📖 User's Guide

Online Data Manager

Application:

- Acquisition, processing and archivation of data form online systems
- HTTP server for network based data access

Characteristics:

- Independent measurement (no time discontinuities), asynchronous database access (cache implemented)
- MSSQL support, optimized inserts for databases under 1GB
- HTTP server implementation for network data access
- Data exports when critical database size exceeded

Ref: 24092003 OS

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Online Data Manager (ODM)

Terminology used

Static data – characteristic measured values such as RMS, Peak-Peak, shifts etc., value of the 1st harmonic value, commonly computed as statistic characteristics
Dynamic data – time waveforms, order analysis series and spectra records.
Database – database managed through SQL server (currently Microsoft SQL Server tested only).
Cell, DataCell – data item containing all information about one concrete type of data (RMS,P-P etc.) stored in database; see additional documentation (DDS2000).
Data state, status – software recognizes normal state(status), alert status and danger status; see additional documentation (DDS2000).
TCG, Time Control Group – groups of measured values for whose are defined store intervals; can be fixed (store every time request for store occurs) or controlled by another values and their limits.

Brief description

Online Data Manager (ODM) is software for data acquisition from machine monitoring systems (such as A3600). The role of the ODM is to assure robust data logging onto SQL server as like as provide intelligent data acquisition management (eg. value-dependent storing). Another functionality ODM assures is to server online data on TCP, so second applications (eg.Online Data View) can process these data.

ODM uses as a data storage SQL server (Microsoft SQL Server or MSDE), database format is compatible with the DDS2000 and DDS2000 software packages. In rare cases the original database can be converted to more optimized form, so large amount of data can be stored without significant change in access times.

ODM is strongly cohered and dependent on DDS2000 software. While ODM acts as data logger, almost all of the parametrisation (excluding TCG configuration, see later) is done via DDS2000 software, which acts as a data collecting and managing center.

ODM is not limitted, but DDS2000 has limits:
- maximum number of static values per cell : 128000
- maximum number of dynamic records per cell : 16300

ODM also acts as a data reducer/compressor. User can define data reduction parameters in DDS2000 software, ODM checks data for changes/duplicities and reduces data as needed. The reduction algorithm has three bands of sensitivity (no reduction, short time reduction, long time reduction), when reduction is evaluated, relative (or absolute) change is evaluated for static data. Dynamic data are at the moment reduced by time preserve only.

All database tasks (data store, reduction, export) are separated from data acquisition in different process thread (they are performed asynchronously), in other words, they do not block measurement of the data whose values are cached internally.

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ODM can also define so called TCG's (Time Control Groups), allowing user to specify different time intervals for storing individual data as like as limit-dependent storing.
User can define limit values in DDS2000 software for each of the measured data cell(characteristic value). If TCG is configured for use of the critical values (limits), ODM evaluates relationships between *controlling values* (determine when other value will be stored) and their limits. If limits are reached store of the TCG's assigned values (so-called *contained items*) is ivnoked. This feature allows user to save interesting intervals of run-up/down and so.

To enlarge robustness in data acquisition user can create up to 4 projects running simultaneously on 4 instances of ODM. ODM uses simple mechanism of startup ini files, where user can define different command line options for each of the ODM instance.
Multiinstance can be used in such a way as is use of different databases for static and dynamic data for different hardware modules.

Maximum robustness is achieved via special database mode called *Partitioned*, when dynamic data for each of the data cells are stored into *different* physical file, even they still acts as compact database. User is able to convert current database to *partitioned mode* via DDS2000 software.
The performance is pushed up only if there are dynamic data in the database.
Caution: before converting database to partitioned mode we recommend to perform backup of the database. If any problem occurs there's still possibility of the restore process of the database to original state after conversion (without data-loss).

ODM also encapsulates database EXPORTS, whose ensures overflow-free function of ODM. Exports are done via ODBC to Access MDB files. User can enable/disable export, limit size of the database leasing to export, time preservation of the online database in the DDS2000 software.

Data reduction and exports

A setting of reduction and export is accessible in file DM_conf.ini. This is in main DM directory.
The ODM lessen data size by data reduction. They are separated to three groups depend on measure time and reduction level:

1. Data without reduction (latest data, which must be unchanged)
2. Short time reduction data (as a rule is less reduction)
3. Long time reduction data (as a rule is more reduction)

The static data reduction, there are reduced by relevant change ratio. This is preserve data in a certain time interval. The dynamic data reduction preserve records in a certain time interval, other records are erased. A size of database is depended on export setting. This keeps database of measurement at solid size. The older part of data is automatically export to Access file at SQL server. These are erased from online database. The reduction and export are apart from measurement process. Measurements don't depend on an exports, erases or reductions.

DM_conf.ini: description of parameters and settings example:

; static data reduction
[ReduceStatic]
; a relevant change ratio for long time reduction [%]
LongReducePercent=70
; no reduction time [day] for long time reduction (later data, short time reduction)
LongPreserveDays=1
; a time interval between two unchanged records for long time reduction [hour]
LongIntHours=1
; a relevant change ratio for short time reduction [%]
ShortReducePercent=40
; no reduction time [hour] for short time reduction (latest data, which must be unchanged)

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```
  ShortPreserveHours=1
; a  time interval between two undelete records for short time reduction [min]
ShortIntMinutes=10

; dynamic data reduction
[ReduceSpectra]
; no reduction time [day] for long time reduction (later data, short time reduction)
LongPreserveDays=1
; a time interval between two unchanged records for long time reduction [hour]
LongIntHours=1
; no reduction time [day] for short time reduction (latest data, which must be unchanged)
ShortPreserveHours=1
; a time interval between two undelete records for short time reduction [min]
ShortIntMinutes=1

; order analysis reduction
[ReduceOrder]
; no reduction time [day] for long time reduction (later data, short time reduction)
LongPreserveDays=1
; a time interval between two unchanged records for long time reduction [hour]
LongIntHours=1
; no reduction time [day] for short time reduction (latest data, which must be unchanged)
ShortPreserveHours=1
; a time interval between two undelete records for short time reduction [min]
ShortIntMinutes=10
; export setting
[OnlineCollaboration]
; export  on - 1 / off - 0
ExportEnable=1
; a limit of database size [MB]
ExportLimitSize=250
; a time to preserve from export [hour] (latest data, which don't be exported)
ExportPreserveHours=9
; an export time [hour]
ExportRunAtHour=0
; a path for export file
ExportPath=C:\program files\adash\dm\export
```

A reduction didn't execute if all parameters are set to 0. If the DM_conf.ini is not found, all the reductions parameters are set to 0, export is enabled when database reaches 250MB and export data at 0 hour to actual directory. Then the new DM_conf.ini file is created. After loading the project used configuration is also written into the log file.

If the limit for static data per cell is reached, the storing of statics continues normally and is limited only by used SQL server. Export of this cell separate data into more cells with the size of limit and they are named “original name”_”number of cell”. We recommend not reach the limit, account on the speed of SQL server response.

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Basic operation

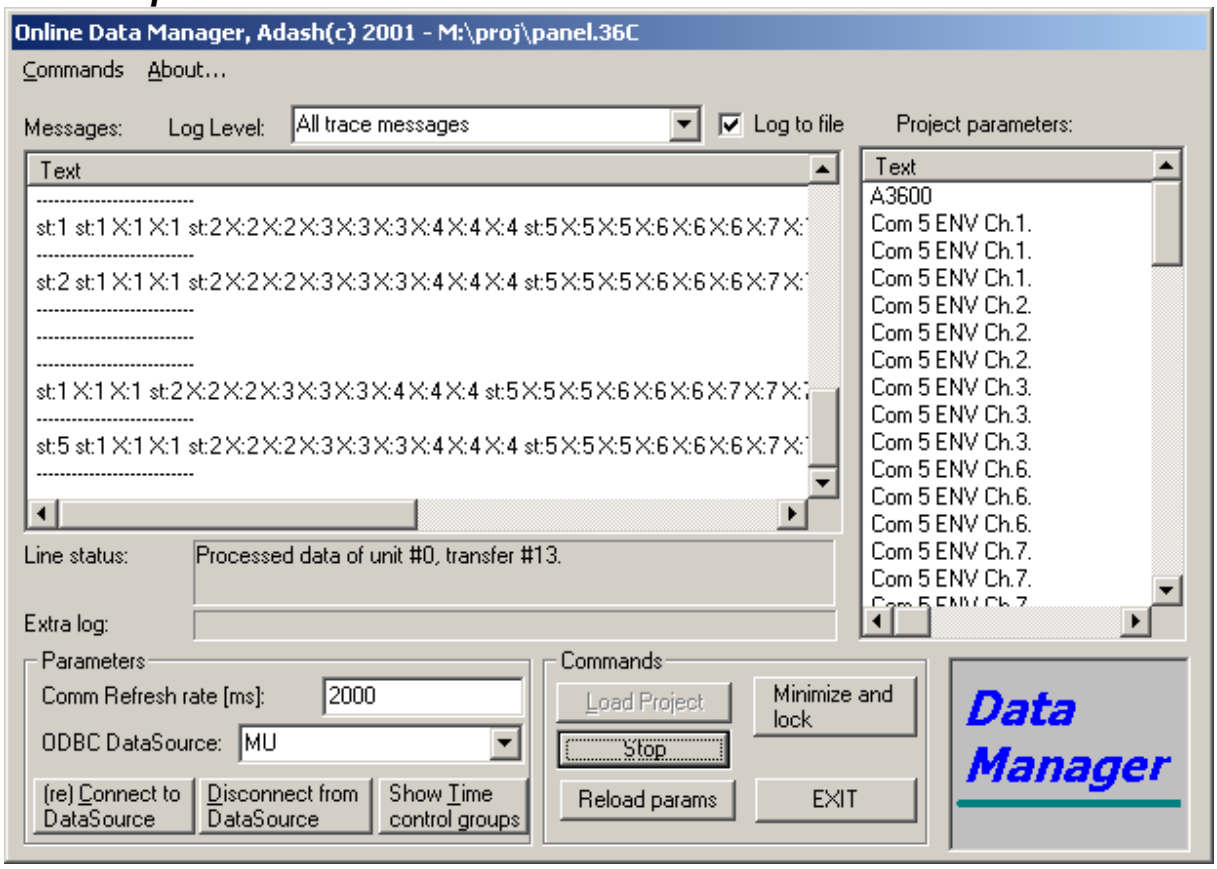

Fig.1. ODM window

User have to specify command line options (see later) or run ODM standalone and perform actions in this sequence:

1) (optional) select **ODBC Data Source** and press button **Connect to DataSource**.
2) press button **Load project**, select file with "600" extension previously cerated in DDS2000 software and press OK.
3) press button **Receive** to start receiving values from the machine.

Description of the user interface:

Menu

- **Commands**
  - **Start Refresh** - run the measurement and data store process
  - **Load project...** - load selected project
  - **Reload parameters** - when user changes global parameters by DDS application this allows to refresh the parameters **without** restarting application
  - **Authentication management** - invoke configuration dialog of the authentication
- **Tools**
  - **Startup parameters** - visual configuration of the startup files. See chapter **Startup files** for details

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Main window items

Log Level combo specifies whose messages will be logged to *Messages* window.
Log To File check button enables/disables logging messages to the log file. If enabled, log files are generated into current directory of the application and they have extensions **lg0, lg1**. **lg0** files are actual logs, **lg1** are log files backed up when the log file size exceeds maximum. The maximum is by default 2000 kBytes, user can specify other value in command line.
Comm Refresh rate specifies basic delay between two scans of the machine fot the measured values.
ODBC DataSource combo lists ODBC data sources configured on the PC running ODM. User selects apropriate ODBC data source to resp. from which the ODM will store resp. read data. More about ODBC can be found in DDS2000 documentation. Standard hardware link projects contains information about configured ODBC.
Connect to DataSource directs manager to connect to the selected ODBC data source. If ODBC is specified in the project, the data source is connected automatically when the project is loaded.
Disconnect from DataSource directs manager to disconnect from the currently connected ODBC data source.
Load project directs ODM to load *.600 project previously created by DDS2000 software.
Reload Params reloads global parameters of the data reduction and exports from the INI files of the Diagnostic System.
Project Parameters list window shows current loaded configuration-items will be receiving and storing by ODM.

Show Time Control Groups invokes TCG configuration dialog (see chapter Time Control Groups)
Minimize and Lock minimizes ODM and if there is defined DDS2000 authentication system is locked and user must enter correct username – password pair to maximize window and unlock user interface.

Short messages description

Many of the DM messages are in the short form to reduce size of the logs. Here comes the description of the short messages:

st:xx … static value of data cell number **xx** scanned
STO:xx … static value of data cell number **xx** scanned and stored to database
X or **X:xx** … value not scanned or scanned with bad status (f.e. channel clear missing)
dyn … dynamic data loaded, but corresponding cell not specified in project
DYN:xx … dynamic data scanned and stored to corresponding cell number **xx**
RED:xx … cell #**xx** data read, reduced and stored

Time control groups(TCG)

Time control groups is mechanism allowing user to define different behavior of storing data during acquisition.

By default, when loading new project first time, all data items are assigned to be stored each 30 seconds, if they are available from the hardware.

User invokes TCG configuration dialog by clicking **Show time control groups** from within the ODM window.

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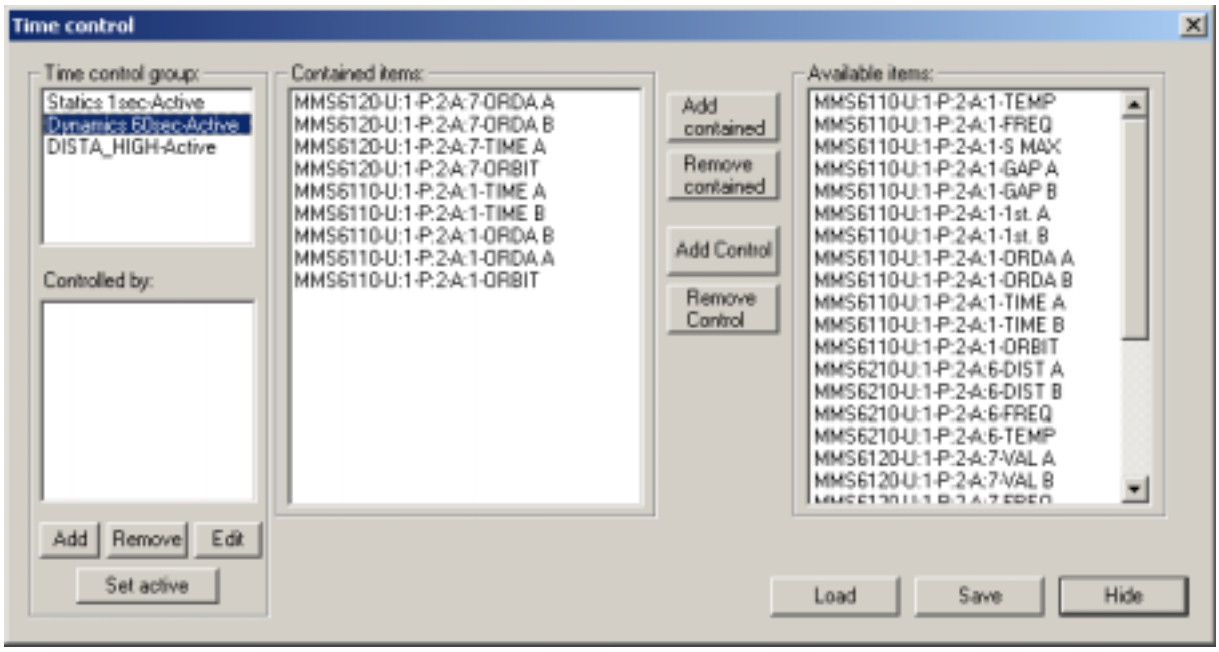

In this dialog user can **add, remove, edit** groups and assign items to them as a *contained items* or as a *controlling items*.
Load and **Save** buttons loads TCGs from the current project resp. saves to the current project (if any loaded).
Button **Set Active** lets user raise TCG to active state. Repeatly pressed button on the same TCG inactivates the selected TCG and so on.
Active state means the group can affect storing of the contained items.

Contained items are those measured values, whose will be affected by the parameters of the TCG (eg.refresh rate) when concrete TCG will be activated by **Set Active** command button.

Controlling items are those measured values, whose actual values will be compared to actual warning and alert levels defined in DDS2000 software. Once the *controlling item* is to be affected by the levels, the TCG will be driven to store *contained* items. The TCG which is to have mentioned functionality must be created of type **Critical Status Change** or **Critical Any Change**.

Critical Status Change TCG will drive contained items to store if controlled item have change in status (f.e. limit levels exceeded). It'll be recorded only the *change* of the status.
Critical Any Change TCG will drive contained items to store if any of the controlled item have change in status from normal to any type of alert or danger. So any over of limits values will be stored.
Status To High (resp.**Status To Low**) TCG will drive contained items to store if any of the controlled item have change in status from higher to lower level of status (resp.from lower to higher level)
Constant Difference TCG is special type designed to watch frequency changes. If some frequency data cell has defined relative change limits (in absolute value of the step) and this data cell is selected as controlled item and contained item, any change greater than defined step will drive all contained items to store. By this way user can monitor constant difference steps in frequency, which can be usefull when monitoring eg. run ups.

While **Critical Status Change** TCG is useful for capturing *changes in status* during transient effects in characteristic values, **Critical Any Change** TCG will capture all values beyond normal status (not only values in *moments* of changes in status).

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Watchdog operation

DataManager supplies application **watchdog.exe**, which is used when command line parameter "-WATC:" is used.
Watchdog watches every 60 seconds (the period is adjustable form the DM command line by -WPAU option) normal response of the DataManager aplication (mechanism used is DataManager response to the defined Windows message).
When the watchdog determines the DataManager is not responding he restarts DataManager and close self. The timeout is 20 seconds by default, adjustable by -WTST command line option. So one cycle of the crash protection is done.
If the user wants to protect DataManager against unconventional behavior continuously, it is needed to write startup ini file **6850DM.INI** and specify in command line parameter **-WATCH:watchdog.exe**. This is standard scenario for use of the software watchdog application.
For examples see section ***Startup Ini Files***.

DDS2000DM Command line options

-ODBC:**DSN**
specify **DSN** defined in ODBC sources will be opened
-PROJ:**path**
load project from location **path**
-RUN:Y
directs ODM to start refreshing
-REFRESH:**interval**
sets refresh rate of the manager to value of **interval** in miliseconds
-PORT:**port**
TCP server of the ODM will be running at this network port number
-LG:**lgsize**
Enables logging to the log files ***.lg0**, **lgsize** specifies maximum size in kilobytes of the log file. When the maximum size is exceeded *.lg0 log file is backed up into file *.lg1.
-WAT:**watchdog_application**
Path to the watchdog application, relative or absolute, default **-WATCH:watchdog.exe** is correct.
-WTST:**testtime**
Watchdog test time in seconds. Watchdog will wait **testtime** seconds for DataManager response than he restarts DataManager.
-WPAU:**sleeptime**
Watchdog sleep time. Watchdog will sleep **sleeptime** seconds between two tests.
-OPT:**value**
this option has meaning of bitwise swicth, so each option has power of 2 value and whole number is result of bitwise OR of the options. Options are:
2 - end DM without user interface when run with duplicate project specified in command line - specify this option when using 2 or more instances of the DM run from startup ini and protected by watchdog.

Global parameters of data reduction

When you edit *.600 project file in DDS2000, during save is stored also path to DDS2000 ini file, which

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contains global parameters of the data reduction.
The default data reduction values are:

- ***Short time reduction*** *is not active*
- **Long time reduction:**
  - Statics
    - Not reduced for 7 days
    - Needed relative change 20%
    - Minimum interval between two reduced records 1 hour
  - Time waveforms and Order analysis waveforms
    - Not reduced for 2 days
    - Minimum interval between two reduced records 2 hours
  - Spectra
    - Not reduced for 2 days
    - Minimum interval between two reduced records 2 hours

Reasons for reduction need

Please, take a while to understand the data reduction mechanism described in DDS2000 manual. It is not problem of the DM software but DDS2000.

For example, if DM let standalone acquiring data 22 days each 30 secs., database will overflow 64000 records of the static data, so no more records can be effectively maintained by DDS2000 software. Due to this you have to set up some reduction, even weak (f.e.20% of change, data not reduced 7 days).
User have not to be afraid, data reduction is very safe due to the data analysis. Significant changes asre not lost, so only effective part of the measurement is acquired and stored.

Also be careful about dynamic data (time waveforms and order analyse data), if your hardware support it. There's data reduction mechanism in th DM too, export mechanism allows you to export part of the database if the size is growing significantly.

Startup Ini files

User have option to run up to 12 instances of the DDS2000DM or DDS2000V (or, if specified, other applications). For both applications can exist file **DM.INI** resp **ODV.INI**. When corresponding file exists and there are found following sections and lines in the file

[Run_1]
[Exe=FullPathToExeFile]
CmdLine=application command line
Delay=1000
…
[Run_12]
[Exe=FullPathToExeFile]
CmdLine=application command line
Delay=2000

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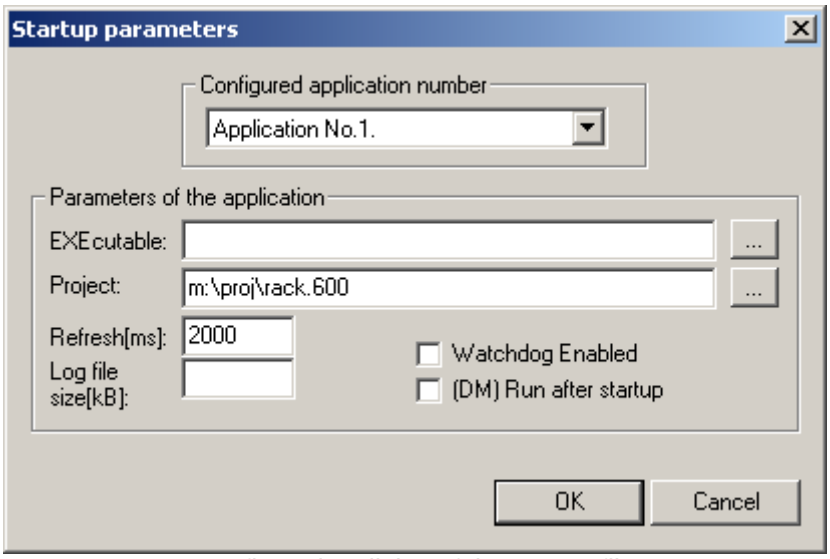
the corresponding application instance will be created. If there's only **[Run_1]** section, current instance of the application will be started with command line specified. **Delay** parametr specifies delay that will be applied after run of the instance. This parametr can be used for optimizing start sequences.

If the parameter **EXE** is specified as full path to application, not **DM or V** will be started but the application specified. This allows user to construct one INI startup file for all of the applications, f.e **DM.INI**.

Menu command **Tools / Startup parameters** enables user to visually configure the startup parameters.
Selecting **Configured application number** sets the actual application for which the configuration is performed, in section **Parameters of the application** user specifies desired startup parameters. Items not filled will be filled with default values. If **EXEcutable** is not filled, DM will run.



Configuration dialog of the startup file

This example INI file runs DataManager with given project.

```
[Run_1]
CmdLine=-PROJ:c:\projects\plant.36C –REFRESH:10000 –RUN:Y -WAT:watchdog.exe
-WTST:30 -WPAU:60 -OPT:2
```

At `[Run_1]`, no exe is specified and because this is DM.INI file the ODM.EXE will be started with parameters specified. "-WATCH:watchdog.exe" runs watchdog application with 30 seconds test time and 60 seconds pause between tests of the DataManager response. `"-OPT:2"` prevents from running same projects multiple times when watchdog restarts application.
At last 2 steps viewer and diagnostic system is started.

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