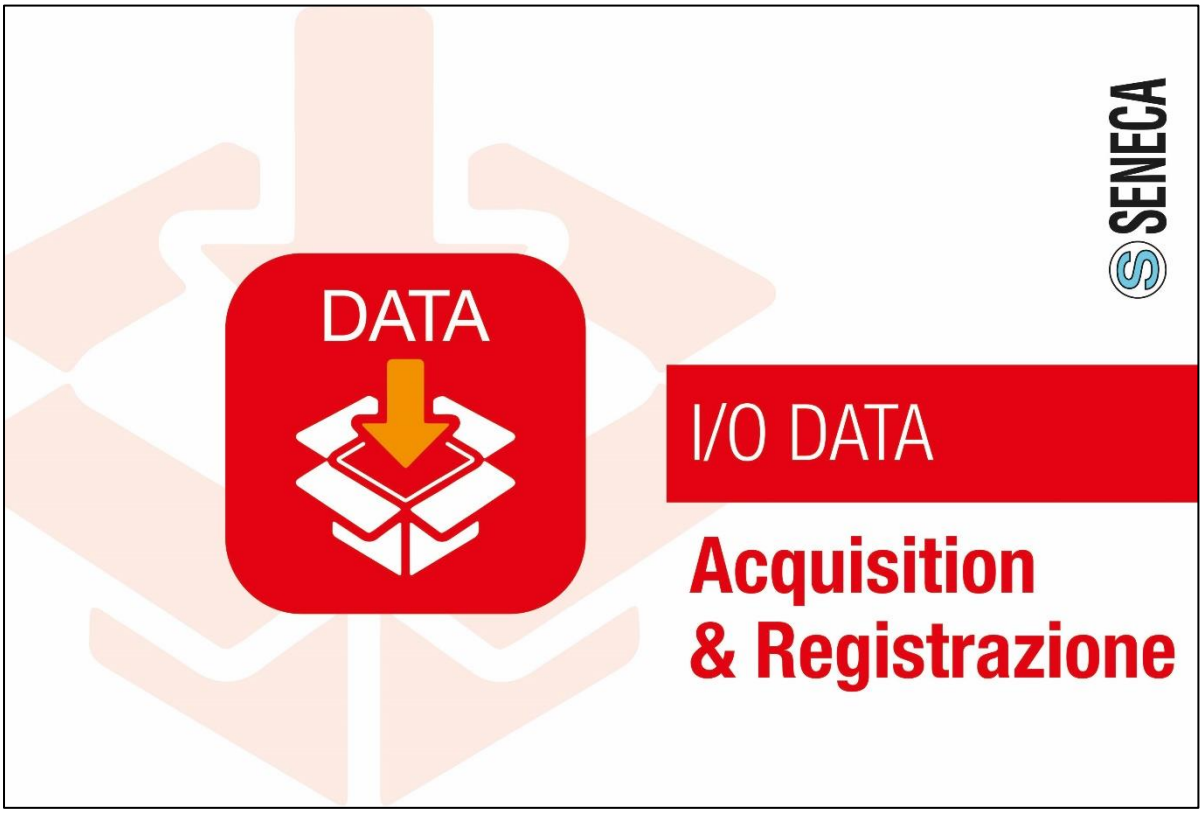


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1 INTRODUCTION

1.1 IDENTIFICATION DATA OF THE MANUAL

The identification data of the manual can be found in the footer of this manual.

1.2 PURPOSE AND USE OF THE MANUAL

This Manual is an integral part of the product and is intended for all people who work on the product or interact with the users of the product itself. It aims to provide all the information necessary to:

- quickly identify all parts of the product;
- create a project, import channels, create viewing pages and record data from channels using different scheduling modes
- ensure the efficient operation of the product.

This manual must be read carefully in its entirety before carrying out any operation on the product. In case of doubts on the correct interpretation of the instructions contained therein, contact SENECA s.r.l. to obtain the necessary clarifications.

This Manual must be kept with care throughout the life of the product and must accompany the product itself in all its transfers, for any reason, to other users. It must be placed near the product, in a place protected from atmospheric agents, heat, humidity and corrosive agents, easily accessible and known to all users; it must be consulted taking care not to damage it, not to remove pages, not to modify its contents in any way.

If, as a result of constructive changes that entail a change in the operation of the product, an update of the manual should be necessary, SENECA s.r.l. will provide the Customer with a revision of the Manual itself that will replace the previous one in all respects.

1.3 CONSULTATION OF THE MANUAL

Inside the manual the information is organized in:

- chapters,
- sub-chapters,
- paragraphs,
- sub-paragraphs

and they are easily traceable by consulting the Summary at the beginning of the Manual itself.

To draw users' attention to the correct and safe use of the product, the following graphic symbols are used in this manual:

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The symbol is used to indicate dangerous situations for people or situations that may cause damage to the product or compromise its efficiency.



The symbol is used to indicate prohibited operations.



The symbol is used to call attention to particularly important information.

1.4 GLOSSARY

I/O modules
Hardware integrating inputs and outputs

Z-NET4
I/O module hardware configuration software

Modbus RTU
Serial communication protocol

Modbus TCP
TCP/IP communication protocol

Sampling interval
Time interval between reading two values from any system

Database
Structured data store

1.5 FORMULATION OF INTELLECTUAL PROPERTY RIGHTS

All information, drawings, diagrams and anything else contained in this Manual and in the accompanying documentation are confidential in nature. None of this information may be reproduced or communicated to third parties without the prior written consent of SENECA s.r.l., which is its exclusive owner.

The only one authorized to use the documentation in question is the Customer to whom the Manual is supplied as an integral part of the product, for the sole exclusive purpose of correctly carrying out all the operations related to the various phases of the life cycle of the product itself.

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2 PRODUCT DESCRIPTION

2.1 GENERAL DESCRIPTION

Data Recorder is an open, scalable and economical software recorder based on PC Windows, ideal for test sessions, laboratories, test rooms, process measurement monitoring. Data acquisition takes place via distributed I/O modules of the Seneca Z-PC Series (with or without CPU) or via any standard Modbus RTU slave device.
The communication between hardware and PC can be serial (RS232/RS485/ModBus RTU) or Ethernet/Modbus TCP, on wired or wireless physical medium (using Z-Link for the serial connection and a WiFi network for Ethernet connections).
In particular, with Data Recorder it is possible to view with displays and graphs the instantaneous values of groups of channels divided into various pages, view in real time some alarms defined on various channels and simultaneously record the values of channels and alarm events in a database.

Throughout the Manual, the Data Recorder software will be referred to as "software".

Maximum number of devices connected simultaneously	ModBUS TCP: no limit ModBUS RTU: Seneca Z-PC I/O max number of devices 40. Using third party devices maximum 32 before amplifying the RS485 signal.
Number of simultaneously recordable I/O systems	Up to 1000 variables
Maximum number of recordable channels	From a minimum of 2 to 1000 channels (depending on the license)
Maximum number of configurable calculated channels	Over 100 configurable calculated channels
Maximum number of software requests open at the same time	Over 20 sessions that can be activated
Acquisition time of the physical devices	1 s
Recording sampling time	From a minimum of 1 second to a maximum of 30 minutes. (With 1000 minimum sampling time variables)
Maximum number of display pages or graphs	Max 100 customised pages
Maximum number of displays per page	48
Maximum number of sticks per chart	8
Maximum number of alarms that can be associated with each channel	Four thresholds (high high alarm, high alarm, low alarm, low low alarm) displayed and stored on database A write alarm threshold on an output channel
Manual recording	Start and stop button
Automatic recording	Three different scheduling methods: At fixed times and days Continuous and periodic with settable start time and duration Start and stop on digital input status Recording option also with pc in stand-by
Calibration	Possibility to carry out various calibrations of different groups of channels associated with TC or PT-100 through linear interpolation Each calibration can be performed on a minimum of one point up to a maximum of five points per channel
Languages	Italian and English

Table 1. Technical Specifications

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ƒ Acquisition of measurements

The software allows the physical acquisition, processing and real-time display of the measurements acquired via ModBus RTU and ModBus TCP protocols through distributed I/O modules of the Seneca Z-PC series (with or without CPU) or any standard ModBus RTU slave device set in one or more projects.

ƒ Calculated channels or math package:

In addition to physical channels, the software allows the creation of calculated channels starting from a combination of imported channels and mathematical operators, it gives the possibility of inserting a possible different scaling for each channel. A calculated channel must be considered as an acquisition channel for the purposes of sizing the license.

Arithmetic operators
Sum +
Subtraction -
Multiplication*
Division /
Exponent ^

Boolean operators
AND
OR
XOR
NOT

Analogue functions
Sine: Sin()
Cosine: Cos()
Tangent: Tan()
Square root: Sqrt()
Exponential: Exp()
Natural logarithm: In()
Logarithm: log()
Module function: int()
Sign function: sgn()

Advanced Functions
Totalizer (integral)

Advanced functions
Status Equations

Table 2. Mathematical operators

ƒ calibrate the channels that need calibration;

if necessary, it allows the calibration of one or groups of channels (measurements from TC and/or PT-100) using a linear interpolation calculated on a number varying from one to five points chosen by the user to eliminate any possible error at the end of the acquisition line.

ƒ alarms:

For each analogue channel it is also possible to enable a set of threshold alarms (high high alarm, high alarm, low alarm and low low alarm) which are then displayed in real-time in the display of the instantaneous values in the various display pages that can be generated. If you choose to enable alarms on a channel, you can also write one of the four alarms on an output channel chosen by the user. Each output channel on which an alarm writing is enabled must be considered as an acquisition channel for the purposes of sizing the license.

ƒ viewing by pages on the display:

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create various display pages containing groups of different channels that show the instantaneous values acquired by the system in the form of a display. In addition to the name and the instantaneous value of the acquired channel, each display on each page also shows the status of any alarms set.

ƒ viewing by chart:

each display page corresponds to a real-time time chart containing a maximum of eight contemporary pens that can be customized in colours, with a time axis that can be set from a minimum of thirty seconds up to a maximum of twenty-four hours.

ƒ recording on database:

each recording generates a database in which the instantaneous value taken by the variable at the time of sampling, its maximum, minimum and average value calculated in the time interval between samples is written for each sample.

ƒ recording sampling time:

project options can be set and can vary from a minimum of one second to a maximum of half an hour.

ƒ data recording schedule:

quite flexible scheduling allowing both manual recording that starts and is stopped by the user and automatic recording via scheduling that can be set in three different modes: recording at times and days of the week, continuous recording and recording with start from digital input. Timed recording allows you to set up to eight daily recording starts for all days of the week or choosing the recording days with the recording duration which also determines the size of the databases created; continuous recording allows you to choose the recording start time and the size in which to break the various recorded databases to avoid generating excessively heavy databases; finally, recording from digital input allows you to set a digital channel that controls the recording start and stop.

ƒ report package:

at the end of each recording, it is also possible to have the software generate automatic reports of all the project display pages or only some which may include graphs, tables of values and tables of recorded alarms.

ƒ notes on database:

for each recording, it is possible to insert descriptive notes which are also shown on a column of the relevant database.

ƒ multi-client package:

option that allows you to start multiple Data Recorder requests on the same PC.

ƒ historical data display:

Once the databases have been recorded, using the Trend Viewer software, it is possible to view in graphs, filter by channels and times and print the data recorded on the database by Data Recorder both in graphical and tabular CSV format.

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2.2 INTENDED USE

The software is intended for one of the following applications:

- create projects for the acquisition, recording and processing of data;
- acquire analogue and Boolean quantities from multiple simultaneous connections (Modbus TCP and Modbus RTU);
- create channels calculated from the acquired channels;
- record the values of the channels in .sqlite database;
- calibrate the channels that need calibration;
- define multiple pages with different groups of channels displayed;
- view the instantaneous values of the groups of channels through displays divided into different pages;
- display through graphs the instantaneous values of the groups of channels associated with the different pages;
- view in real time the alarms defined on the channels;
- view and record alarm events.
- import one or more projects from the Z-NET4 software that can be used to configure Seneca devices;

Subsequently, using the Trend Viewer software it will be possible to view, filter and print the historical data recorded by Data Recorder.

2.3 TECHNICAL SPECIFICATIONS

The physical data acquisition takes place via distributed I/O modules of the Seneca Z-PC series (with or without CPU) or via any standard Modbus RTU slave device set in one or more Z-NET4 projects. The communication between hardware and PC can be serial (RS232/RS485/ModBus RTU) or Ethernet/Modbus TCP, on wired or wireless physical medium (using Z-Link for the serial connection and a WiFi network for Ethernet connections).



Communication with the modules can take place via both ModBUS RTU and ModBUS TCP.

Licensing is managed with a USB key and covers a display range from 2 to 1000 channels, be they analogue, digital, impulsive or calculated.
The real-time display offers multiple selection possibilities: groups of channels, representation interval, scrolling direction on the screen.
The consultation of the historical archive (data and alarms) is guaranteed with the appropriate viewng tool (Trend Viewer software).
The basic package includes: alarm management (with implementation of digital outputs), management of automatic reports and mathematical package with algebraic, linear, trigonometric, boolean functions for creating calculated channels, calculating averages, compensations and deviations on measurements.
Furthermore, in the Plus license package you have the multi-client functionality to use multiple software requests simultaneously on the same PC.

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DR-02	Maximum 2 channels (between acquired, calculated, alarms and digital outputs).
DR-04	Maximum 4 channels (between acquired, calculated, alarms and digital outputs).
DR-08	Maximum 8 channels (between acquired, calculated, alarms and digital outputs).
DR-16	Maximum 16 channels (between acquired, calculated, alarms and digital outputs).
DR-32	Maximum 32 channels (between acquired, calculated, alarms and digital outputs).
DR-64	Maximum 64 (between acquired, calculated, alarms and digital outputs).
DR-unlimited	Maximum of 1000 channels that can be used in the project (between acquired, calculated, alarms and digital outputs).

Table 3. Licenses for channels to be acquired

The features of the software are:

- data acquisition from 2 to 1000 channels (minimum sampling period 1 second);
- setting of display pages;
- viewing in graphic or display mode;
- start/stop/pause recording commands;
- selection of channel groups divided into different pages;
- display of real-time measurement values;
- automatic report generation;
- recording scheduling;
- alarm display;
- simultaneous calibration of multiple channels (e.g. thermocouples)
- independent multi-client recording sessions (option).

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2.4 RESIDUAL RISKS

SENECA s.r.l. is not liable for any damages deriving from:

- installation/use other than those envisaged and, in particular, other than the safety prescriptions provided for by the regulations in force in the country where the product is installed and/or indicated in this Manual;
- tampering and/or alteration of the product;
- product configuration incorrect or not compatible with the type of application for which it is intended.



SENECA s.r.l. declines all responsibility for damage to persons and/or property deriving from the incorrect configuration of the product.

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3 NEW PROJECT IN 3 STEPS

Creating a Data Recorder project can be done in 3 simple steps:

- Project creation;
- Connection definition;
- Channel configuration.

To start the Data Recorder click on the start button of the operating system in the bottom left, scroll the menu until you find the corresponding icon in the Seneca folder and then select the program to open.

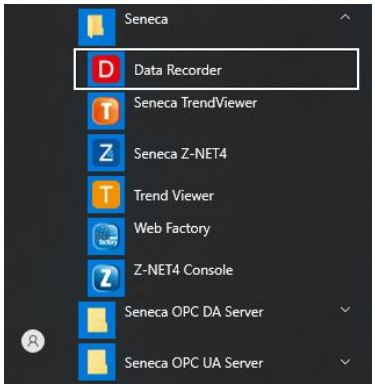


Figure 1. Opening Data Recorder

Alternatively, if present on the Desktop, start the Data Recorder directly by double clicking (left button) on the icon.

3.1 Project creation (1st step)

To create a new project, you can select the New item from the File menu or, alternatively, select the New button on the toolbar.

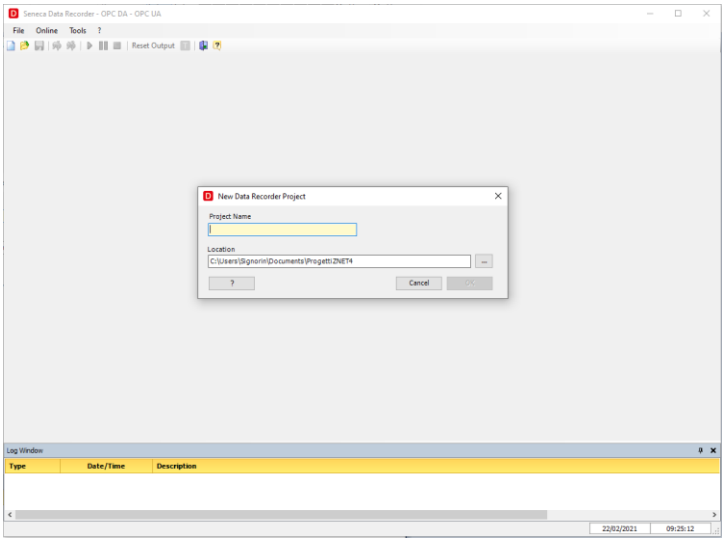


Figure 2. New Data Recorder Project

In this window you must enter the name of the project you want to create and you can select the location where to save it. Confirm your choice by clicking on the Ok button.

After having correctly entered the project, the main screen appears and the options of the navigation menu of the application are visible on the left.

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3.2 Connection definition (2nd step)

The software can simultaneously manage Modbus RTU and Modbus TCP serial connections, so the second step consists in defining the communication parameters, specific to each connection.
Selecting **Connections** from the options listed on the left, the window in which the connections will be listed opens in the centre. By clicking on the **Add Connection** button, a window appears in which it is possible to type the name of the connection and define the serial or TCP communication parameters. Multiple connections can be created within a project.

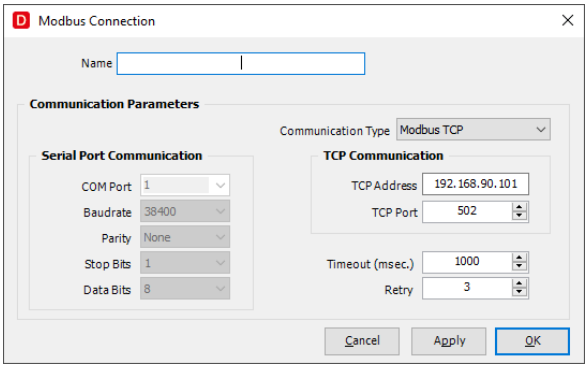


Figure 3. New Connection

3.2.1 Serial Connection

To correctly define the serial connection it is first of all necessary to correctly identify the Com Port through which the communication will be conveyed and, secondly, to define the following characteristic parameters:

- Baudrate (1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200);
- Parity (none, even, odd)
- Stop Bit (1 or 2)
- Data Bits (7 or 8)

3.2.2 TCP Connection

To correctly define the TCP connection, it is necessary to correctly identify the IP address and the associated port towards which the communication will be forwarded and, secondly

You must specify the Timeout (msec) and Retry parameters for both options.



The selected settings must be consistent and compatible with the devices installed and associated with this connection.

The connections are listed on the screen and show whether they are characterized by a <<Free>> configuration or if they are associated with a Project created with the Z-NET4 software (software dedicated to the hardware configuration of the Seneca devices installed).

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3.2.3 Configuration with Z-NET4

After creating a new connection, you can associate an existing Z-NET4 project with it or create a new one. With the right mouse button, clicking on the connection on which you want to operate, the following options will appear:

- Import ZNET Project
- Create ZNET Project

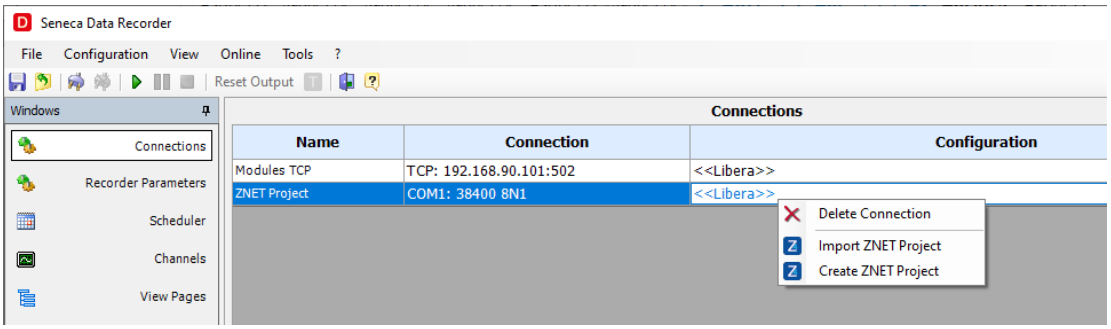


Figure 4. New Connection

The advantage of having a connection to a Z-NET4 project consists in simplifying the process of defining the channels to be acquired, using the import tool.

3.2.4 Recorder parameters

By selecting Recorder Parameters from the left menu, you can set the parameters that characterize the recording process.
In this screen it is possible to choose:

- the sampling interval (minimum 1 second, maximum 30 minutes) **(Figure 5 page 14)**;
- the number of correct readings (samples) necessary to consider the data valid;
- the action associated with the invalid data;
- the path in which to save the database with the recorded data and the name to be assigned to the database **(Figure 5 page 14)**;
- the name of the database where the acquired data will be saved;
- the Trend Viewer configuration file (software dedicated to real-time consultation of recordings and completed sessions).

Further details available on the "General Settings" page **(4.4 "Connections" page page 32)**;

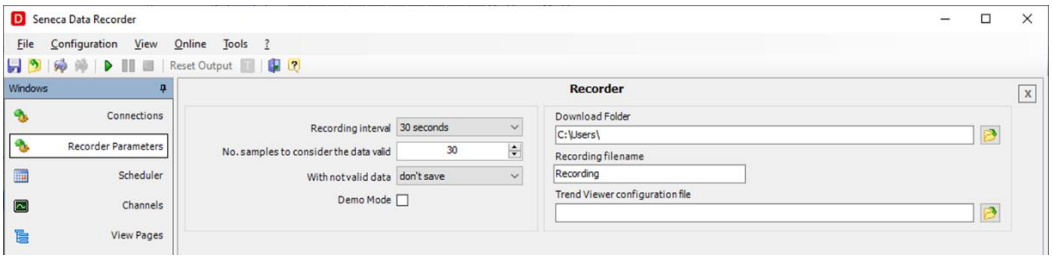


Figure 5. Recorder parameters

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When choosing the sampling time it is important to keep in mind that the instantaneous value is displayed in the Data Recorder display pages, but the instantaneous value taken by the variable at the moment of sampling, the maximum, the minimum and the average value calculated in the time interval between one sample and another are written in the database for each sample.

3.3 Channel Configuration (3rd step)

Click in the navigation menu on the "Channels" page **(Figure 32 page 40).**
To add the channels you want to record, select the “Add Channel” button located at the bottom of the screen. **(Figure 32 page 40)**
The following window appears in which it is necessary to select the reference connection where the channel will be acquired.

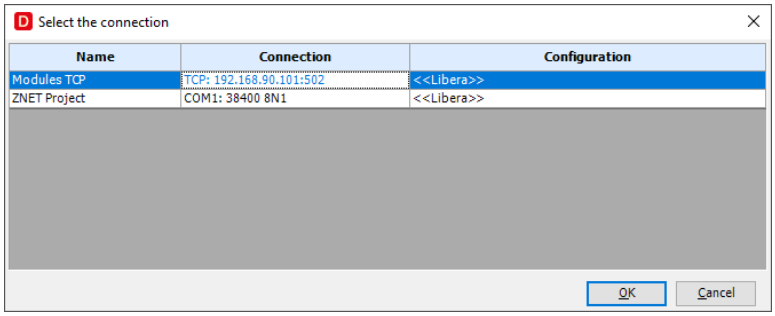


Figure 6 Add Channel. Connection selection

If the connection is <<Free>>, i.e. it is not associated with any Z-NET4 project, in the window that appears later it will be possible to parametrize the acquired channel according to the characteristics of the signal being recorded **(4.10 “Channels” page on page40).**

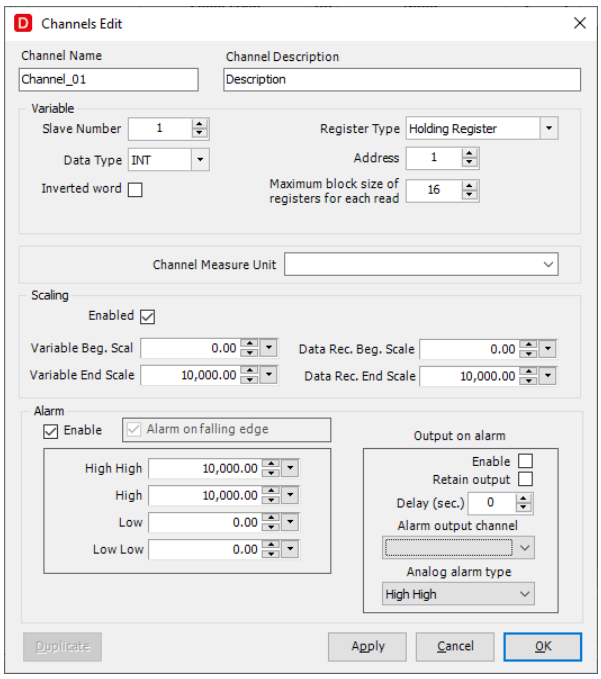


Figure 7. Channel Configuration

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If the connection was associated with a Z-NET4 project, the window that appears later allows the user to speed up the channel configuration operation, identifying the associated device and selecting one or more channels to be included in the project.

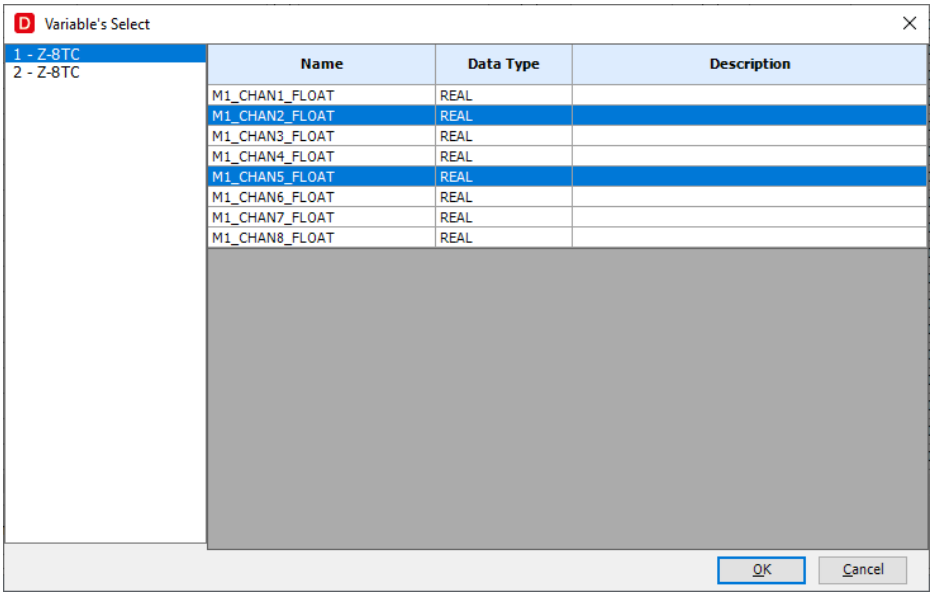


Figure 8. Importing a channel from a Z-NET4 project

The Channels page visually summarizes all configuration information.

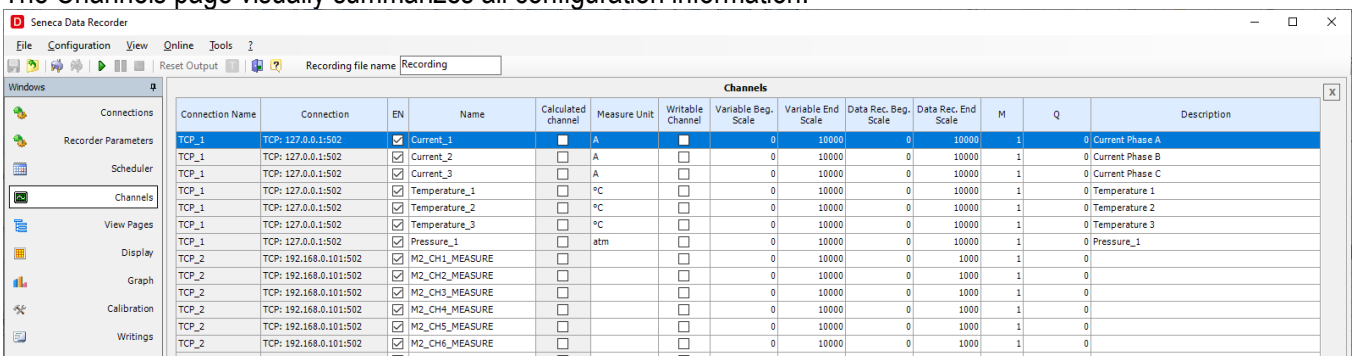


Figure 9. Display of the used Channels

Clicking on a channel row opens the pop-up with the channel settings in which to set any alarms, units of measurement and scaling and choose whether or not to save a channel on the database during recording.
Further details on the “Channels” page **(4.10 “Channels” page - page40)**.

3.3.1 Alarm Configuration

For each channel there is a section where it is possible to enable and configure the alarms associated with the changes in the values detected during recording.
If an analogue channel is used, 4 thresholds can be set (Low-Low, Low, High and High-High), but only one can be associated with the activation of a digital contact.
Otherwise, if a digital channel is used, you can choose whether the alarm is linked to the rising edge or the falling edge.
To set an analogue alarm as a function of a threshold, proceed as follows with reference to the following figure (Figure **10**):

- Enable the alarms section **(A)**
- Enter the thresholds for which you want to track events **(B)** and which will be recorded in the database.

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Optionally, the writing of the alarm on a digital contact can be associated with a threshold following the following steps:

- Enable writing **(D)**.
- Choose which alarm to associate the alarm writing with **(C)**.
- Choose whether the switching will be retentive or not **(E)**. If the retentive output is selected, you can reset it by pressing the dedicated button located in the toolbar **(Table 9. Toolbar)**
- Set the delay with which the digital output will be written **(F).** If left at 0, writing will occur instantly.
- Select the digital channel that will be associated with the alarm **(G)**.

- At the end of the alarm configuration, you can confirm and close **(OK)** or cancel the changes **(Cancel) (H)**

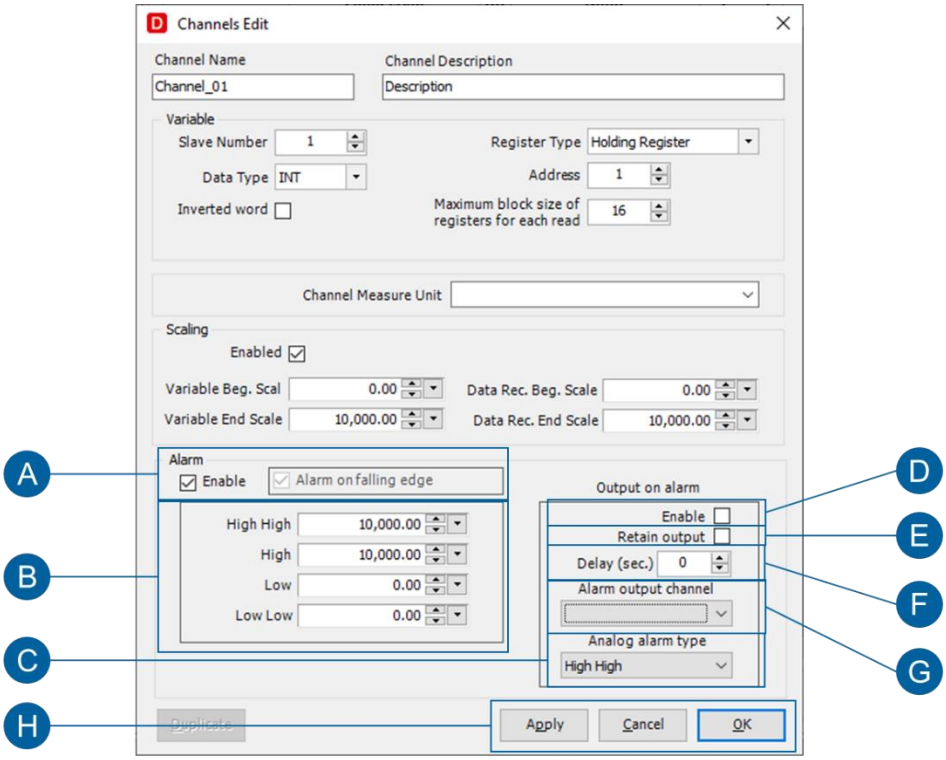


Figure 10. Alarm Configuration

To set a digital alarm according to its variation, proceed as follows with reference to the following figure (Figure **10**):

- Enable the alarms section **(A)**
- Choose whether the alarm is associated with the falling edge **(A)**.
- Optionally, it is possible to associate alarm detection with writing on a digital contact by following the same steps described in the previous case.
- At the end of the alarm configuration, you can confirm and close **(OK)** or cancel the changes **(Cancel) (H)**

Alarms are active only with a recording in progress. If no recording is active, no associated action is performed.

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3.4 Calculated Channels (Mathematical Functions)

In the configuration step of the channels acquired from the field, it is already possible to insert a different scaling for each one and according to the representative unit of measurement. In addition to this functionality calculated channels can be created.
By clicking on the “Add Calculated Channel” button, the window that enables the customization of the calculated channel opens.

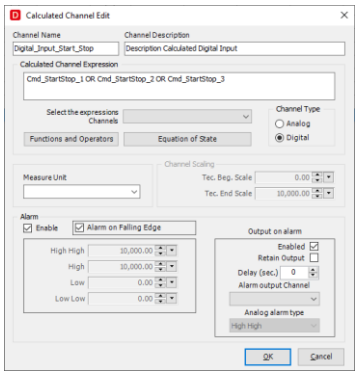


Figure 11. Calculated Channel Configuration

Through this tool it is possible to combine the channels acquired from the field exploiting the mathematical operators available (arithmetic, boolean, analogue functions). Furthermore, the calculated channels can be parametrized like the channels acquired directly (recording enabling, scaling and events on threshold).

A calculated channel must be considered as an acquisition channel for the purposes of sizing the license.

The mathematical functions and operators are accessible by clicking on the Select button located in the centre of the window **(Figure 11on page 18).** The following figure shows the available selection options (***Functions and Operators*** and ***Status Equations***)

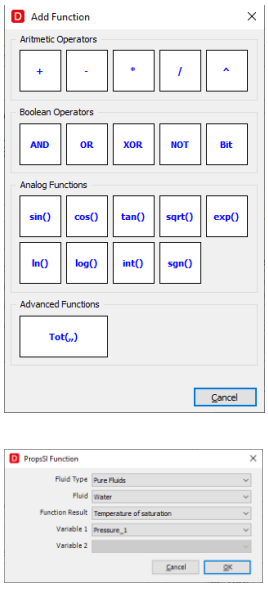


Figure 12. Mathematical Functions

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3.4.1 Advanced Functions

In addition to mathematical and trigonometric operators, Advanced Functions are available.

The function ***Tot(VAR,Vi,Vf)*** is used to calculate the integral of an analogue signal (VAR) by applying the trapezium rule

The formula can be represented as follows:

$$TOT(T)=TOT(T-1) + (Sample(T-1)+Sample(T))/2*(Timestamp(T)-Timestamp(T-1)) + Vi$$

Where:
Vi is the initial value that can be set in the formula at the declaration stage (can be a CHANNEL or a NUMBER);

- TOT(T-1) is the calculation performed at the previous instant;
- Sample(T-1) is the sample acquired and stored at the previous instant;
- Sample(T) is the sample acquired and stored at the current instant;
- Timestamp(T-1) is the time instant at which the previous sample was stored (seconds)
- Timestamp(T) is the current instant at which the sample is stored (seconds)

The operating logic is as follows:

- With the system connected, no calculation is performed, so the result displayed is "???"
- The calculation starts when logging is started;
- When I stop recording:
  - If Vf=1 (TRUE) then Vi changes and assumes the final value of the calculation (Vi=TOT)
  - If Vf=0 (FALSE) then Vi is NOT changed and assumes the value initially set in the formula.



With 'invalid data', the calculation uses the last valid value.
If Sample(T) NOT valid -> Sample(T)=Sample(T-1) and the calculation is performed as per the formula.



If the Data Recorder software is closed, after restarting the calculation resumes from the initial configuration.

3.4.2 Status Equations

To be able to exploit the status equations, proceed as follows:

- Select the type of fluid (Pure Fluid or Predefined Mixture)
- Select the fluid for which you want to perform calculations
- Select the type of Function Result
- Assign the Input variables paying attention to the table below. In particular, attention must be paid to the units of measurement of the quantities involved in the calculation.

Function Result	UM	Description	Input 1	Input 2
Dmass	kg/m³	Mass density	T (K)	P (Pa)
H	J/kg	Enthalpy saturated vapor (ref. Pressure)	P (Pa)	*Q=1 (fixed)*
H	J/kg	Enthalpy saturated liquid (ref. Pressure)	P (Pa)	*Q=0 (fixed)*
H	J/kg	Enthalpy saturated vapor (ref. Temperature)	T (K)	*Q=1 (fixed)*

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H	J/kg	Enthalpy saturated liquid (ref. Temperature)	T (K)	*Q=0 (fixed)*
P	Pa	Pressure of saturation	T (K)	-
T	K	Temperature of saturation	P (Pa)	-
VISCOSITY	Pa s	Viscosity	T (K)	P (Pa)
CPMASS	J/kg/K	Mass specific constant pressure specific heat	P (Pa)	T (K)
CVMASS	J/kg/K	Mass specific constant volume specific heat	P (Pa)	T (K)

Table 4. Licenses for channels to be acquired

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3.5 Calibration

For each project and for all related sub-projects there is a single reference file that includes the calibrations performed for each channel. Any calibration performed by a sub-project can be saved and used by the other sub-projects.
The instrument dedicated to calibration allows you to standardize the measurement acquired by one or more sensors (channels) at the same time, by calculating the linearisation coefficients M and Q.
To access the “Calibration” tool, select the corresponding item from the menu.

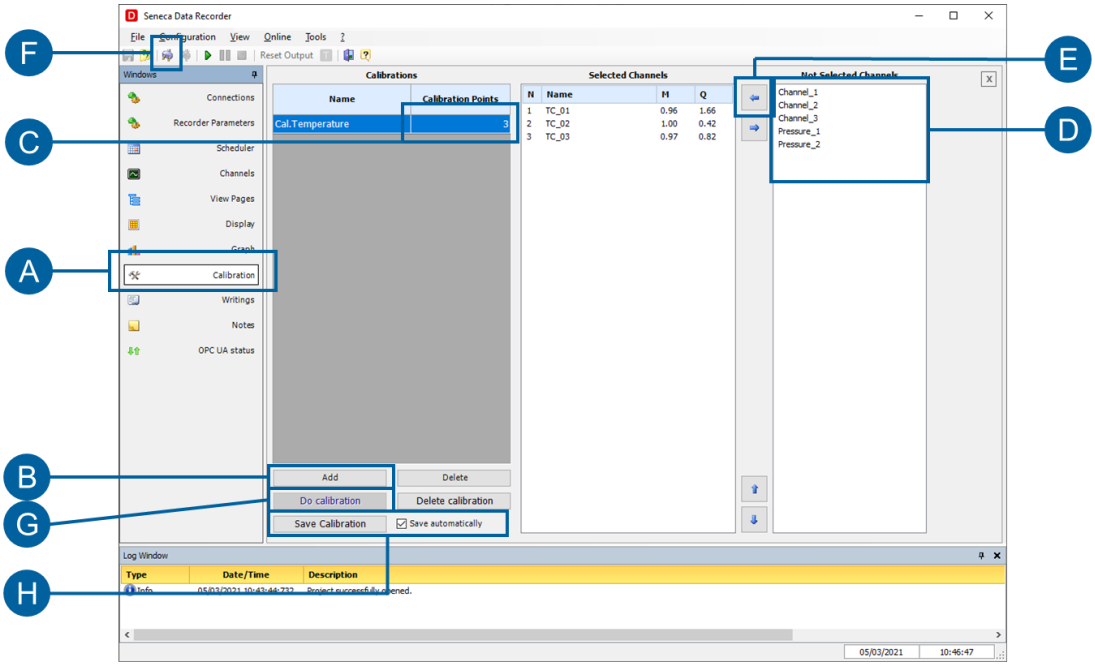


Figure 13**Choosing the channels to be calibrated**

The procedure for proceeding with the calibration of one or more channels is as follows:

- Click on **(B)** “Add” to create a group of channels to be calibrated.
- Click on **(C)** to choose the number of points on which calibration can be performed.
- Select the channel to add, multiple channels can be selected at the same time **(D)**.
- Click on **(E)** to add the channels to the created calibration group.
- Click on **(F)** to connect the system and enable the "Perform Calibration" button.
- Click on the "Perform Calibration" button **(G)**, the pop-up where you can perform the calibration will open **(Figure 14 page 21)**

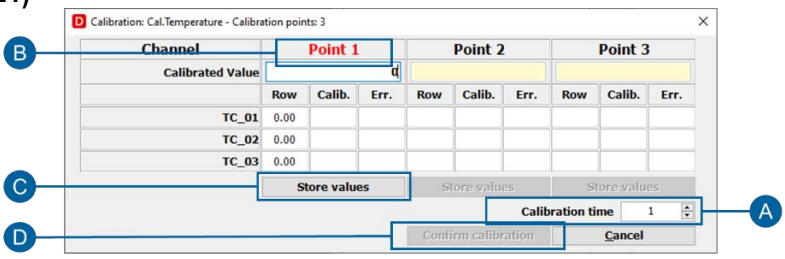


Figure 14 Performing the calibration

- Click on **(A)** to choose the calibration duration for each point.
- Write on field **(B)** the value of that point, button **(C)** "Store values" is enabled.
- Click on the "Save values" button **(C)**
- Repeat for all calibration points.
- Click on the "Accept Calibration" button **(D)**

You can optionally choose not to automatically save the calibration in the project (H), and the Save Calibration

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button (H) allows you to save the calculated values at any time.

Further details on the “Channels” page **(4.12 “Calibration” page - page 44)**.

3.5.1 Calibrated Channels - Import/Export Calibration

It is possible to consult the list of calibrations performed by selecting Calibrated Channels from the View menu. The calibration is specific for each channel and can be imported and exported from one project to another using the dedicated buttons **(B)**.

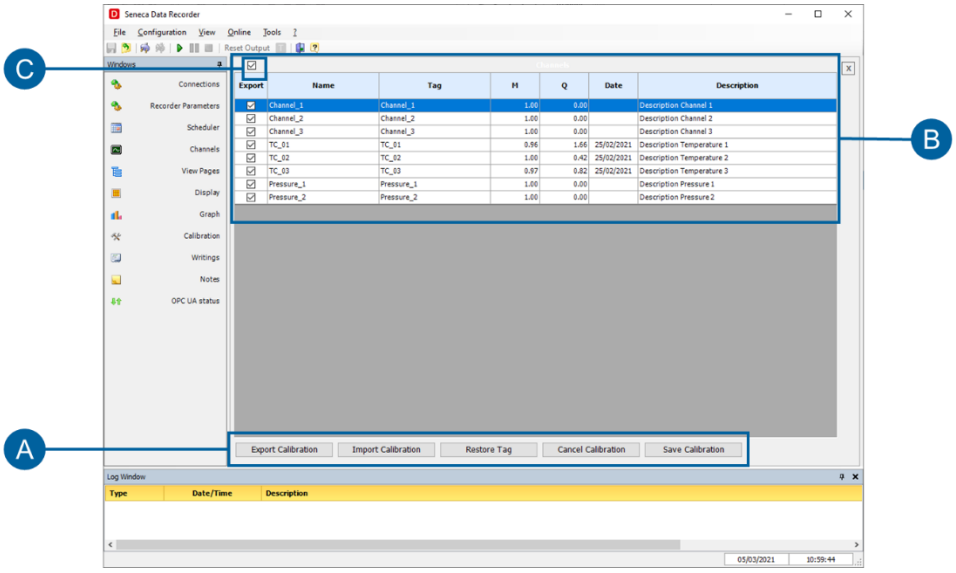


Figure 15. Calibrated Channels

With the available commands (A), from this window it is possible to:

- Export the Calibration
- Import the Calibration from another project
- Reset the Tags, i.e. delete all references (TAG Column) and restore the original reference copying the name of the channel.
- Resetting the Calibration allows you to reset the reference (TAG) and restore the default values M = 1 and Q = 0.
- Save the parameters displayed in the file that contains the general reference of the calibrations for the project and for all sub-projects.

To export the calibration, proceed as follows:

- Select the calibrated channels that you want to export through the check mark located in the first column. It is possible to select all the channels by acting on the tick **(C)**.
- Press the Export Calibration button **(A)**.
- A window appears in which to assign the name of the file, with the extension .calib, which will contain the calibrations of the selected channels.
- Save the file

At this point the calibration can be imported into any other project.

To import the calibration into another project, proceed as follows:

- Press the Import Calibration button
- Select the file in which the calibration was previously saved. After opening the file, Figure **16** appears.

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- The left column shows all the channels of the Data Recorder project you are working on, while the right column shows the "TAGs" or the calibrated channels from the other project **(B).**
- To import the calibration into the channel, the source channel **(D)** must be selected in the TAG column.
- You can then choose whether or not to overwrite (C) the calibration tags of the project you are working on. The choice to overwrite the TAGs is to keep track of the reference to the original project.
- To accept the calibration import select OK, while to cancel the changes select CANCEL **(A)**.

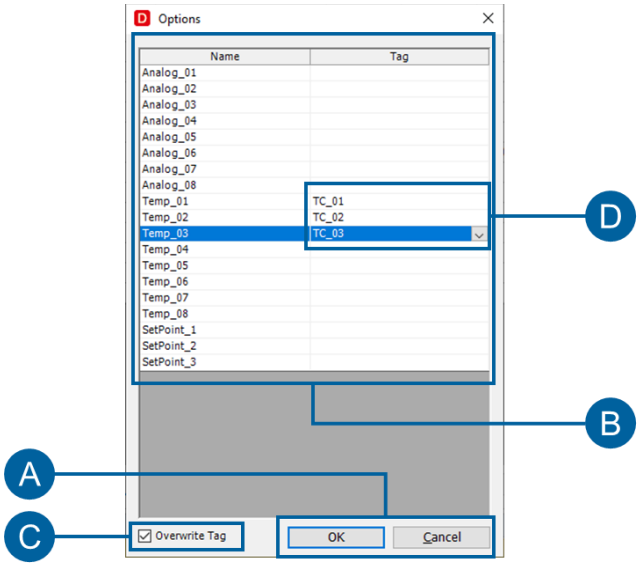


Figure 16. Calibration Import

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3.6 Display Pages

The real-time display offers multiple selection possibilities: groups of channels, representation interval, scrolling direction on the screen. To quickly configure the Display Pages, you can follow the steps below:

- In the navigation menu, click on the "Display pages" page **(A)**.
- Click on “Add” **(B)** to create a display page.
- Choose whether to create a page of analogue or digital channels **(C)**.
- Select one or more channels to be displayed on the display page **(D)**.
- Click **(E)** to add the channels to the display page.

Repeat the procedure for all the desired display pages.
Details on the “Display Pages” page **(4.7 "Display pages" page page 36)**.

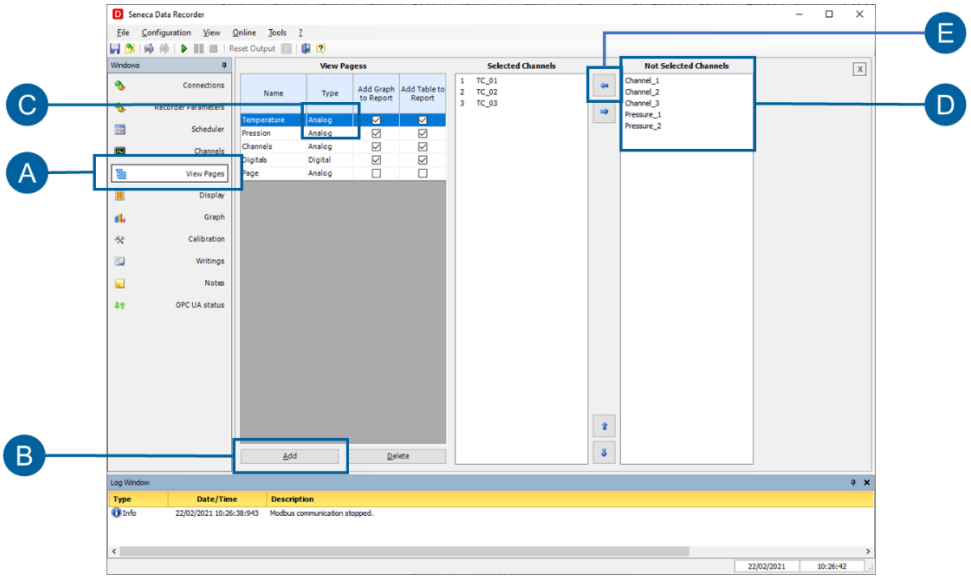


Figure 17 Creating display pages

By clicking on connect on the global project commands **(Figure 23 on page 30)** at this point it is possible to see the instantaneous values on the “Display” **(4.8 "Display" page page 38)** and “Chart” **(4.9 "Chart" page page 39)** pages.

In display mode **(4.8 "Display" page page 38)** it is possible to create various display pages containing groups of different channels which show the instantaneous values acquired by the system in the form of a display. In addition to the name and the instantaneous value of the acquired channel, each display on each page also shows the status of any alarms set
In **chart** mode **(pen) (4.9 "Chart" page page 39)** each display page corresponds to a real-time time chart containing a maximum of eight contemporary pens that can be customized in colours, with a time axis that can be set from a minimum of thirty seconds up to a maximum of twenty-four hours.

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3.7 Starting recording

Recordings can be manually controlled by the user through the Start, Stop and Pause buttons. Unless otherwise selected, the default recording mode is set to manual.
You can check this setting by selecting the "Scheduler" page **(A)** in the navigation menu and check the "Start recording" option.

3.7.1 Manual recording

To start a recording in manual mode, you can follow the procedure below:

- If otherwise set, select “Manual” from the drop-down menu **(B)**.
- Connect the system by clicking on **(C)**.
- Start recording by clicking on **(D)**.
- In the “Display” **(4.8 "Display" page page 38)** and “Chart” **(4.9 "Chart" page page 39)** pages it is possible to see the instantaneous values and the software saves the database of the recorded values.
- To stop recording click on **(D)** again.

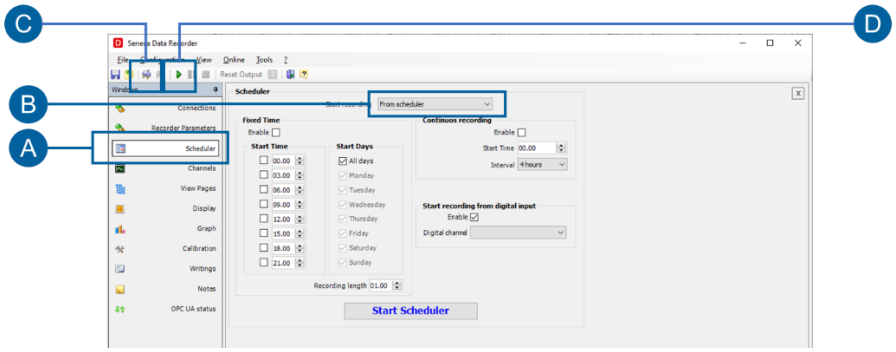


Figure 18. Starting recording in manual mode

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3.7.2 Scheduler - Automated recording

As an alternative to Manual Recording, the option to automate the system is available using three different methods, one an alternative to the other:

- recording at fixed times and days of the week;
- continuous recording;
- recording with start from a digital input.

Timed recording allows you to set up to eight daily recording starts for all days of the week or choosing the recording days with the recording duration which also determines the size of the databases created; continuous recording allows you to choose the recording start time and the size in which to break the various recorded databases to avoid generating excessively heavy databases; finally, recording from digital input allows you to set a digital channel that controls the recording start and stop.

To start recording in "From scheduler" mode, you can follow the procedure below:

- In the navigation menu, click on the “Scheduler” page **(A)**.
- Select "From scheduler" from drop-down menu **(B).**
- Connect the system by clicking **(C)**, or by selecting the "Connect if disconnected" option.
- Choose the desired scheduling mode from "Recording start times", "Continuous recording" and "Start from Digital input" **(D)** and set the desired scheduling times.
- Start the scheduler by clicking on **(E)**.
- To stop the scheduler click on **(E)** again.

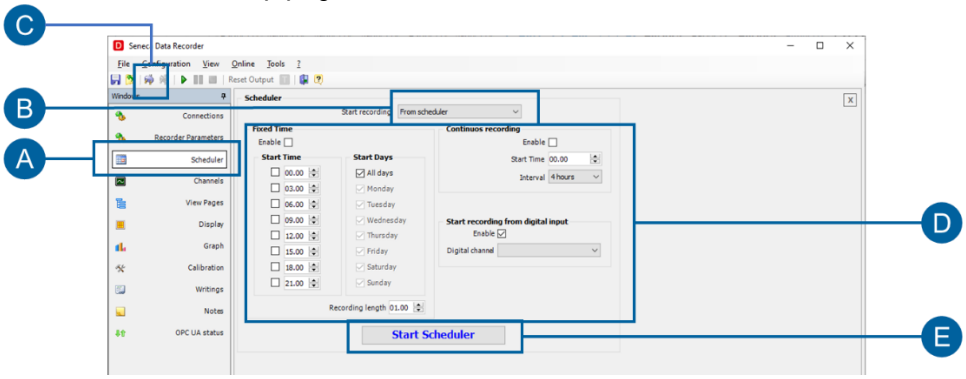


Figure 19. Starting recording in scheduler mode

In the “Display” **(4.8 "Display" page page 38)** and “Chart” **(4.9 "Chart" page page 39)** pages it is possible to see the instantaneous values (if the connection is active) and the software saves the database of the recorded values according to the times set in the scheduler.

Details of the “Scheduler” **(4.6 “Scheduler” page page 35)** page.

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4 SOFTWARE PAGES

4.1 Pages menu

You can browse the main pages using the page menu **(A)** on the left of each main page.

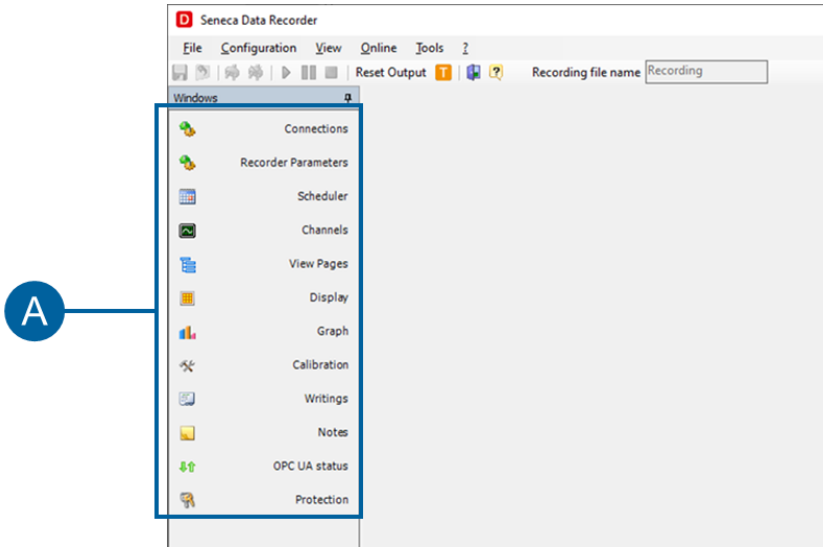


Figure 20. Pages menu

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Connections	Key to access the “Connections” page **(4.3 Global commands page 30)**.
Recorder Parameters	Key to access the “Recorder Parameters” page **(4.5 “Recorder Parameters” page page 34)**.
Scheduler	Key to access the "Scheduler" page **(4.6 “Scheduler” page - page 35)**.
Channels	Key to access the “Channels” page **(4.10 “Channels” page - page 40).**
View Pages	Key to access the “Display pages” **(4.7 "Display pages" page - page 36)**.
Display	Key to access the “Display” page **(4.8 "Display" page - page 38)**.
Graph	Key to access the "Chart" page **(4.9 "Chart" page - page 39)**.
Calibration	Key to access the "Calibration" page **(4.12 “Calibration” page - page 44)**.
Writings	Key to access the “Writings” page **(4.12 “Calibration” page - page 45)**.
Notes	Key to access the "Notes" page.
OPC UA status	Key to access the "OPC Server UA" page.
Protection	Key to access the o set a password protection for the project.

Table 5. Pages menu

The pages can also be navigated by clicking on "Configuration" and "View" in the first line at the top of the software from which the "Calibrated Channels", "Units of Measurement" and "Report" pages are also accessible.

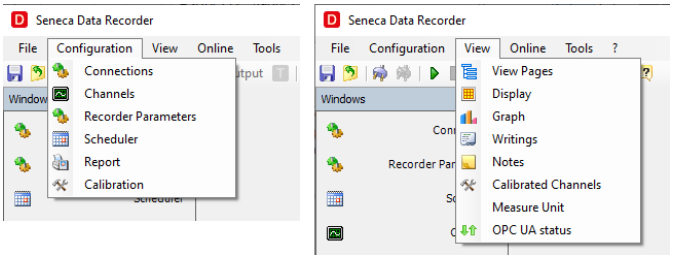


Figure 21. Pages menu from Configuration and Display

Calibrated Channels	Key to access the "Calibrated channels” page. **(4.12 “Calibration” page – page 45)**

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Measure Unit	Key to access the “Units of measurement” page (**4.16 “Unit of measurement” page page 52**).
Report	Key to access the “Automatic report” page (**4.14 “Automatic report” page page 50**).

Table 6. Extra pages menu from “Display

4.2 Common elements

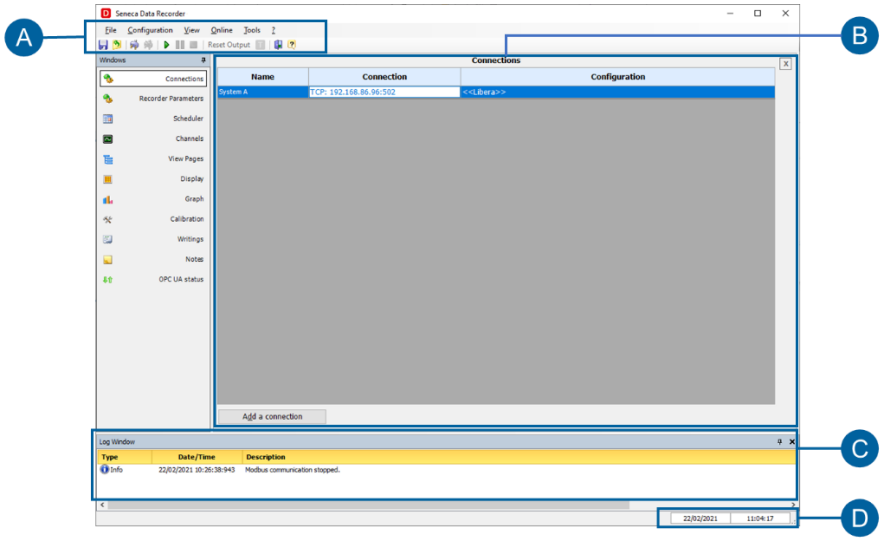


Figure 22. Common elements

A	Global project commands: in the first line the submenus "File", "Display", "Online", "Tools" and "?" and on the second line a series of commands from icon
B	Area relating to the main page selected from the navigation menu or from the "Display" menu.
C	Log window showing the events that take place in the software, in particular four groups of events are displayed: error messages, information (result of operations carried out), data (messages sent by the modules), trace (more specific additional information).
D	Current date and time.

Table 7. Common elements

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4.3 Global commands

The first two lines at the top of the software contain the global project commands.

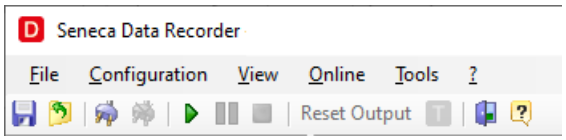


Figure 23. Project global commands

Each item in the first line constitutes the main menu of the software and is structured as described in the following table.

File	If no project is open it contains the "New", "Open", "Save", "Save As", "Recent projects", "Exit" commands. If the project is open, the Create under Project, Duplicate Project, “Close", "Save", "Save as", "Recent projects", "Exit" commands are enabled.
Configuration	Recording project configuration menu.
Display	Navigation menu of all software pages.
Online	It contains the "Connect", "Disconnect", "Start", "Pause", "Stop", "Reset Output", "Trend Viewer" commands.
Tools	It contains the "Options" commands which opens the "Options" pop-up, "Start Minimized to icon", "Log Window" which hides or shows the "Log Window", "License" which opens a pop-up with the information about the present license and the number of channels used within the project.
?	It contains the "Online Help", "About Seneca Data Recorder 2.0" commands.

Table 8. Main menu

Each icon in the second row, belonging to the software toolbar, executes the command described in the following table.

	Saves changes to the project.
	Closes the project.
	Opens a new project.
	Connects the software to the modules, starts communication with modules.
	Disconnects the software from the modules, closes the communication with the modules.
	Starts manual recording. Enabled if communication with the modules has been started previously.

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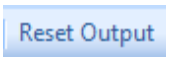
	Pauses recording. Enabled only if recording has been started previously.
	Stops manual recording. Enabled only if recording has been started previously.
	Resets the outputs of any digital alarms set on the channels used in the project.
	Opens the Trend Viewer software.
	Closes the software.
	Help.

Table 9. Toolbar

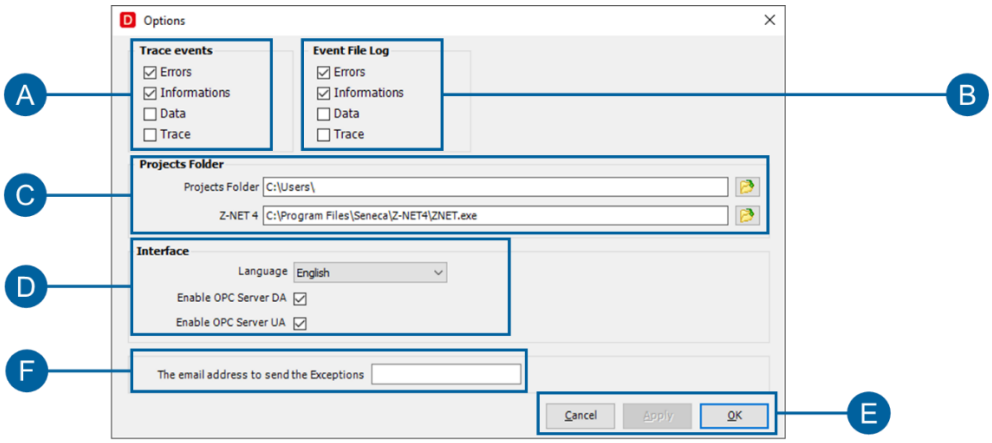


Figure 24. “Options” pop-up

A	Section where you can select and deselect the signalling groups you want to see in the "Log Window” **(C) (Figure 22 page 29)**.
B	Section where you can select and deselect the signalling groups that you want to save in a file. **(C) (Figure 22 page 29)**.
C	Folder to save to by default.
D	Choice of the language to work with
E	The OK button allows saving the modifications. The Cancel button allows exiting without saving the modifications
F	Email address reports relating to the software should be sent to

Table 10. “Options” pop-up

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4.4 “Connections” page

The "Connections" page allows you to create new connections and to import Z-NET4 projects from which to select the channels for which you want to enable recording.

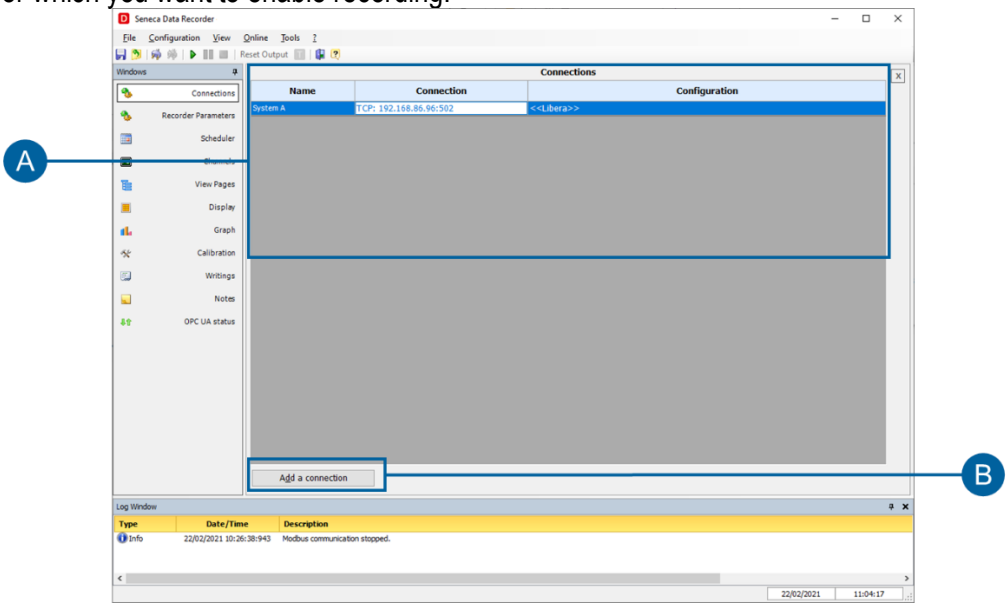


Figure 25. “Connections” page

A	Area where the connections are shown and a <<Free>> connection, that is manually configured, is indicated, showing also if it is associated with an imported Z-NET4 project. The first column on the left displays the name associated with the connection, followed by the connection parameters and finally the type of reference project.
B	Opens the “Modbus connection” pop-up of **Figure 26 page 32** to add a new connection to the Data Recorder project

Table 11. Connections page

To delete an imported connection, select the connection to be deleted and click on "Delete" on the PC keyboard.

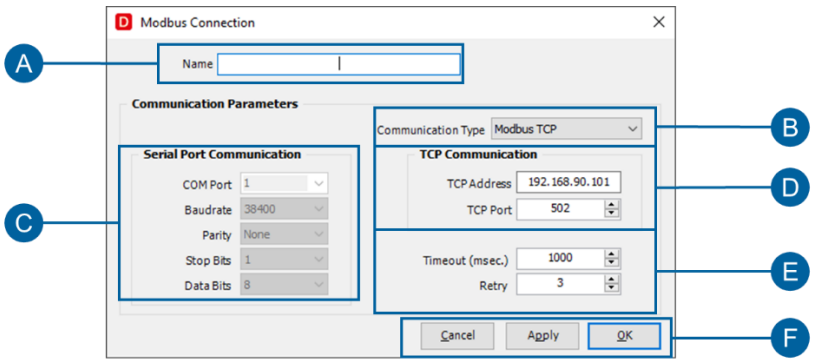


Figure 26. “Modbus connection” pop-up

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A	Field in which to indicate the name of the connection to be added.
B	Drop-down menu for choosing the type of communication to use. The "Modbus RTU" selection enables the parameters of section C, the "Modbus TCP" selection enables the parameters of section D.
C	Communication parameters to be set consistently with the system from which to acquire the channels and the "Modbus RTU" type of communication.
D	Communication parameters to be set consistently with the system from which to acquire the channels and the "Modbus TCP" type of communication.
E	Waiting time in milliseconds and number of attempts before declaring the communication with each module in the network identified by the connection as failed.
F	The "Delete" button closes the pop-up and returns to the "Connections" page without any modification to the project; the "Apply" button makes the changes set on the pop-up effective; the "OK" button, to be clicked after the "Apply" button, closes the pop-up and adds the Connection to the project.

Table 12. “Modbus connection” pop-up

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4.5 “Recorder Parameters” page

The "Recorder Parameters" page allows you to choose the general settings of the Data Recorder project, that is to define the data recording mode.

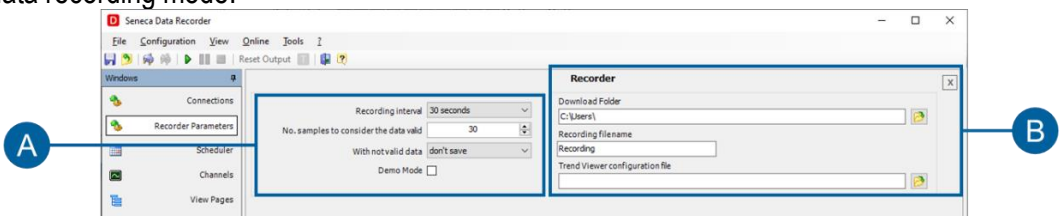


Figure 27. Recorder Parameters page

A	General project settings: • the drop-down menu allows you to choose the sampling interval during data recording, the smallest value is 1 second, the largest 30 minutes; • Number of samples to consider the data as valid, it consists of the number of readings that take place correctly to determine that a measurement can be recorded on the database; • With invalid data, it indicates the action to be performed in the event that the data has not been acquired correctly; • the flag allows you to run the current project in simulation mode.
B	Section for the data saving settings of the Data Recorder project: • the “Download folder” indicates the folder on the PC where the database of recorded values is saved; • the “Name of the recording file” allows you to indicate the name with which the recording database will be saved; • the “Trend Viewer configuration file” allows you to show the Trend Viewer software which configuration to recall if it is started from the Data Recorder.

Table 13. Connections page

To delete an imported connection, select the connection to be deleted and click on "Delete" on the PC keyboard.

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4.6 "Scheduler" page

The "Scheduler" page allows you to select the recording mode and the scheduling settings of the recordings in "From scheduler" mode.

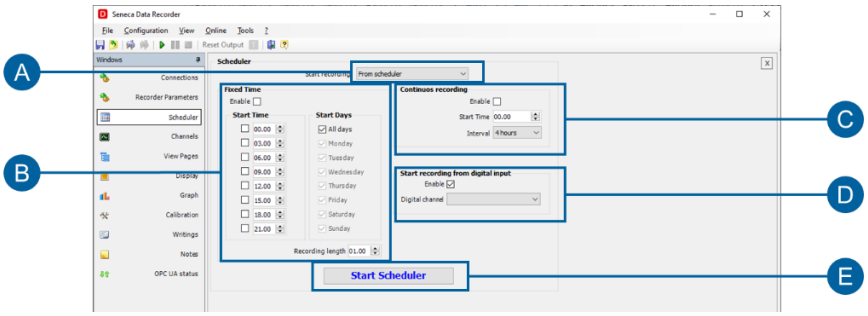


Figure 28. Scheduler page

A	Selection of the recording mode between "Manual" and "From scheduler". In "Manual" the recording starts and stops by clicking on the appropriate buttons in the global commands in the second line of the software **(Figure 18 on page 25)**, or by using the appropriate buttons in the "Online" submenu. For each operator's recording start and stop, a separate database will be created. In "From Scheduler" mode, the rest of the "Scheduler" page is enabled and manual controls are disabled.
B	Section for setting the recording by periodic scheduling. By clicking the "Enable" box it is possible to modify the rest of the section. In the "Start times" subgroup you can select and set up to eight daily recordings that start at different settable times; the "Start days" subgroup has by default the "all days" recording selected, but by deselecting it, you can choose the days on which to start the recording. Finally, the "Recording duration" field allows you to set the recording time for each start, keep in mind that this setting also determines the size of the databases created since you will have a database for each recording.
C	Section to set the start of recording from continuous. By clicking the "Enable" box it is possible to modify the rest of the section. The "Start time" field allows you to set the time when recording is to start, while the "Divide database files every" field allows you to set how often to create a separate database during recording. Compared to recording in manual mode this allows the creation of databases all of the same size.
D	Section for setting the recording from digital input. By clicking the "Enable" box it is possible to modify the rest of the section. The "Digital channel" field allows you to select the digital channel to be used as the recording start and stop; to be present in the drop-down menu of the "Digital channel" field, the channel must first be imported into the "Channels" page **(4.10 "Channels" page page 40)**. Recording starts when the selected digital channel takes value 1 and stops when it takes value 0. The files in the database will have a variable size depending on how long the trigger variable remains at 1.
E	Button that starts and stops recording using the settings chosen on the "Scheduler" page.

Table 14. "Scheduler" page

It is possible to enable only one recording start mode at a time from the scheduler and selecting one mode disables the others. In recorder mode, if not connected, communication starts automatically at the start of recording.

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4.7 "Display pages" page

The "Display pages" page allows you to create different pages to display instantaneous data and to associate the channels you want to view for each page.

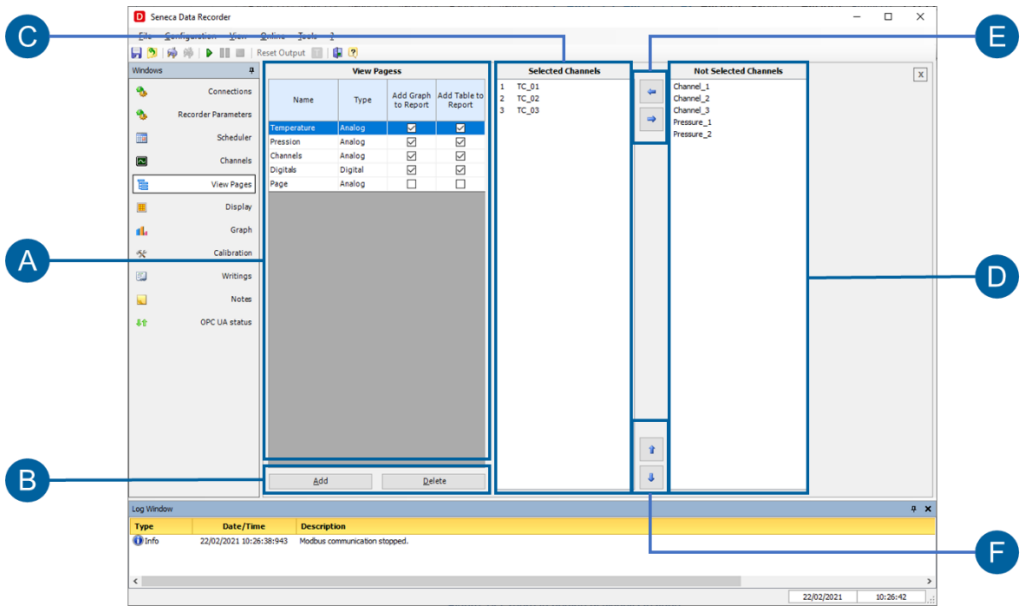


Figure 29."Display Pages" page

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A	List of the created display pages. A click on a field in the “Name” column modifies sections C and D of the page showing in section C the channels selected for display on the selected page and in section D the channels present in the current project relating to the type of selected page (analogue or digital) but not selected for display on the page being considered. A double click on a field in the "Name" column allows you to change the name of the selected page. Clicking on a field in the "Type" column opens a drop-down menu that allows you to choose if you want to create a page with analogue or digital channels; the choice modifies sections C and D of the page, showing respectively the channels present in the project not selected and selected in the page that is being created only analogue or only digital depending on the selection. Careful, changing the type after choosing the displayed channels cancels the selection made. The flags "Add Chart in Report" and "Add Table in Report" allow you to choose whether to integrate every page in the form of a table or in the form of a chart in any set reports.
B	The "Add" button allows you to add a new display page to the project, the "Delete" button deletes the display page selected in section A.
C	List of channels selected for display on the page selected in section A. The channels are all analogue or all digital depending on the "Type" chosen in section A.
D	List of channels not selected for display on the page selected in section A but present in the project. The channels are all analogue or all digital depending on the "Type" chosen in section A.
E	The arrow to the left allows you to bring the channels that are selected in the "Unselected channels" section into "Selected channels", adding them to the selected display page, while the arrow to the right allows you to bring the channels that are selected in “Selected channels” into the "Unselected channels" section, therefore deleting them from the selected display page.
F	The up and down arrows allow you to change the order of the list of channels in "Selected channels" thus changing the order in which the channels are displayed on the page.

Table 15. "Display pages" table

For each display page, it is possible to insert up to a maximum of 48 channels that can be displayed simultaneously on the "Display" page **(4.8 "Display" page page 38**) and a maximum of 8 channels that can be displayed simultaneously on the "Chart" page **(4.9 "Chart" page page 39)**. By setting more than eight channels per display page, you will see up to forty-eight channels on the "Display" page while on the "Chart" page relating to the same display page the first eight will be shown.

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4.8 "Display" page

The "Display" page allows you to view the instantaneous values for each display page once the connection has been started, using the appropriate buttons in the global commands of the software **(Figure 18 on page 25)**. The display of the values is independent of the recording on the database.

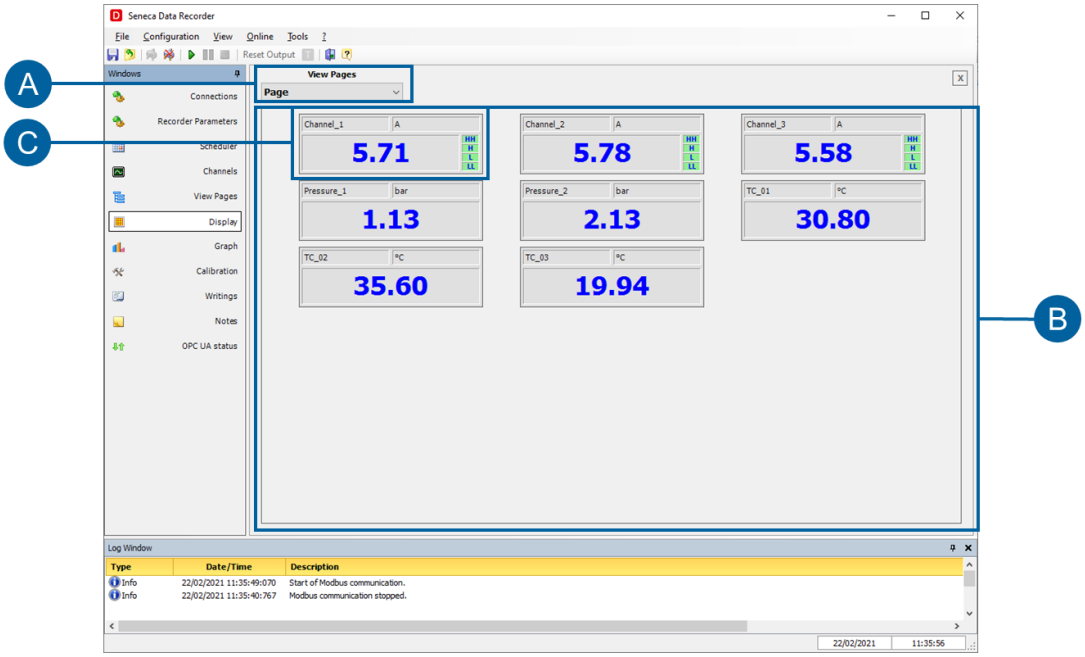


Figure 30."Display" page

A	Drop-down menu that allows you to choose the display page to be displayed in section B.
B	Display of the instantaneous values in the channels for each display page selected in section A. The instantaneous values are displayed once the connection is started, regardless of whether the software is recording them or not in a database.
C	Display of a channel. In the top left corner the name of the channel, in the centre the instantaneous value detected, on the right, if enabled within the channel in the "Channels" page **(4.10 "Channels" page page 40)**, the very high (HH), high (H), low (L) and very low (LL) alarms in green if not active and in red if active. A double click anywhere in the box relating to a channel opens a small pop-up in which it is possible to modify the decimal digits displayed from 1 to 5 (this modification has no effect on recording the value in the database, but has only effect on the display of the instantaneous value in the "Display" and "Chart" pages) and the colour of the pen associated with that channel in the chart on the "Chart" page **(4.9 "Chart" page page 39)**.

Table 16. "Display" page

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4.9 "Chart" page

The “Chart” page allows you to view a chart of the instantaneous values for each display page once the connection has started, using the appropriate buttons in the global commands of the software **(Figure 18 on page 25)**. The display of the pens is independent of the recording on the database.

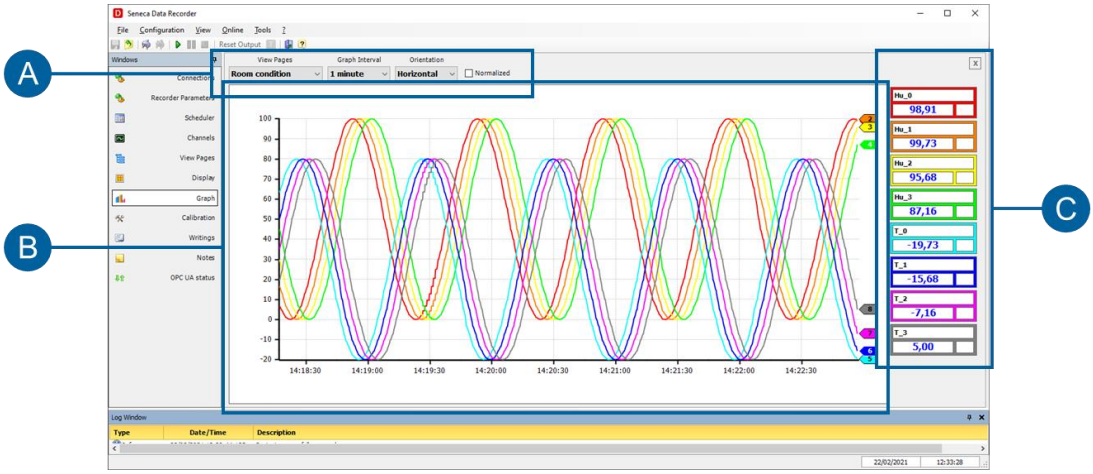


Figure 31.”Chart” page

A	Section that allows you to choose the display page to be displayed in the chart in section B, set the length of the time axis displayed in the chart in section B (variable from 30 seconds to 24 hours), choose the horizontal or vertical orientation of the chart and choose whether to display the normalized data or with their real values.
B	Chart relating to the channels on the display page and with the parameters selected in section A.
C	List of channels on the display page and then in the chart in section B. Each box relating to a channel has the name of the channel at the top and below the instantaneous value detected (once the connection has started regardless of whether the software is recording them or not in a database); the panels associated with the channels do not display the alarms on this page. A double click anywhere in the box relating to a channel opens a small pop-up in which it is possible to modify the decimal digits displayed from 1 to 5 (this modification has no effect on recording the value in the database, but has only effect on the display of the instantaneous value on the "Display" and "Chart" page) and the colour of the pen associated with that channel in the chart; in addition to the pen in the chart, the outlines of the entire box are also coloured with the selected colour.

Table 17. "Chart" page

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4.10 “Channels” page

The “Channels” page allows you to add, edit and view the channels to be used in the software.

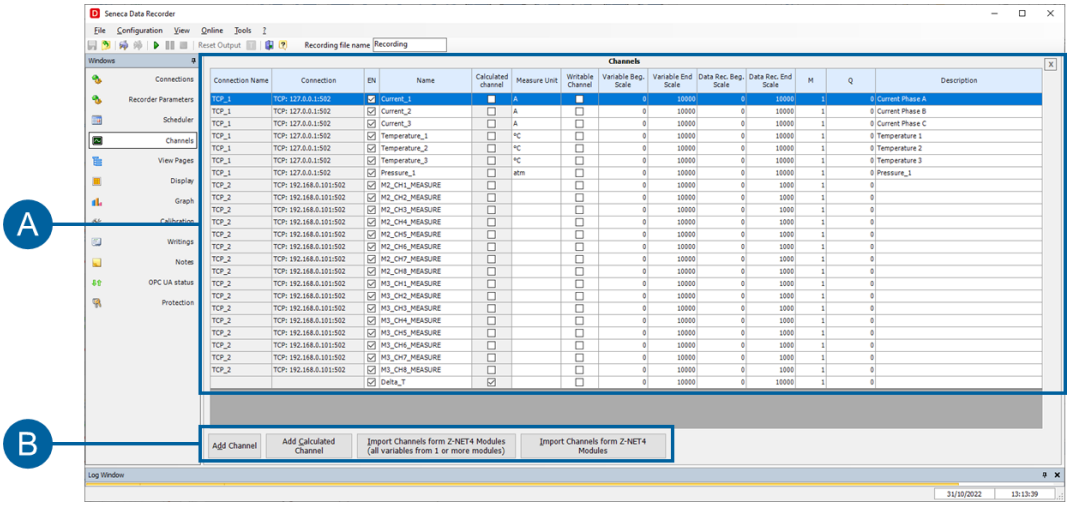


Figure 32. Channels page

A	List of channels associated with the project For each channel from left to right there is the "IP address or COM port" relating to the project from which the channel was imported, the tick "Save to database" (EN) enabled by default the "Name" assigned to the variable, which is the name that is then used within the software for that channel, the tick "Calculated channel", which cannot be changed, indicating whether the channel comes from a direct reading or if it is a channel created from a combination of other channels; the "unit of measurement", the "Start of Data Rec Scale.", the Data Rec. Full Scale " If set, the "M" and "Q" calculated during any channel calibration on the "Calibration **(4.12 “Calibration” page - page 45)** page and any "Description" of the channel. Channel changes can only be done with the system disconnected (by clicking on the appropriate button in the global commands **(Figure 18 on page 25)**, or by using the appropriate buttons in the “Online” submenu. With a single click on "Save to database", the saving of the values of that channel to the database in case of recording is disabled; a single click on "Unit of measurement" brings up an arrow that opens the drop-down menu from which you can select the unit of measurement to be assigned to the channel; a single click on the "Start of Data Rec. Scale", Data Rec Full Scale. " and "Description" allow you to write in these fields. A double click on any point of the line relating to a channel (with the exception of the "Save to database" column) opens the "Edit channels" pop-up **(Figure 33 on page 41)** in which it is possible to modify all the parameters relating to the selected channel. With a single click on "Writable Channel" the variable to be written is enabled and will appear in the window dedicated to writing **(4.11 “Writings” page - page 44)** NOTE: EN enables the modbus communication (data acquisition) and the database recording
B	The “Add a Channel” button allows you to add one channel at a time and opens a pop-up where you can enter the characteristic information or select the channel from the associated Z-NET4 project. In this last case, a second pop-up opens in which to select the module and then the channel to import The button "Import channels from Z-NET Project (all the variables of one or more modules)" allows you to simultaneously add all the channels of one or more modules associated with the Z-NET4 project. The button "Import channels from Z-NET Project (one or more variables of a module)" allows you to select which channels, associated with the Z-NET4 project, you want to import into the project. The "Add Calculated Channel" button opens the "Edit Calculated Channel" pop-up **(Figure 33 on page 41)** and allows you to create a channel calculated as a combination of other already imported channels.

Table 18. “Channels” page

To delete an imported channel, select it and click on "Delete" on the PC keyboard.

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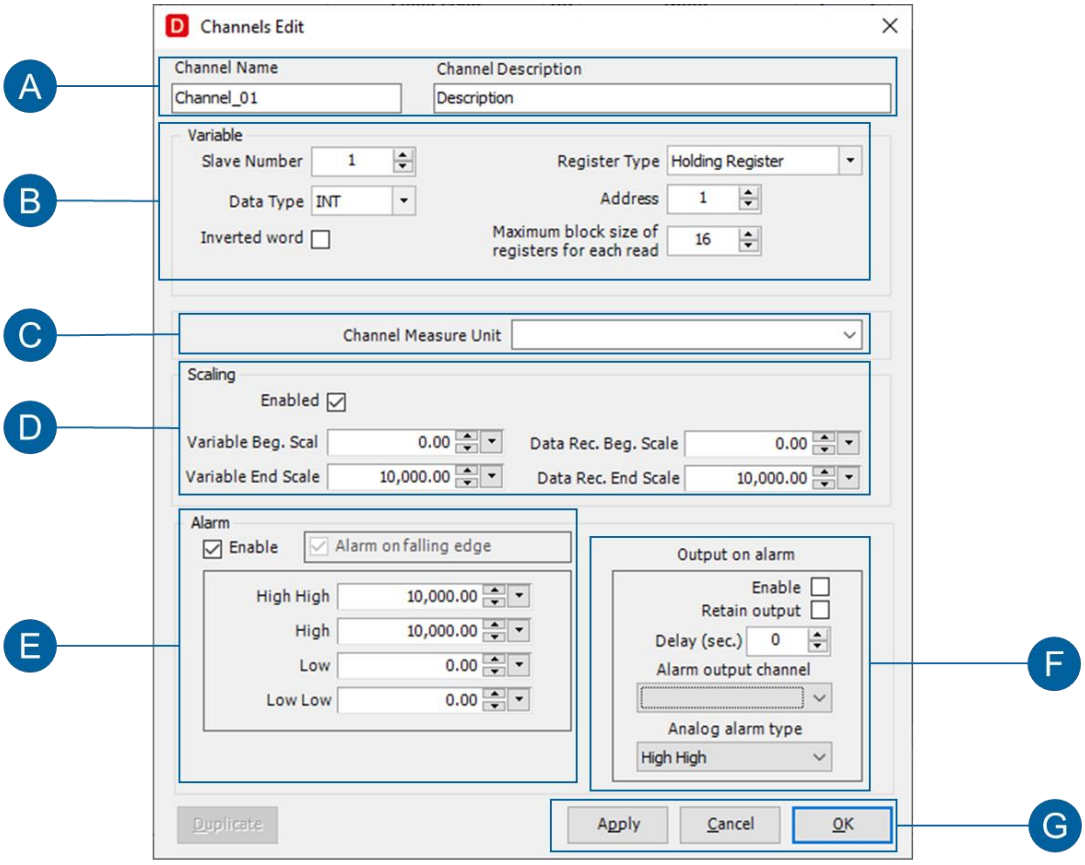


Figure 33. “Edit channels” pop-up

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A	The “Channel Name” field shows the name of the channel, which can be changed in this pop-up. The "Channel Description" field allows you to enter a description of the channel.
B	Channel information. If the channel is imported from a Z-NET4 project, the settings are accepted automatically.
C	Drop-down menu to set the unit of measurement associated with the variable.
D	Ticking the "Enabled" box enables the fields in this section where you can set a scaling for the selected channel.
E	Checking the "Enabled" box enables the fields in this section where you can set the High High (HH), High (H), Low (L) and Low Low (LL) alarm thresholds which are then displayed on the " Display” page **(4.8 "Display" page page 38)** where the channel is entered. If the channel being considered is digital, it is also possible to enable the "Alarm on the falling edge".
F	Enabling the alarm in section E enables the fields in this section where it is possible to write the alarm status on a digital channel. In order to select the "Alarm output channel" it is necessary to have previously imported the channel into the "Channels" page **(4.10 “Channels” page page 40)**.
G	The "OK" button confirms the changes to the channel and closes the pop-up. The "Delete" button closes the pop-up cancelling any changes made on the channel.

Table 19. “Edit channels” pop-up

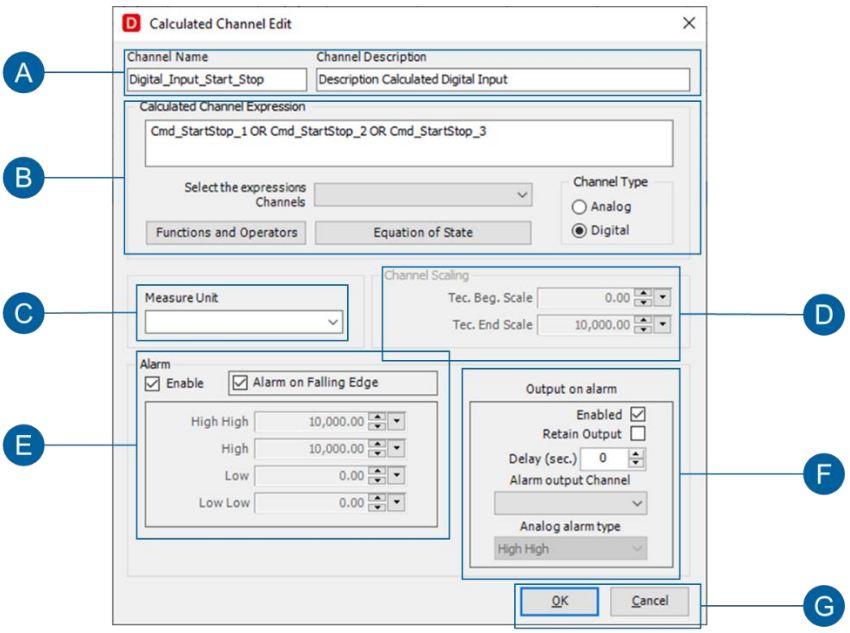


Figure 34. “Calculated Channel” modification

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A	In the "Channel Name" field, the desired name for the calculated channel being created must be entered. The "Channel Description" field allows you to enter a description of the channel.
B	Section in which you can create the combination of channels from which to generate the calculated channel. Whenever you want to add a channel to the calculation, open the "Select channels for expression" drop-down menu and click on the chosen channel; every time you want to add an operator click on "Select" next to "Functions and Operators" and choose the desired function. Alternatively, freely write the expression in the "Expression of the calculated channel" field. In a correct expression the background of the "Expression of the calculated channel" field is white, while in an incorrect expression the background is yellow with a circle and a flashing red exclamation mark next to the same field. On the right under "Channel Type" you select if you want to create an analogue or digital channel.
C	Drop-down menu to set the unit of measurement associated with the variable.
D	Section in which it is possible to set a scaling for the channel.
E	Checking the "Enabled" box enables the fields in this section where you can set the High High (HH), High (H), Low (L) and Low Low (LL) alarm thresholds which are then displayed on the " Display " page **(4.8 "Display" page page 38)** where the channel is entered. If the channel being considered is digital, it is also possible to enable the "Alarm on the falling edge".
F	Enabling the alarm in section E enables the fields in this section where it is possible to write the alarm status on a digital channel. In order to select the "Alarm output channel" it is necessary to have previously imported the channel into the "Channels" page **(4.10 "Channels" page page 40).**
G	The "OK" button confirms the changes to the channel and closes the pop-up. The "Delete" button closes the pop-up cancelling any changes made on the channel.

Table 20. "Calculated channel modification" pop-up

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4.11 “Writings” page

The "Writings" page allows you to write some variables that were previously marked in the Channels page by clicking on the "Writable channel" checkmark.

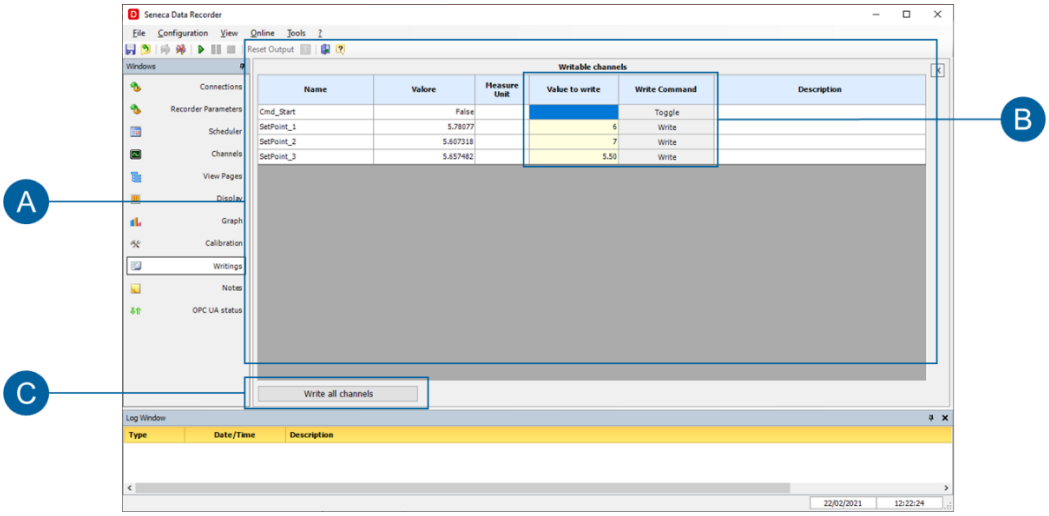


Figure 35. “Writings” page

A	List of variables that can be written. The Name, Description and UM (unit of measurement) columns list the details of the analogue and digital channels that can be written. The Value column lists the value acquired according to the settings associated with the channel.
B	The Value to Write column can be edited with the value to be transferred to the device connected to the associated channel. To transfer the set value, press the Write button next to it. In the case of digital variables, it is possible to act directly on the Toggle key to order the change of status into Value
C	All variables can be written with a single command. With this option it is possible to decide which variables to write, by entering the corresponding values, and to send the writings with a single command.

Table 21. “Writings” page

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4.12 “Calibration” page

The “Calibration” page allows you to create groups of channels to be calibrated and carry out the calibration.

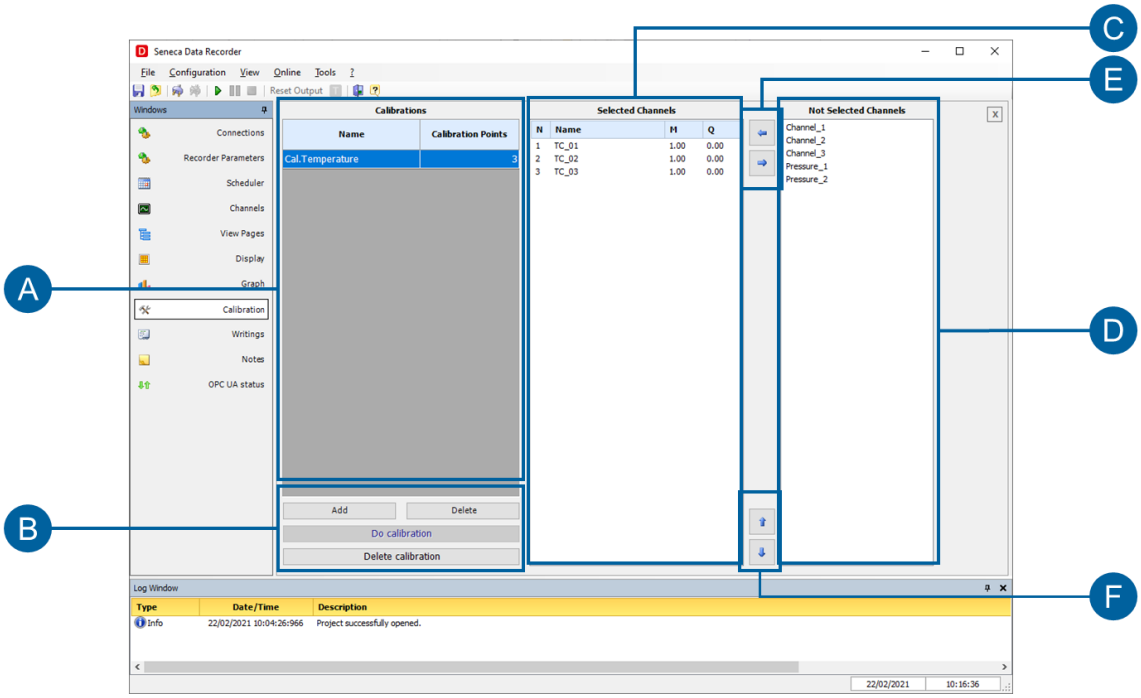


Figure 36. “Calibration” page

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A	List of the created calibrations. A click on a field in the "Name" column modifies sections C and D of the page showing in section C the channels selected for calibration on the selected page and in section D the channels present in the project but not selected for calibration in the calibration group being considered. A double click on a field in the "Name" column allows you to change the name of the selected calibration. Clicking on a field in the "Calibration points" column opens a drop-down menu that allows you to choose the number of points for calibration, ranging from one to five.
B	The "Add" button allows you to add a new calibration to the project, the "Delete" button deletes the calibration selected in section A, the "Perform calibration" button is enabled only with the connected project using the appropriate button in the global commands **(Figure 18 on page 25)**, or by using the appropriate button in the "Online" submenu. The "Perform Calibration" button opens the "Calibration" pop-up **(Figure 37 on page 46)** which allows you to calibrate the group of channels associated with the selected calibration. The "Clear Calibration" button cancels any calibration already performed on the group of channels associated with the calibration selected in section A.
C	List of the channels selected for the calibration selected in section A.
D	List of the channels not selected for the selected calibration in section A but present in the project.
E	The arrow to the left allows you to bring the channels that are selected in the "Unselected channels" section into "Selected channels", adding them to the selected calibration, while the arrow to the right allows you to bring the channels that are selected in "Selected channels" into the "Unselected channels" section, therefore deleting them from the selected calibration.
F	The up and down arrows allow you to change the order of the list of channels in "Selected channels".

Table 22. "Calibration" page

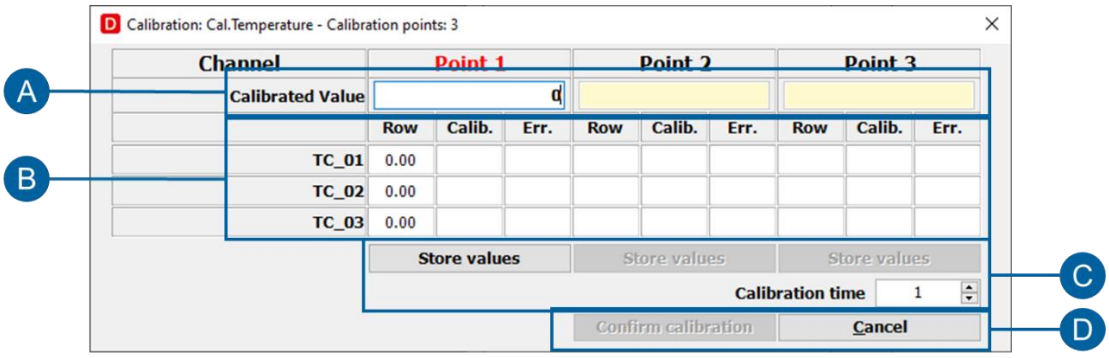


Figure 37. "Calibration" pop-up

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A	The actual values of the measurement to be entered for calibration. To insert a value click on the field to be modified, type the value then click enter. The pop-up columns vary from one to five depending on the number of calibration points set in section A of the "Calibration" page **(Figure 36 on page 45)**.
B	The channels to be calibrated, for each channel for each calibration point, have the "Row" column indicating the recorded value to be calibrated, "Calib." indicating the measured value corrected by the calibration and "Err." showing the extent of the correction made.
C	The "Store values" button is enabled after the corresponding calibration value in section A has been set and the system has recorded the number of samples set in "Calibration duration"; allows you to store the calibration point for its column. Definition of calibration duration: the number of samples used to perform the moving average of the measurement to be calibrated.
D	Once calibration is complete, the "Accept Calibration" button allows you to validate the calibration and close the pop-up, while the "Close" button closes the pop-up without saving the calibration that may have been carried out.

Table 23. “Calibration” pop-up

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4.13 “Notes” page

The “Notes” page allows you to create descriptive notes when recording data in the database which are also copied to a column in the database. Please note that notes can only be created, edited and deleted during recording.

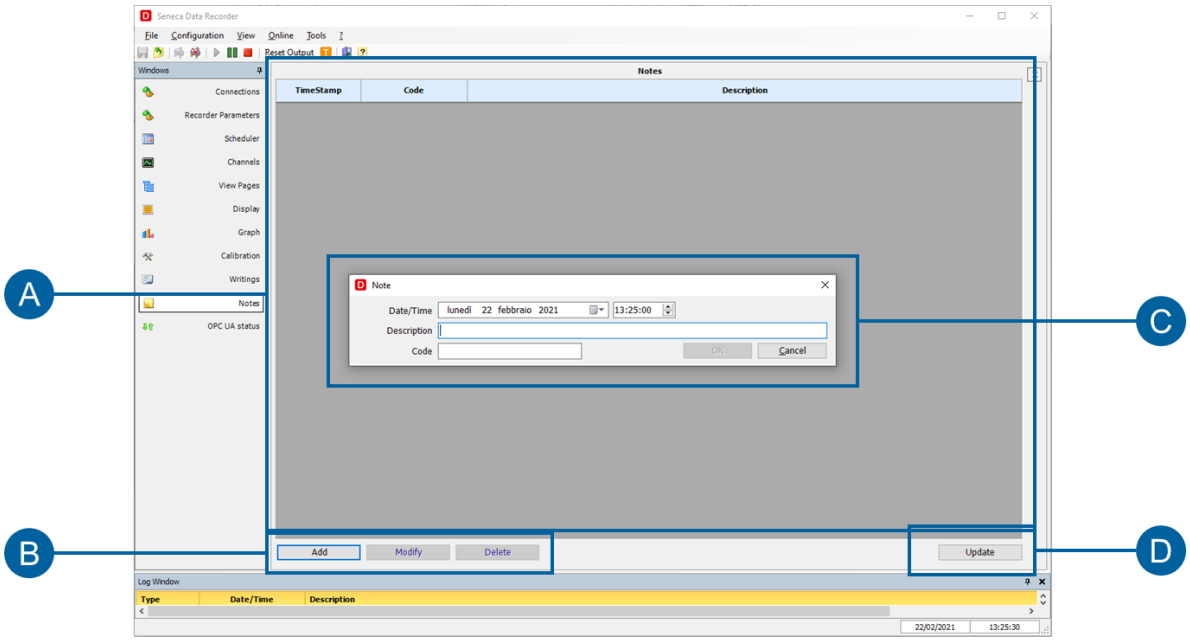


Figure 38. “Notes” page

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A	List of the created notes. From left to right the "TimeStamp" column indicates the date and time when the note was created, the "Code" column shows any code that was entered during the creation phase of the note (even if the note is subsequently modified the date and time are not edited), finally the "Description" column shows the text of the note.
B	The buttons in this section are enabled only when recording data in the database. The "Add" button allows you to add a new note opening the pop-up of section C. The "Edit" button allows you to edit the note selected in section A opening the pop-up of section C. The "Delete" button deletes the note selected in section A.
C	Pop-up for creating and editing a note. The fields to the right of "Date/Time" contain the current date and time, but can be edited at will. The text of the note must be entered in the "Description" field, a code for identifying the note (optional field) can be entered in the "Code" field. The "OK" button is enabled after filling in the "Description" field and closes the pop-up saving the created note which is then added to the list in field A, while the "Delete" button closes the pop-up without saving the created note.
D	Updates the list of created notes.

Table 24. "Notes" page

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4.14 “Automatic report” page

The "Automatic report" page allows you to set up the creation of automatic reports.

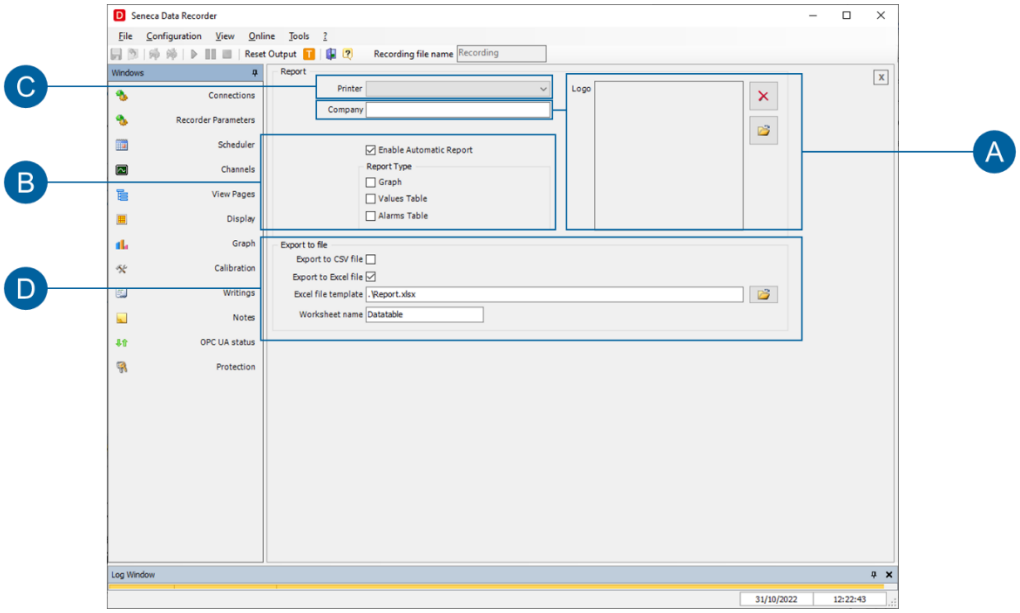


Figure 39. “Automatic report” page

A	The button with the yellow folder allows you to import a .jpg or .btm file, usually the logo, which is integrated into the automatic report. The button with the red "X" deletes the selected logo and the box shows a preview of the uploaded image. There is a field in which to enter the company name
B	Drop-down menu from which to select the means by which to print the report.
C	By clicking on the "Activate Automatic Report" flag, the other fields in this section through which you can choose what to include in the report are enabled.
D	It is possible to set the automatic export to an Excel file, using a template file for the creation of customized reports. The data will be exported to the worksheet with the name indicated in the textbox “Worksheet name”

Table 25. “Automatic report” page

Once the automatic report has been set and the project is saved, the software generates a report every time a database file is closed, therefore every time a recording session is ended.

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4.15 "License" page

The “License" page shows the characteristics of the license used and the number of channels used in the current project.

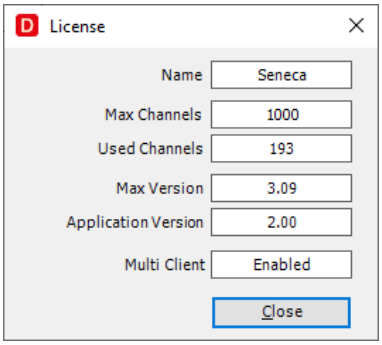


Figure 40. “License” pop-up

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4.16 “Unit of measurement” page

“The “Units of measurement” page shows the editable list of units of measurement present in the software.

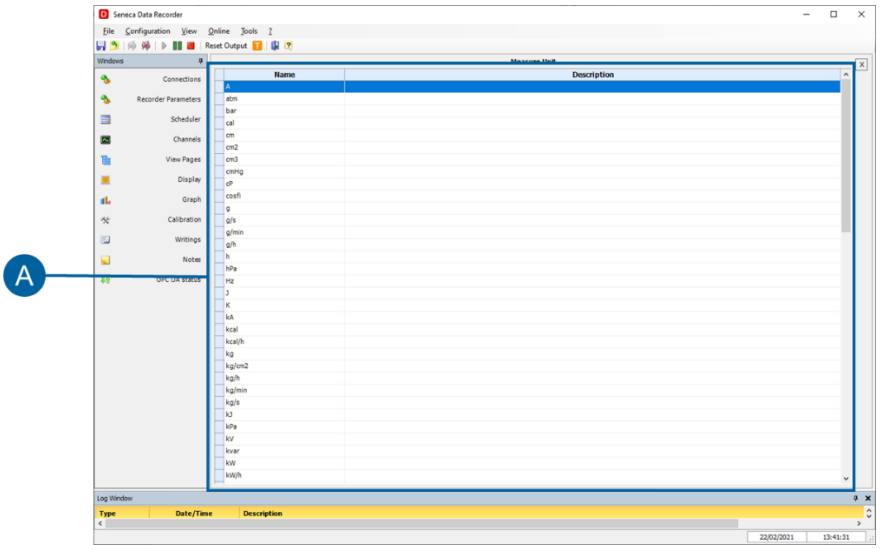


Figure 41. “Units of measurement” page

A	List of the units of measurement present in the project. From left to right the "Name" column indicates the unit of measurement, the "Description" column allows you to enter a description for each unit of measurement. A double click on a field of any column allows you to edit that field. Scrolling the list with the scroll bar on the right at the end you will find a white line highlighted with an asterisk on the left: here you can add other units of measurement to the list, every time you change the empty "Name" field and click " enter ”the new unit of measurement is added at the bottom of the list and there is a new empty line highlighted with an asterisk for other entries.

Table 26. “Units of measurement” page

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5 DATA RECORDER SERVICE MANAGER

This tool allows you to activate, deactivate and control the functioning of the software as a service.
There are 4 tabs where you can Install, Start and control the status of the service.

5.1 Installation and state

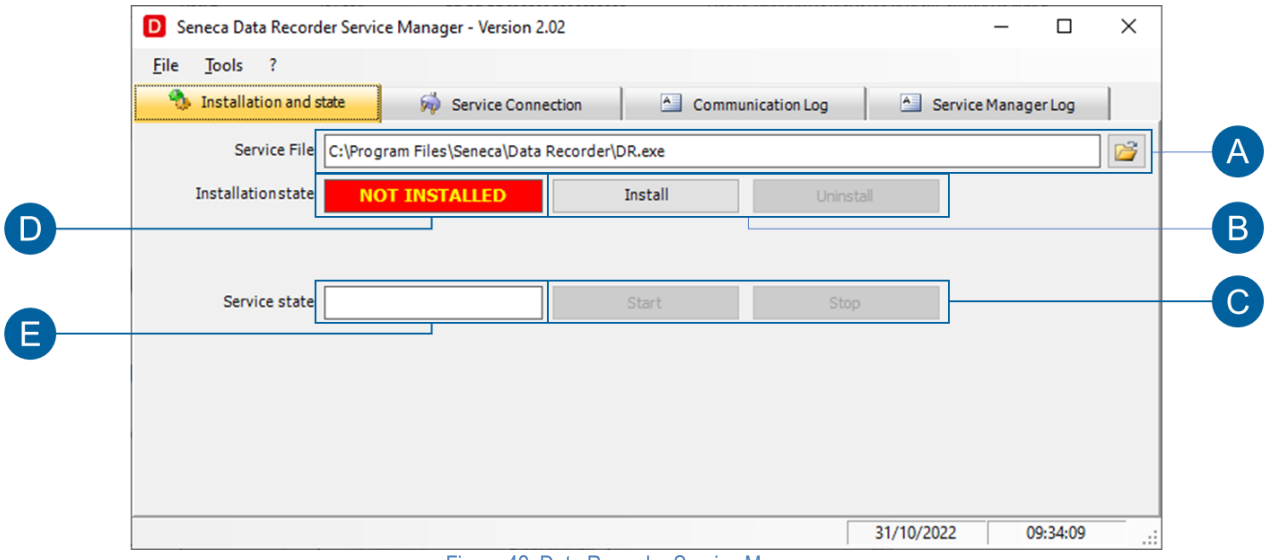


Figure 42. Data Recorder Service Manager

In order to manage the Data Recorder as a service it is necessary to follow the following steps:

A	Path where the data recorder (.exe) application is installed. Verify that the path indicated in the text box is correct.
B	Buttons that allow you to install and uninstall the service. By clicking on Install, the Data Recorder will be installed as a service, the label indicating the status (D) turns green and shows "INSTALLED". By pressing Uninstall, the Data Recorder will be uninstalled as a service, the label indicating the status (D) turns red and shows "NOT INSTALLED". NOTE: The service can only be uninstalled after it has been stopped.
C	Buttons that allow you to start and stop the service. By pressing on START, the service will run, the label indicating the status (E) turns green and shows the word "RUNNING". Pressing on STOP, the service will be stopped, the label indicating the status (E) turns red and shows "STOPPED" NOTE: The service must be started after being installed.
D	Label that indicates the status of the service installation.
E	Label that indicates the status of the service.

Table 27. Installation and State of Data Recorder as a service

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This option is available starting with version 2.02.
If software works as a service, the "Multiclient" option is not available.

5.2 Service connection

The “Service Connection” tab allows you control and send command to the Data Recorder while it is running as a service.
This option also enables software management from another workstation.

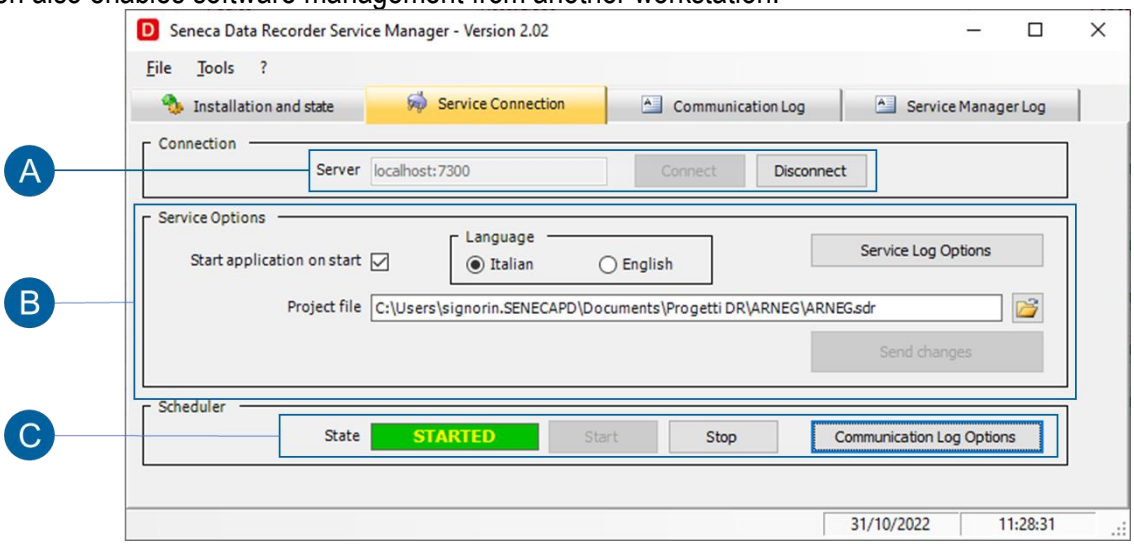


Figure 43. Data Recorder Service Manager, Service Connection

A	To access the service control, you need to Connect. After clicking on the Connect button, the "Service Options" (B) will be enabled.
B	The Service Options allow you control the status of the Data Recorder. To start the project automatically when Windows starts, it is necessary to associate the correct path in the "Project file" textbox and enable "Start application on start". The project startup settings can be changed and sent to the running service by clicking on the "Send changes to the service" button.
C	The Scheduler can be started and stopped using the Start and Stop buttons. The STATE label turns green, showing "STARTED" when the scheduler is active and turns red "STOPPED" when the scheduler is not active.

Table 28. Control of Data Recorder as a service

To take advantage of service control and project execution, it is necessary that the start of the recording is configured "by scheduler" (Ref. 3.7.2)

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5.3 Communication Log

In this tab you can acquire the Log coming from the Data Recorder. The selection of the logged information takes place in the Data Recorder or by using the "Communication Log Options" button (Ref. 5.2 - B).

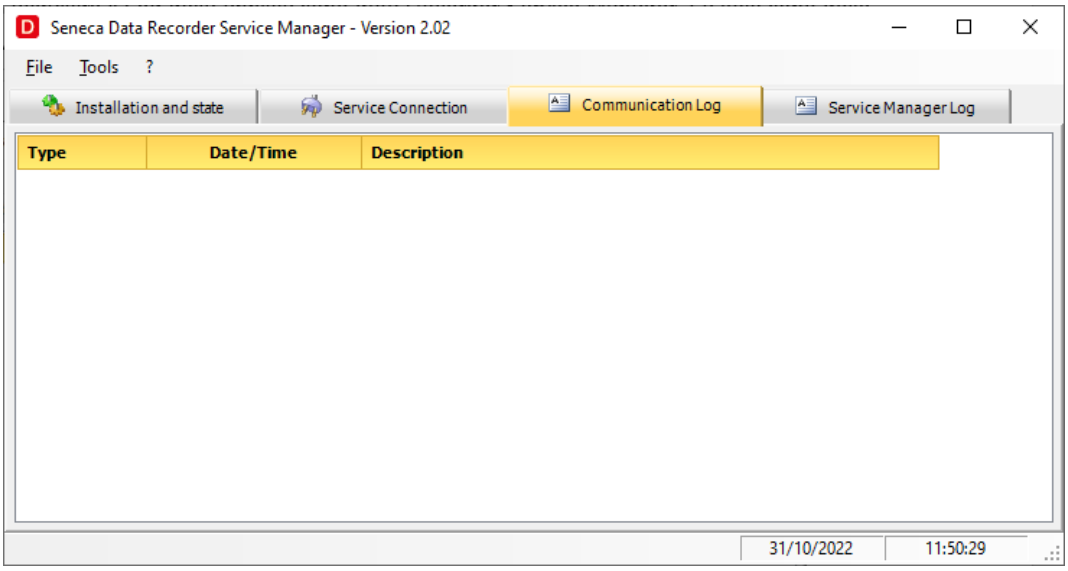


Figure 44. Log from Data Recorder

5.4 Log Service Manager

In this tab you can acquire the Log of the Data Recorder Service Manager application. The information displayed is selected in the Data Recorder Service Manager by using the "Service Log Options" button (Ref. 5.2 - C), or via the Tools menu by selecting "Logger Service Manager Options".

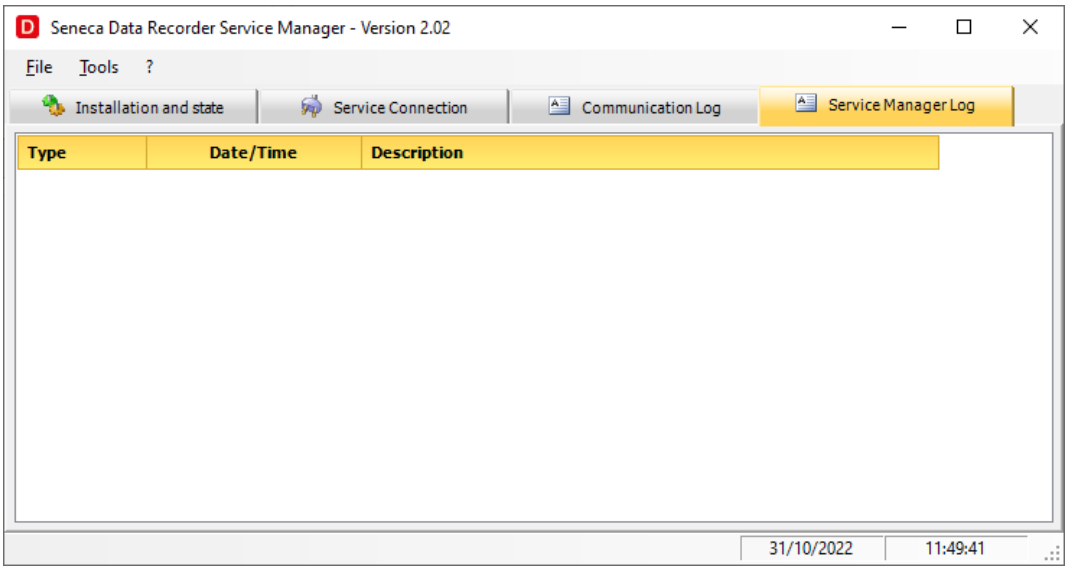


Figure 45. Log from Data Recorder Service Manager

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6 SYSTEM UPDATE

The latest version of the software is available from the www.seneca.it website



It is possible to download from this link:
https://www.seneca.it/linee-di-prodotto/acquisizione-dati-e-automazione/daq-software/data-recorder/

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