2020-08-20T08:30:08Z	27,4	13,36	6,1	0	0	1	0
2020-08-20T08:30:09Z	27,4	13,36	6,1	0	0	1	0

Fig 1. example data set from 4116

References for figure 1.

1. Device identification
2. Serial number for host where serialnumber is stored in memory. Not available for PR products : 4114 V0,V1,V2, 4116 V0,V1,V2, 4131 V0,V1,V2, 9106/9107, 9113/9116, 9202/9203.
3. UTC time when log file was exported
4. Start and stop UTC time for log
5. Datalog interval in seconds
6. Application type and version who created the log file
7. Device version, in this case a 4116 version 3
8. Timestamp for log entry in UTC time
9. Password for the device
10. Display/input value in configured engineering unit
11. Device configuration
12. Percent PV = % value of output range
13. Output value in selected output type
14. Additional information about the measurement status – abbreviations:
  - (ES) = Error Status
  - (MS) = Measurement Status
  - (MC) = Measure Control
  - (RS) = Relay Status

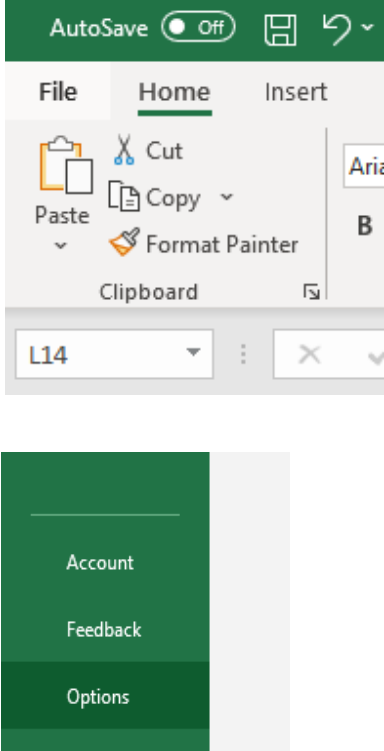
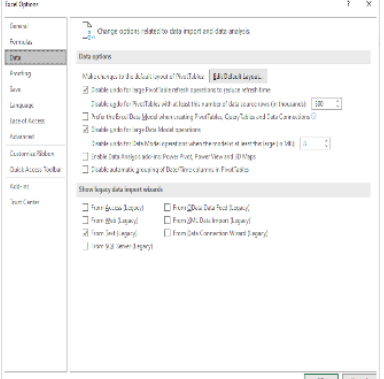
For a full dataset the \*.PRESET can be use to retried data not to be found in the simplified \*.CSV dataset, ie. calibrated values, raw values. For a complete reference, pls. consult the individual product Modbus manual for further information.



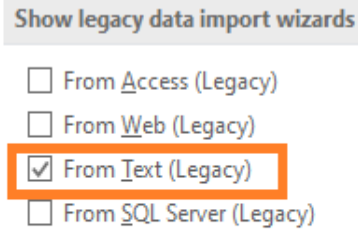
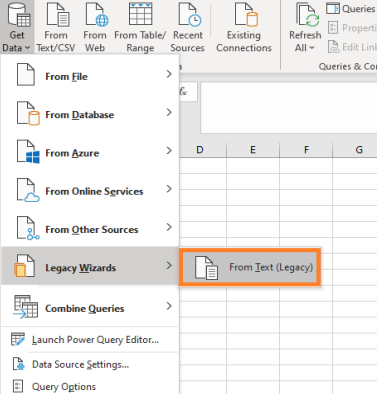
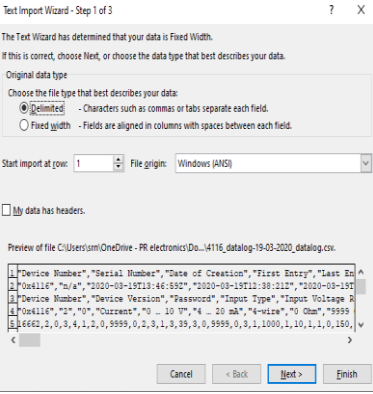
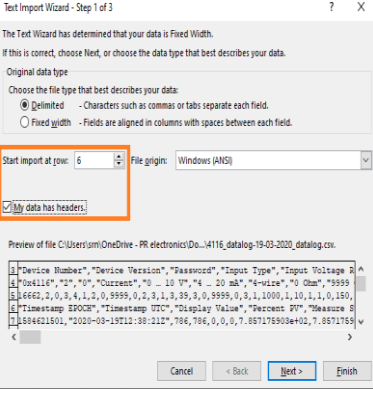
## 1 Import from Microsoft Excel

One option to explore your data sets is in Microsoft Excel. Excel can serve as your swiss army knife for data handling and visualization.

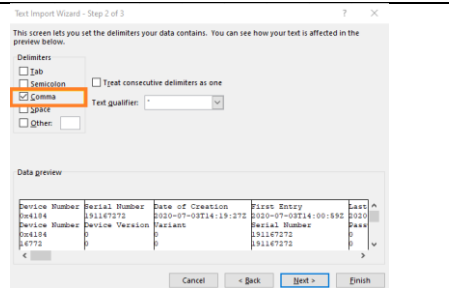
However, with the recent development in Excel tools for linking various datasets, Microsoft has introduced increased complexity and ‘hard to work around’ issues importing CSV files. For users on newer versions of Excel, i.e. Excel for Microsoft 365, a recommended procedure is to enable ‘From Text (legacy import)’.

<p>1. Select file and options</p>	 <p>The screenshot shows the Microsoft Excel ribbon with the 'File' tab selected. The 'Data' section is expanded, showing the 'From Text (Legacy)' option. The 'Options' button is visible at the bottom of the ribbon.</p>
<p>2. Make sure 'From Text (Legacy)' is checked</p>	 <p>The screenshot shows the 'Data Options' dialog box in Microsoft Excel. The 'From Text (Legacy)' checkbox is checked, indicating that the legacy import method is selected.</p>

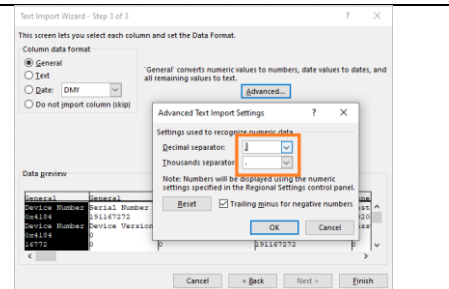


	 <p>Show legacy data import wizards</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> From Access (Legacy)</li> <li><input type="checkbox"/> From Web (Legacy)</li> <li><input checked="" type="checkbox"/> From Text (Legacy)</li> <li><input type="checkbox"/> From SQL Server (Legacy)</li> </ul>
<p>3. In a new empty Excel sheet, you can now import data selecting 'Data' -&gt; 'Get Data' -&gt; 'Legacy Wizard' -&gt; 'From Text'.</p>	
<p>4. Select 'Delimited' and 'Windows ANSI'</p>	
<p>5. To only download logged data and header and skip configuration, import from row = 6, and check 'my data has headers'</p>	

- Select comma as delimiter, observe that data now is organised in columns



- Make sure you have selected correct decimal point as 'dot' and thousands separator as 'none/blank', before you continue to import data.



## Realtime Clock

The 4512 contains an internal clock backed by a rechargeable battery (no user replaceable part). The clock has a low drift with an accuracy of <60s/year at ambient temperature 25 °C. Expect less accuracy when device is working in environments within the extended temperature range.

Clock is set during 4512 manufacture. After connecting the 4512 to a smart device, the following logic is executed:

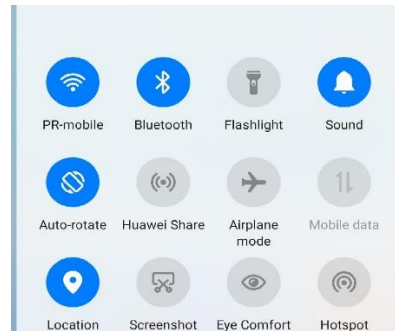
- When 4512 RTC backup battery detects power loss, an adjustment of RTC is performed with connected smart device
- An offset is calculated and stored in memory of 4512, if RTC Clock is  $\neq$  smart device clock (+/- 2min).

When retrieving log data, the latest calculated offset **before** log was started is used for offset correction of the data before presenting to the user.

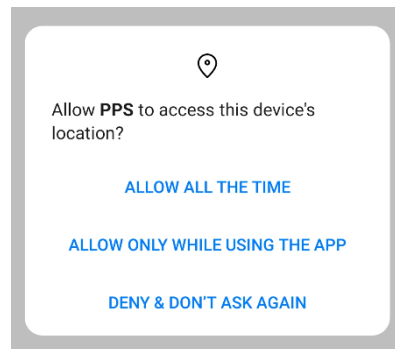
## Connectivity & Supported features

### Connectivity issues – PPS cannot see any 4512 connected products

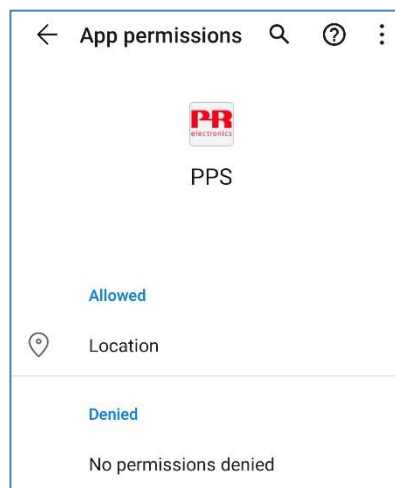
**Android:** Pls make sure Bluetooth is enabled in quick setting:



Upon installation of PPS app on an Android device you are asked to allow PPS to access location services:



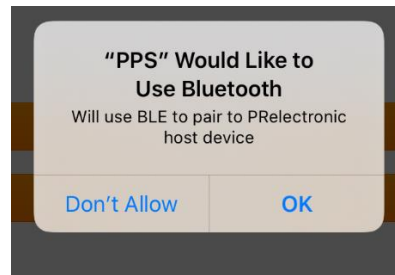
For Android smart devices it is necessary to make sure the PPS app have the correct permissions to access Bluetooth location services. PPS do not use location as an active information, however from Android OS, access to certain Bluetooth devices is closely linked to Bluetooth Location services. If you deny or accidentally change permissions, you must enable location service as a permission for PPS:



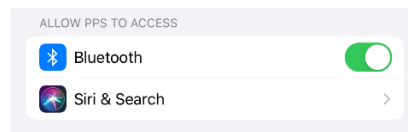
For a Huawei P30 Pro it is done selecting: “Settings -> Apps -> Apps -> PPS -> Permissions”. For alternative Android implementations from other manufacturers this might be slightly different.

If your device has a battery/power save function in “Settings -> Apps -> Apps -> PPS” or in “Settings -> battery”, it is recommended that you disable battery save for PPS.

For **Apple iOS** Bluetooth must be enabled on a general basis and for PPS on an application basis. First time you start PPS on iOS you will be prompted to enable Bluetooth for PPS:



If you disallow Bluetooth access at installation or you have for some other reason disabled Bluetooth, you have to enable Bluetooth for PPS on an application basis under general settings > PPS, you will find the slider to enable PPS to access Bluetooth:



## SIL mode is not supported

PPS does not support configuring SIL from PPS. Datalogging on 4512 is not supported with SIL mode enabled. Datalogging enabled is not possible for a device entering SIL mode.

## 4000/9000 Supported Features matrix

Unit Id	Configuration	Simulation	Calibration	Datalogging
4104	Yes <sup>*1</sup>	Yes <sup>*2</sup>	Yes	Yes
4114	Yes <sup>*1</sup>	Yes <sup>*2</sup>	Yes	Yes
4116	Yes <sup>*1</sup>	Yes <sup>*2</sup>	Yes	Yes
4131	Yes <sup>*1</sup>	Yes <sup>*2</sup>	NA	Yes
4179	Yes <sup>*1</sup>	Yes <sup>*2</sup>	Yes	Yes
4184	Yes <sup>*1</sup>	Yes <sup>*2</sup>	Yes	Yes
4222	Yes <sup>*1</sup>	Yes <sup>*2</sup>	Yes	Yes
9106	Yes <sup>*1</sup>	No	NA	Yes
9107	Yes <sup>*1</sup>	No	NA	Yes
9113	Yes <sup>*1</sup>	Yes <sup>*2</sup>	Yes	Yes
9116	Yes <sup>*1</sup>	Yes <sup>*2</sup>	Yes	Yes
9202	Yes <sup>*1</sup>	No	NA	Yes
9203	Yes <sup>*1</sup>	No	NA	Yes

\*1 Not supported is: Configuration of Language, Display Values: Contrast/Light/Orientation, Latch, Fast set, Rail setup.

\*2 9113 and 9116 simulation provide the option of exclusive simulation of either input or output or relay. Simulate input and your output will react according to process configuration. For 4000 series devices you can exclusively simulate either input or the combined output (analog + relay). Simulate the analog output on 4000 series forces the relay output into simulations mode. For 4000/9000 series if you simulate input your output reacts according to process configuration.

Simulation via PPS for 9000 series products is supported for 9113 and 9116 products. While in simulation mode, updating the 4512 display is suspended and Display Value and Output value will not be updated during simulation.