
# Manual

Software MARViN 11

## Identification

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## Safety recommendations

**⚠ DANGER**

**Warning of a possible danger, which can lead to death or to serious injuries.**

The MARVIN Seed-Analyzer is a system and consists of the operating device (MARVIN Seed Analyzer) and the software MARVIN 11. Optionally further devices can be installed (balance, barcode scanner etc.)

Before installing the software, please read the End User License Agreement. If you have any questions, please contact the customer service.

If there is any reason to believe that the seed analyzer is no longer operating correctly, the seed analyzer has to be unplugged immediately from the electricity supply (pull out power unit) and secured against inadvertent usage.

Don’t use the seed analyzer in an area near to explosive goods or substances!

The seed analyzer is only suitable for dry seeds and leaves. Make sure that there are no liquids in the vicinity that could be spilled. If liquid is spilt on the seed analyzer, the device must be unplugged immediately from the main electricity supply (pull out power adaptor).

**⚠ DANGER**

The seed analyzer may only be operated when the power supply unit, is plugged in before connecting the power supply unit to the electricity grid, check the operating voltage indicated on the power supply unit corresponds to the local electricity grid voltage. If the operating voltage is not the same as the voltage of the electricity grid, do not connect the power supply unit to the mains under any circumstances. If you have any questions or need clarification, please contact MARViTECH Customer Service.

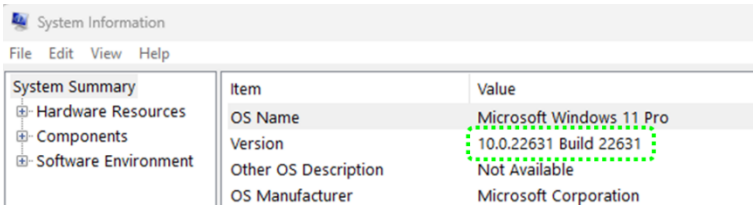
# 1 Important Requirements and Notices

## 1.1 Software requirements

Runnable from WINDOWS10

Build 19041 released 2020-05-27

You can check that out in the Windows System information.




## 1.2 Client installation

The MARViN11 (graphical user interface) has to be installed for each client on the computer.

## 1.3 Saving hardware settings

The installation path for the hardware (MARViN camera + weighing scale) is **C:\ProgramData\MARViTECH GmbH\MarvinProvider\COMPONENTS**

MARViN control / MARViN balance are writing the settings in a commonly used folder

C:\ProgramData\MARViTECH GmbH\MarvinProvider\COMPONENTS

RASTERPROVIDER – files for the camera calibration

WEIGHTPROVIDER – files for the balance communication

## 1.4 Re-Calibration / Support / Color-Card

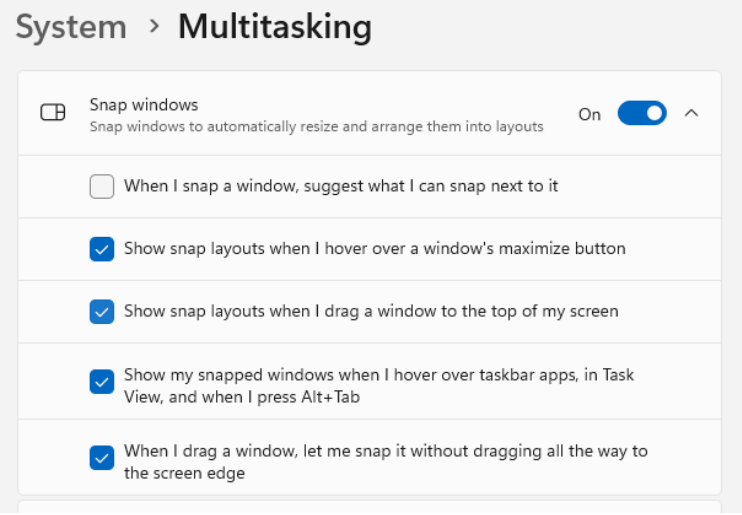
For any support, please contact the MARViTECH support (support@marvitech.de) or fill the fields on https://www.marvitech.de/en/remote-support/

A color card is supplied with the MARViN VisionLine system.

Please keep the color card available for any support-related inquiries.

# 2 Window arrangement

The MARViN11 software is a multi-window program and also usable on multiple screens. The windows itself have not special place. To bring the program windows in a senseful arrangement, there are some tricks in the WINDOWS®11 settings.

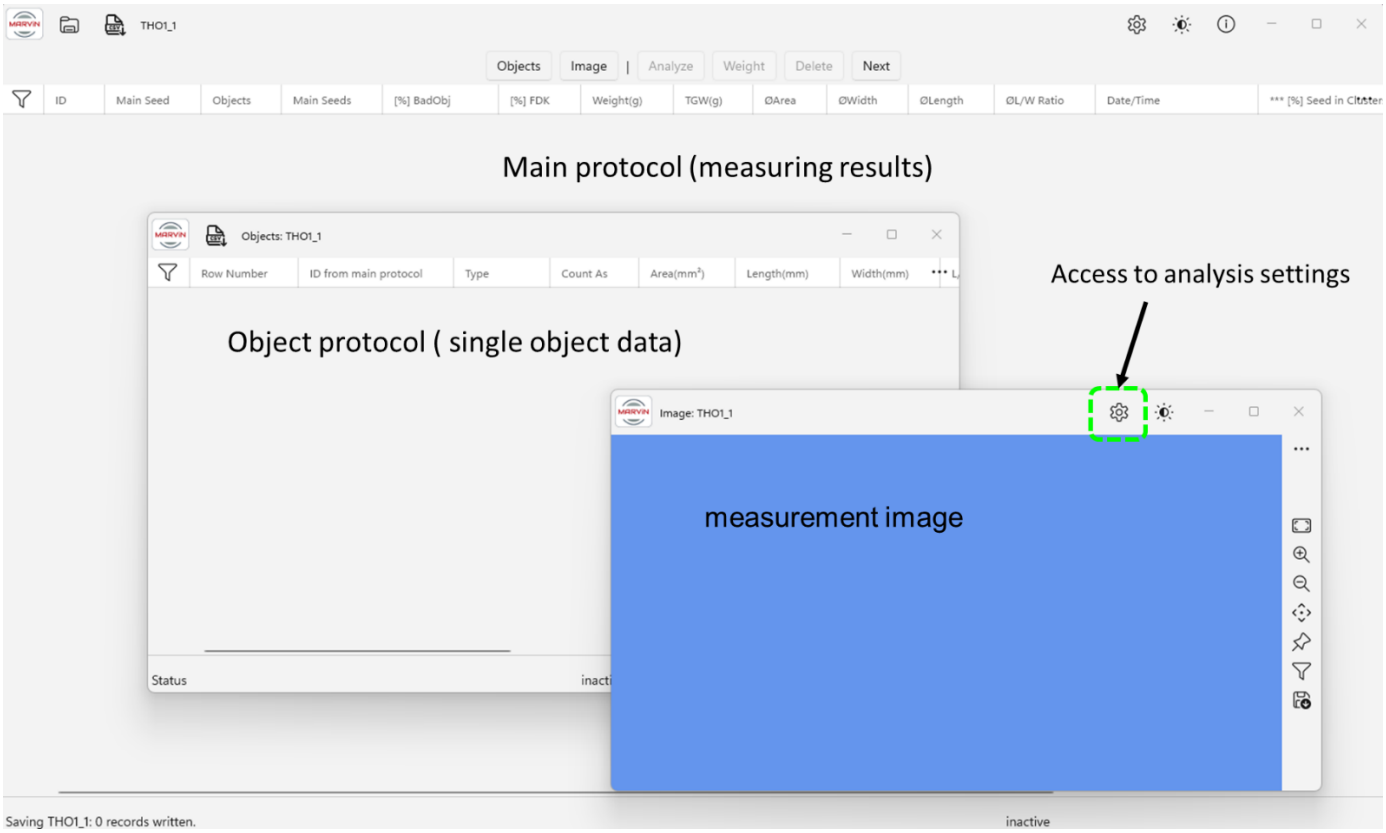


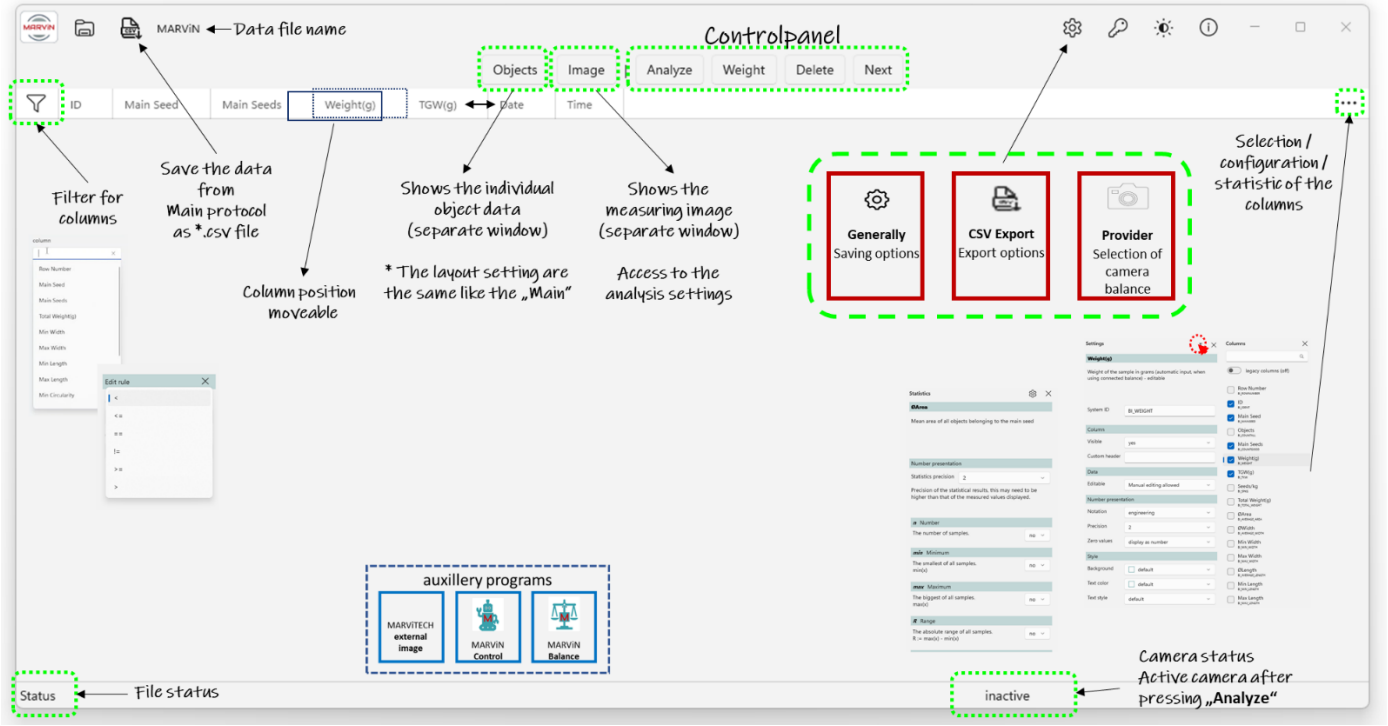

You can also use WIN + Z to arrange the windows on the desktop

# 3 MARViN11 User Interface

If you hover over an icon, a helpful hint will appear.

It is not necessary to open the object protocol or the measuring image.




MARVIN
Data file name
Controlpanel
Objects
Image
Analyze
Weight
Delete
Next
ID
Main Seed
Main Seeds
Weight(g)
TGW(g)
Date
Time
Filter for columns
Save the data from Main protocol as *.csv file
Column position moveable
Shows the individual object data (separate window)
* The layout setting are the same like the „Main"
Shows the measuring image (separate window)
Access to the analysis settings
Generally
Saving options
CSV Export
Export options
Provider
Selection of camera balance
Selection / configuration / statistic of the columns
auxillery programs
MARVITECH external image
MARVIN Control
MARVIN Balance
Status
File status
inactive
Camera status
Active camera after pressing „Analyze"

# 4 Light Scene Selection

MARViN11 software together with the MARViN VisionLine has the possibility to use different pre-configured light scenes. This is useful to get the optimal measuring results.

Further light scenes can be configurated, together with the MARViTECH support.

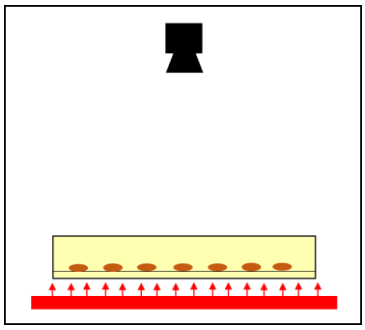
## 4.1 Delivery status

The MARViN VisionLine comes with the following lighting scenes:

### 4.1.1 Default monochrome

This measuring method provides a high contrast between the objects and the tray, allowing for a higher quantity to be detected.

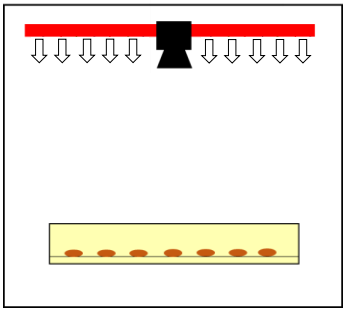
- backlit silhouette scanning with white light
- fast, precise and efficient analysis
- measuring time around 8 seconds



### 4.1.2 White monochrome overhead scanning

This measuring method allows to detect brightness differences on the object surface. Only the white overhead light is activated. So there is a fast measuring time of around 8 seconds.

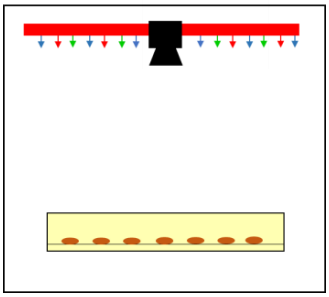
- overhead monochrome scanning with white light
- fast, precise and efficient analysis
- measuring time around 8 seconds
- detecting of brightness classes on the object surface



### 4.1.3 RGB overhead scanning

This measuring method enables RGB color scanning of the object surface. The red, green, and blue channels are measured sequentially. After scanning, an RGB image is generated. There is a measuring time of around 25 seconds.

- Overhead color scanning
- Comprehensive object analysis
- measuring time around 25 seconds
- RGB – values for every object
- HSL – values for every object
- Brightness classes for every object
- HUE (color tone) classes for every object



## 4.2 Other light Scenes

Please contact the MARViTECH support to configure other light scenes.

### 4.2.1 Blue Screen

This scene allows to use any color background to optimize the contrast between the object and background.

### 4.2.2 Monochrome overhead scanning with other colors

This measuring method allows to detect brightness differences on the object surface. So there is a fast measuring time of around 8 seconds.

- overhead monochrome scanning with RED or GREEN or BLUE (or mixed) light
- fast, precise and efficient analysis
- measuring time around 8 seconds
- detecting of brightness classes on the object surface

# 5 Templates

A template is a pre-designed format or structure. The MARViN11 app works with templates in order to be most flexible.

## 5.1 Types of templates

**Customer templates (*.mpr-ct)**

Contains Analysis templates and protocol templates

Ideal for customers with just a few varieties

Ideal for customers with different locations

**Protocol templates (*.mpr-pt)**

pre-designed format of the parameter columns

Contains the format for the “Main Protocol”, the “Object Protocol” and the formulas from MARViLogiX

**Analysis template (*.mpr-ap)**

contains the settings for different varieties (e.g., wheat, barley, canola etc.)

some of them can be downloaded directly from the MARViTECH website

**Import all settings from an existing data file (*.mpr)**

Contains all settings for analysis, protocols and MARViLogiX formulas

## 5.2 Specifications for templates

**Every measuring file can be saved either at**

Analysis template (*.mpr-ap) - saves only the analysis settings

OR

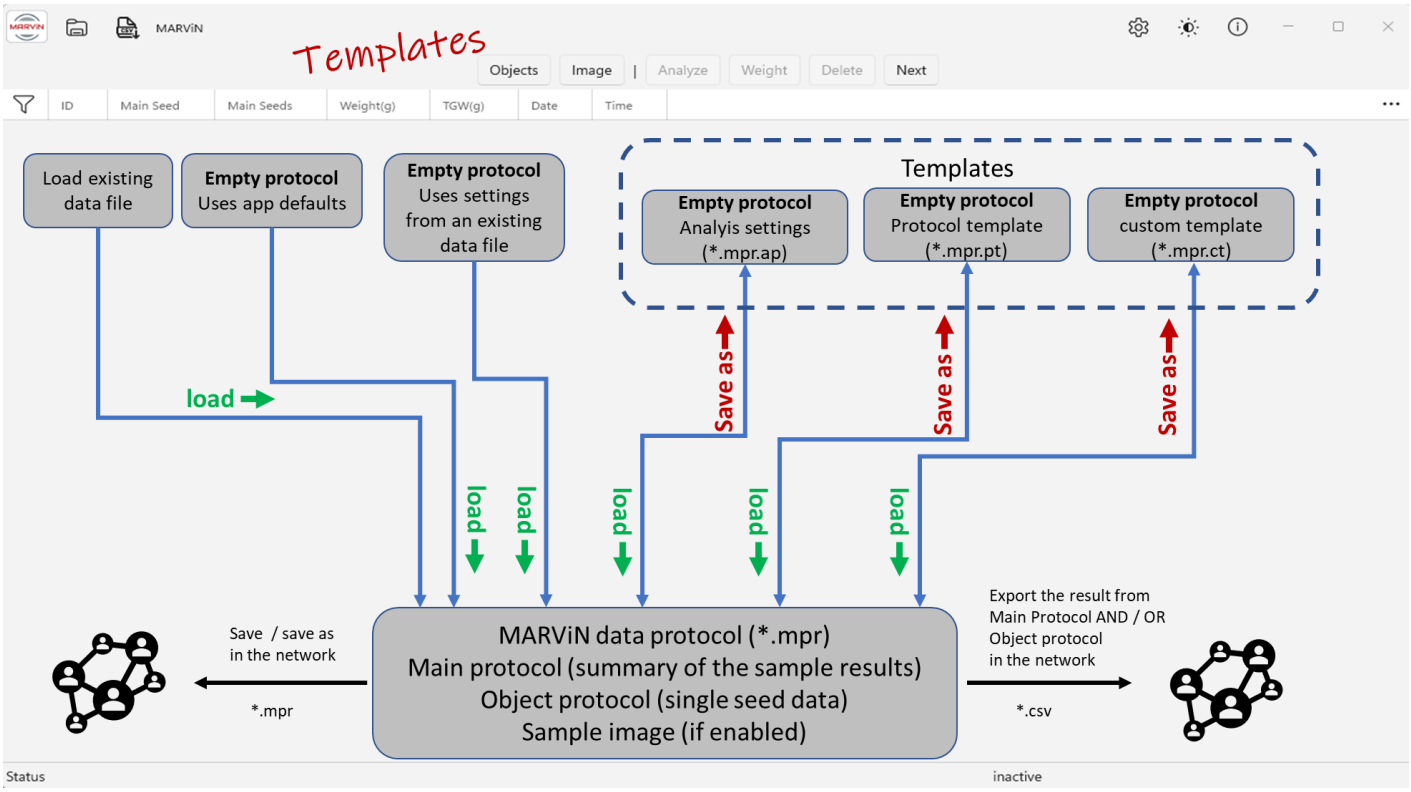
Protocol template (*.mpr-pt) - saves only the protocol settings, incl. formulas from MARViLogiX

OR

Custom template (*.mpr.ct) - saves protocol settings and analysis settings

**The template is always an empty file (just the structure)**

## 5.3 Overview templates



# 6 Working with MARViN11

Here are five options, sorted by relevance in descending order.

1.) Load an existing data protocol and continue the measuring process.

2.) Load only the settings from an existing data measuring file

You can select another analysis template (e.g., if you want to change the variety)

**It is crucial that you save the data protocol immediately to prevent any data loss.**

3.) Create a new protocol by using a custom template ((e.g., at different sites or locations)

You can choose an analysis template (e.g., at different sites or locations)

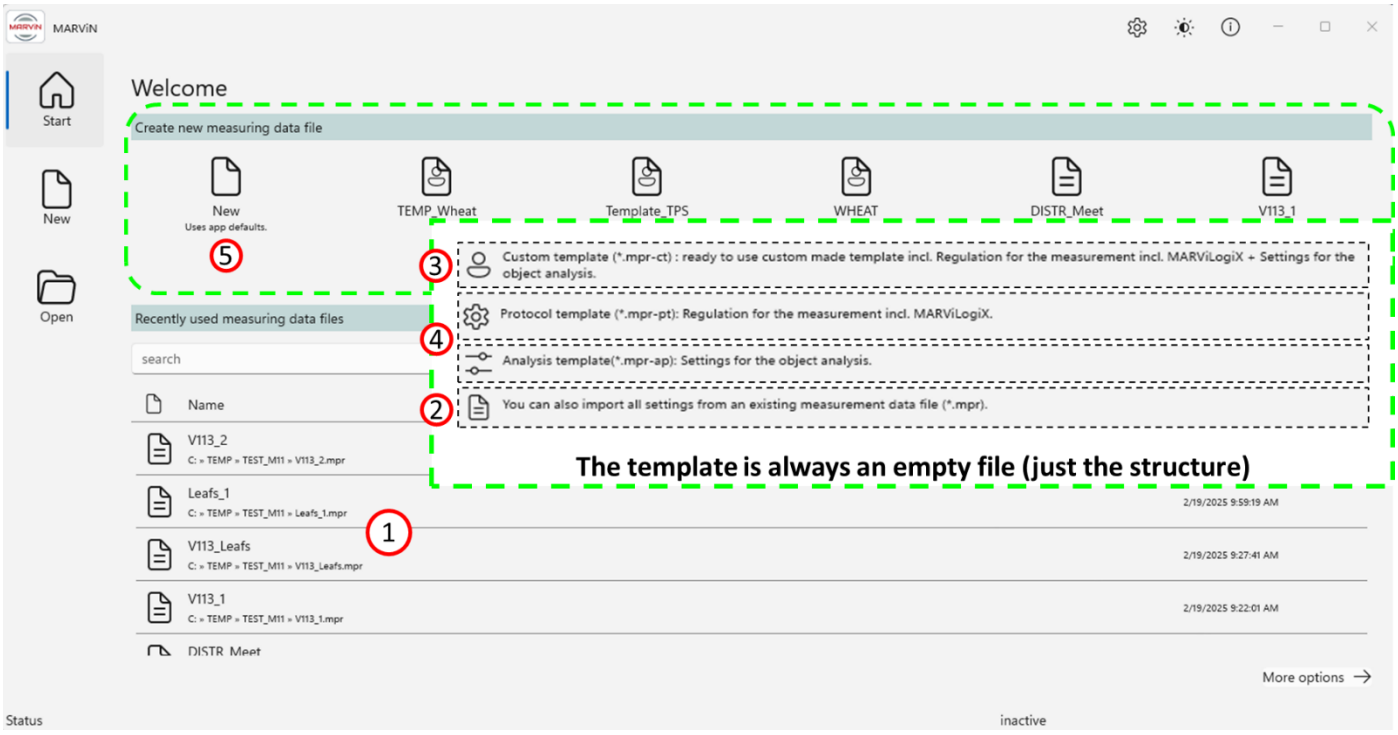
**It is crucial that you save the data protocol immediately to prevent any data loss.**

4.) Create a new protocol by using an analysis template or protocol template or both

**It is crucial that you save the data protocol immediately to prevent any data loss.**

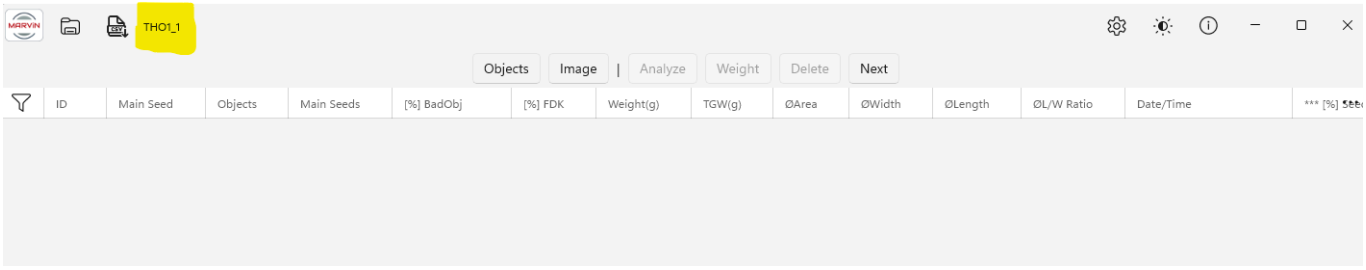
5.) Open an empty protocol by using the app defaults (analysis and protocol settings)

**It is crucial that you save the data protocol immediately to prevent any data loss.**




After selecting the options 2-5 you need to save the measuring data protocol. **It is crucial that you save the data protocol immediately to prevent any data loss.**

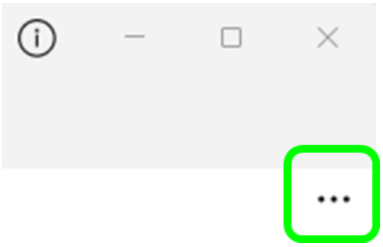

The file name will appear in the upper left corner.




**If it says “MARViN” – the measuring data file has not been saved! AVOID data loss!**

# 7 Columns Main protocol and Object protocol

With the three dots, you can reach the columns selection and settings



By clicking a parameter, you can reach the parameter settings.

In the parameter settings, you can reach the statistic functions.


**Please note that the calculation of the statistical functions is at the expense of the analysis speed.**

## 7.1 Intensity

I-Mean Is the mean (average) of the object's grey value Intensity (possible values: 0…254)

Intensity ranges from 0 (black) to 254 (white)

Definition: Intensity refers to the actual physical value of light at a pixel level in a digital image. It represents the amount of light captured by a sensor and corresponds to the pixel values in grayscale images or the color channels in color images.

## 7.2 RGB color channels

R-Mean Is the mean (average) of the object's RED color channel (possible values: 0…254)

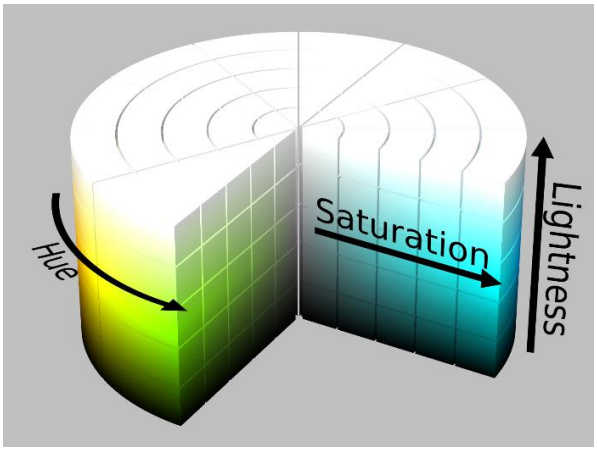
G-Mean Is the mean (average) of the object's GREEN color channel (possible values: 0…254)

B-Mean Is the mean (average) of the object's BLUE color channel (possible values: 0…254)

Explanation of the RGB values:

- **200–254** → Clear perception of the color
- **150–220** → Mixed color, slightly dimmed
- **50–120** → Very dark but still visible
- **0–20** → Almost black, barely visible color

## 7.3 HSL Color model




**HSL color model**


**Hue (or color tone)**

| | |
|---|---|
| H-Mean | Is the mean (average) of the object's **H**UE (possible values: 0…360) |
| | See the picture |
| S-Mean | Is the mean (average) of the object's **S**ATURATION (possible values: 0…1) |
| | Saturation ranges from 0 (pure gray) to 1 (pure hue) |
| L-Mean | Is the mean (average) of the object's **L**IGHTNESS (possible values: 0…1) |
| | Lightness ranges from 0 (black) to 1 (white) |

## 7.4 Variable parameter fields

### 7.4.1 In Main protocol

**User fields:**

You can create another 99 user fields in the first user field (BI_USER_1)

In the user fields, you can select another balance(s) (User weight)

**Formula fields:**

You can create another 99 formula fields in the first formula field (BI_FORMULA_1).

### 7.4.2 In Object protocol

**Formula fields:**

You can create another 99 formula fields in the first formula field (OI_FORMULA_1)

**I-F fields (brightness intensity)**

You can create another 10 I-F fields in the first I-F field (OI_I_FRACTION_1). This fields calculates the area portion of the pre-configurated brightness classes from the **Frequency of gray values** (analysis settings).

OI_I_FRACTION_1 is for class 1

OI_I_FRACTION_2 is for class 2 …

**Please note**: good practice are 5 classes

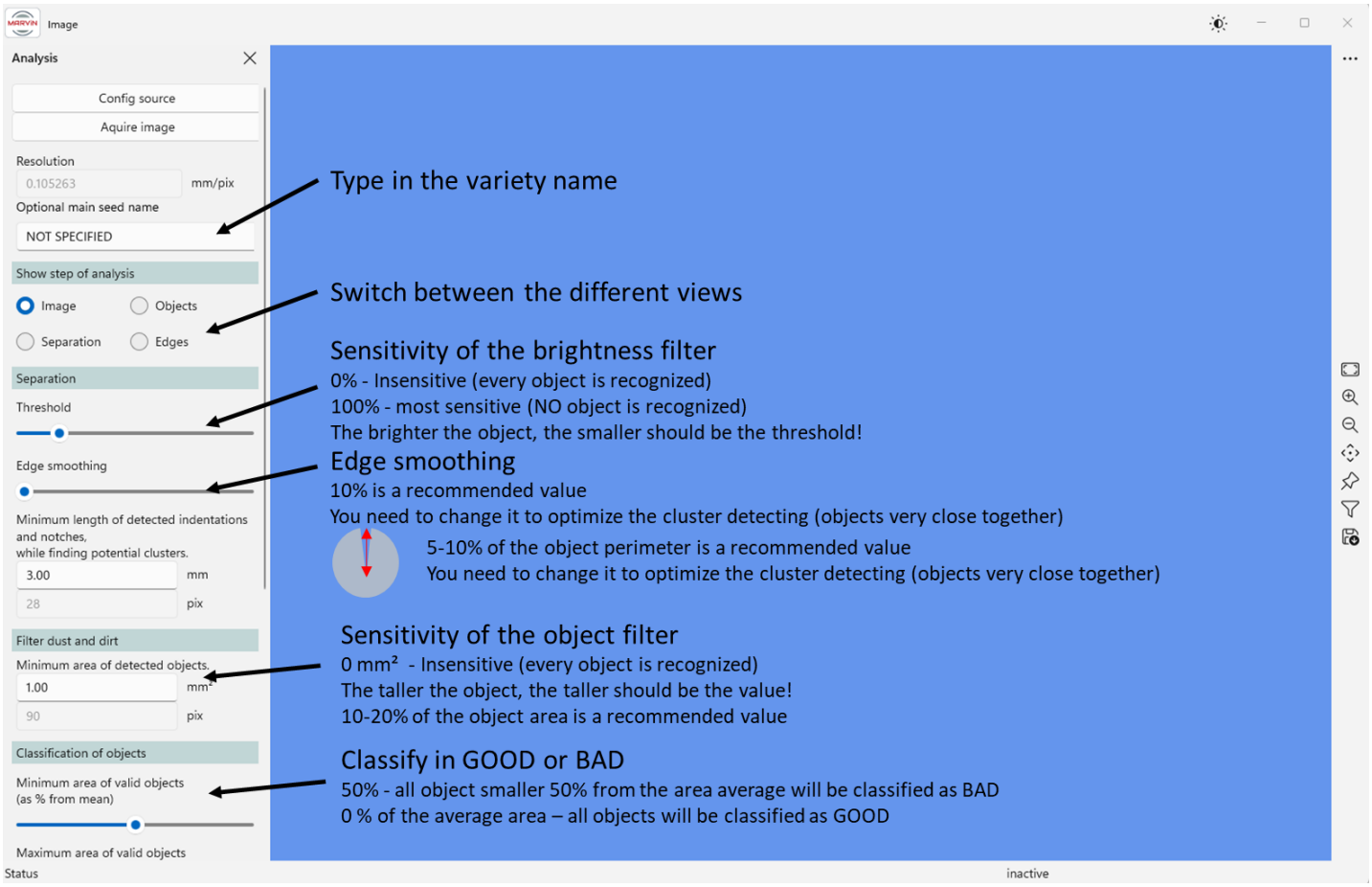
**H-F fields (hue or color tone)**

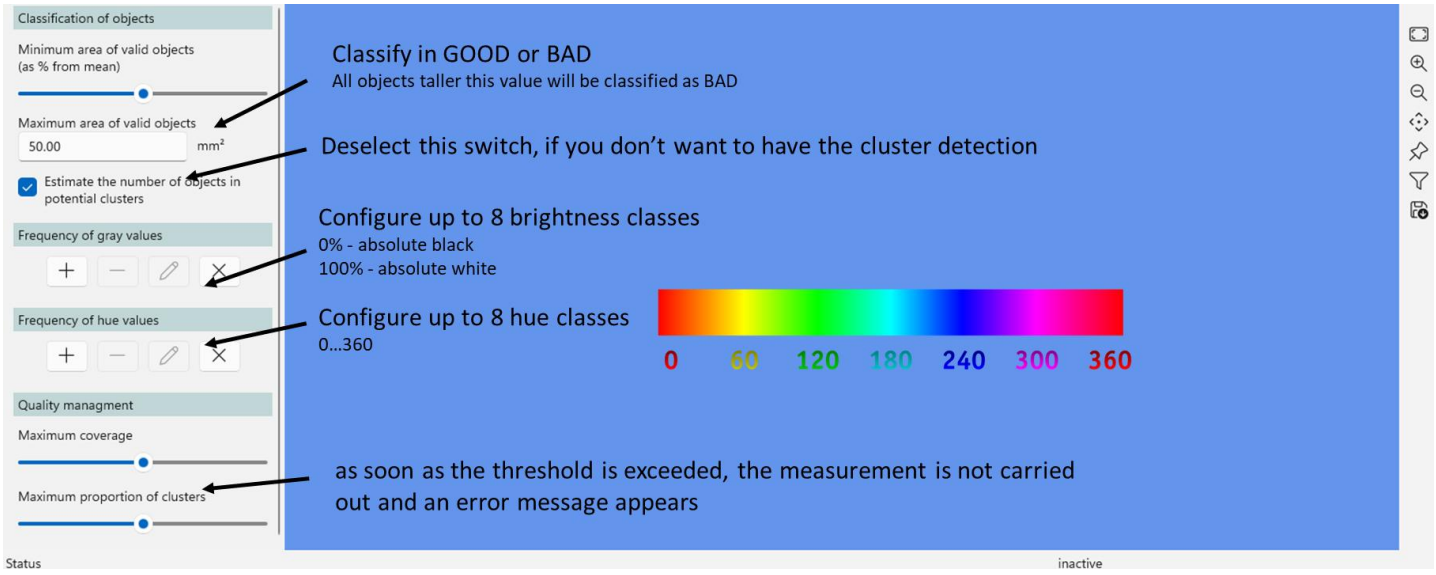
You can create another 10 H-F fields in the first H-F field (OI_I_FRACTION_1). This fields calculates the area portion of the pre-configurated hue classes from the **Frequency of hue values** (analysis settings).

OI_H_FRACTION_1 is for class 1

OI_H_FRACTION_2 is for class 2 …

# 8 Object analysis



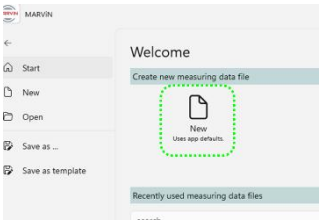



## 8.1 Step-by-step: Creating new analysis settings

Video link: https://youtu.be/DWFXqrVi0yo

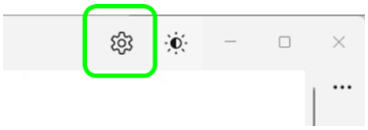
STEP1 Fill in some objects (seeds) in the MARViN operating device – the objects must not be on top of each other

STEP1a Open the MARViN program and chose a new (empty) protocol template

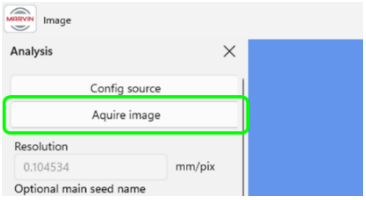



STEP 2 Open the object and the image window and click Next in order to create a new row.

STEP 3 Open the settings in the image window



STEP 4 Acquire the image




STEP 5 Fill in the object name / variety in **Optional main seed name**

STEP 6 Move the **Threshold** slider, that the objects are well framed.

Please note: The brighter the object, the smaller should be the threshold!

STEP 7 Activate the **Separation**

Meaning of the outline colors:

| | |
|---|---|
| Red / orange | recognized as one object |
| Green | recognized as two objects |
| Blue | recognized as three objects |
| Purple | recognized as four or more objects |

STEP 8 Move the **Edge smoothing** slider in order to smooth small spikes. 10% is a recommended value

STEP 9 The input for **Minimum length of detected indentations…** should be around 5-10% from the average perimeter. Please activate the perimeter column in the object protocol.

STEP10 The input for **Minimum area…** should be around 10-20% from the average area. Please activate the area mm² column in the object protocol.

STEP11 The **Minimum area of valid objects** depends on your requirements. Default is 50%.

All objects smaller 50% from the area average will be classified as BAD.

STEP12 The **Maximum area of valid objects** is depending on your requirements and the object sizes.

All objects bigger than the Maximum area will be classified as BAD

Three times the average area is recommended.

STEP13 **Frequency of gray values** (default are 8 steps) are on your requirement. The system adjusts the entered values.

STEP14 **Frequency of hue values** are on your requirement.

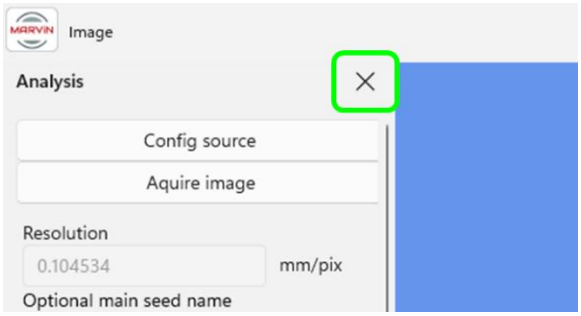
STEP15 **Maximum coverage** (default 50%) is on your requirement

STEP16 **Maximum proportion of clusters** (default 50%)

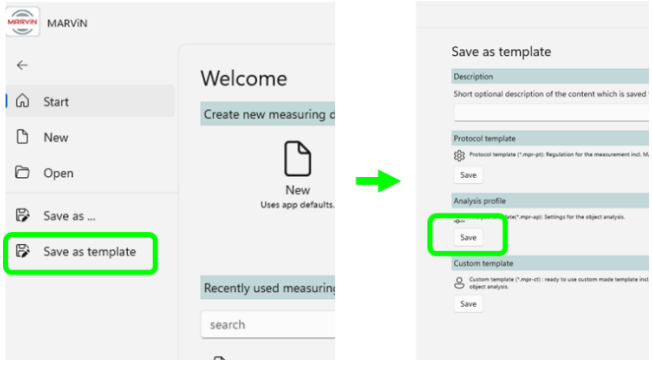
Please note: Objects in clusters are not used for calculating averages.

STEP17 Check again, if there is a object name / variety in **Optional main seed name**

STEP18 Close the analysis settings




STEP19 Click to file (main protocol) -> Save as -> Save as template -> Save Analysis profile



# 9 MARViLogiX

Info: the terms of the formulas are similar to those used in PASCAL programming.

MARViLogiX is a powerful tool for extracting detailed measurement results directly from raw data. Basic programming skills are required.

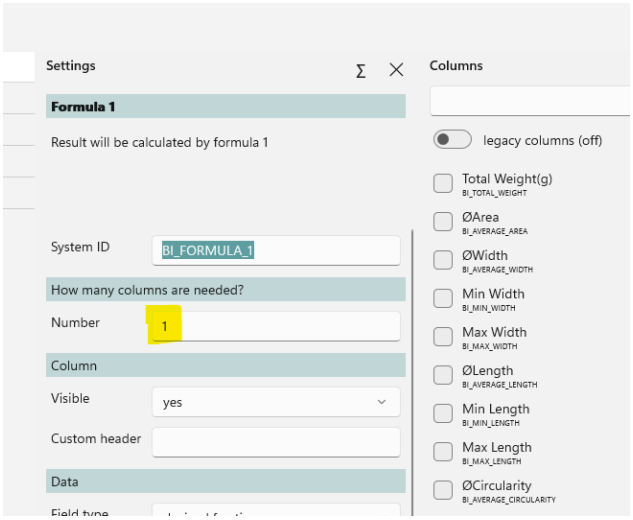
## 9.1 Flexible formula columns

There are available up to 99 formula columnmns in the **OBJECT PROTOCOL** and in **MAIN PROTOCOL**. The numbers of formula columns are flexible, depending on the demands.

The numbers of formulas can be configured in the settings of the FIRST formula column

BI_FORMULA_1 – for MAIN PROTOCOL

OI_FORMULA_1 – for OBJECT PROTOCOL

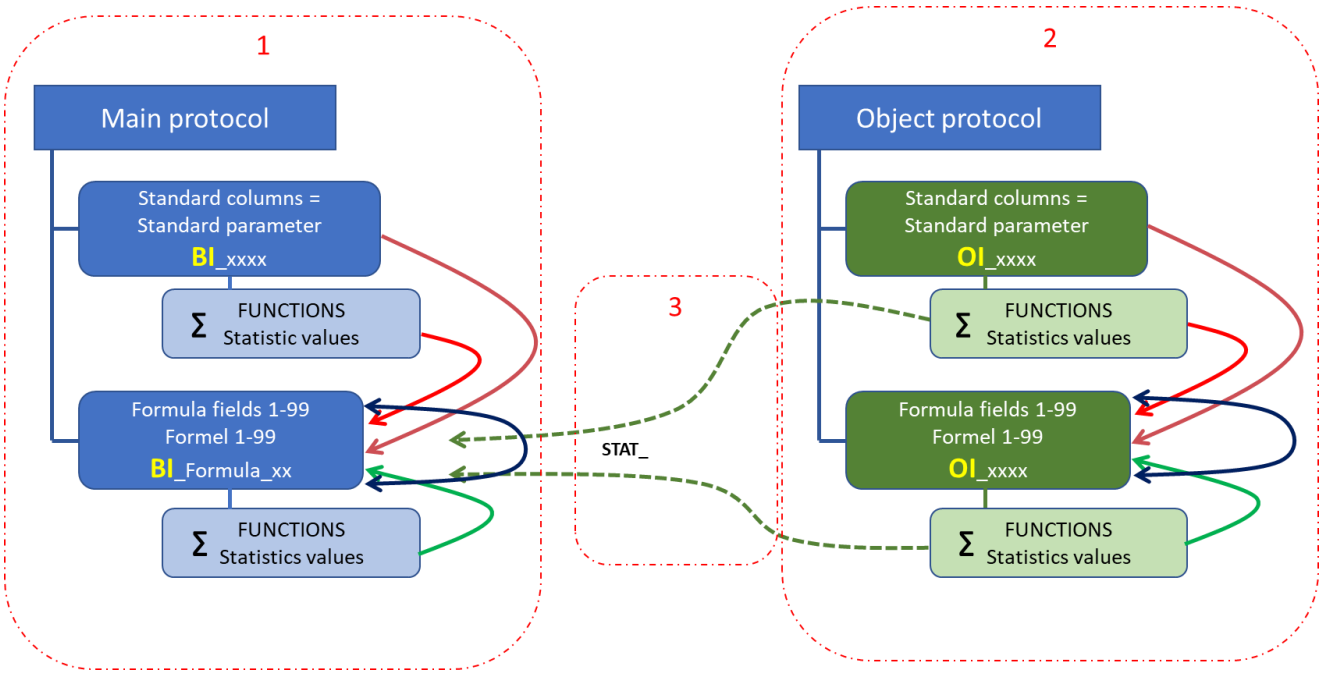



**Note:**

You can only remove formula columns from the end. It's not possible to delete columns in the middle or at the beginning.

## 9.2 3 ways of formula calculation

- (1) formulas can be calculated **within the main protocol** by using main protocol fields and functions
- (2) formulas can be calculated **within the object protocol** by using object protocol fields and functions
- (3) formulas can be calculated **within the main protocol by using object protocol** functions




3 WAYS OF FORMULA CALCULATION 1

### 9.2.1 How to create a formula column in the MAIN PROTOCOL?

We want to get a note, if the parameter Weight(g) is > 10. „Too heavy“ should be used as a note. Otherwise this note should pop up: „OK“

Step 1 - Open the column selection in the MAIN Protocol ( *** )

Step 2 - If it will be the first formular, skip to Step 4

Step 3 - Create a new, flexible formula column

Step 4 - Click „Show LogiX editor“

Step 5 - with *** you'll reach the variables – please note that the **BI** variables are from the MAIN Protocol, the OI variables are from Object Protocol

Step 6 - select ***BI_WEIGHT***

Step 7 - complete the formula: **if** BI_WEIGHT **>** 10 **then** "Too heavy" **else** "OK" **end**

Step 8 - Check syntax and Apply formula

Step 9 - Customize the appearance (customer header, precision, color)

### 9.2.2 How to create a formula column in the OBJECT PROTOCOL?

We want to see which objects (seeds) have a certain size (area) between 11-15mm². If the seed has the size between 11-15mm²,

Step 1 - Open the column selection in the OBJECT Protocol ( *** )

Step 2 - If it will be the first formular, skip to Step 4

Step 3 - Create a new, flexible formula column

Step 4 - Click „Show LogiX editor“

Step 5 - with *** you'll reach the variables – please note that the **BI** variables are from the MAIN Protocol, the OI variables are from Object Protocol

Step 6 - select ***OI_AREA_MM***

Step 7 - complete the formula: **if** OI_AREA_MM **>** 11 **and** OI_AREA_MM **<** 15 **then** 1 **else** 0 **end**

Step 7a - It makes sense, to apply the formular only for “single objects” and not for “BADSEED”. Here the extended formula:

**if not** OI_CLASS **=** "BADSEED" **and** OI_COUNT **=** 1 **and (**OI_AREA_MM **>** 11 **and** OI_AREA_MM **<** 15**) then** 1 **else** 0 **end**

Step 8 - Check syntax and Apply formula

Step 9 - Customize the appearance (customer header, precision, color)

### 9.2.3 How to create a formula column in the MAIN PROTOCOL by using object protocol functions?

We want to see the percetage of objects (seeds) have a certain size (area) between 11-15mm².

We take the previous formula, **as first part**. As a second part we need an auxiliary formula.

Step 1 - Open the column selection in the **OBJECT Protocol** ( *** )

Step 2 - If it will be the first formular, skip to Step 4

Step 3 - Create a new, flexible formula column

Step 4 - Click „Show LogiX editor“

Step 5 - with *** you'll reach the variables – please note that the **BI** variables are from the MAIN Protocol, the OI variables are from Object Protocol

Step 6 - select ***OI_AREA_MM***

Step 7 - complete the formula: **if** OI_AREA_MM **>** 11 **and** OI_AREA_MM **<** 15 **then** 1 **else** 0 **end**

Step 7a - It makes sense, to apply the formular only for "single objects" and not for "BADSEED". Here the extended formula:

**if not** OI_CLASS **=** "BADSEED" **and** OI_COUNT **=** 1 **and (**OI_AREA_MM **>** 11 **and** OI_AREA_MM **<** 15**) then** 1 **else** 0 **end**

Step 8 - Check syntax and Apply formula

Step 9 - Customize the customer header to "SIZE

Step 9 - Customize the appearance (customer header, precision, color)

**Second part - auxiliary formula (in OBJECT PROTOCOL)**

Step 10 - Create a new, flexible formula column

Step 11 - Click „Show LogiX editor“

Step 12 - with *** you'll reach the variables – please note that the **BI** variables are from the MAIN Protocol, the OI variables are from Object Protocol

Step 13 - select ***OI_AREA_MM*** and ***OI_COUNT***

Step 14 - complete the formula: **if not** OI_CLASS **=** "BADSEED" **and** OI_COUNT **=** 1 **then** 1 **else** 0 **end**

Step 15 - Check syntax and Apply formula

Step 16 - Customize the appearance (customer header, precision, color)

**Third part: Display in the MAIN PROTOCOL**

Step 17 - Open the column selection in the MAIN Protocol ( *** )

Step 18 - If it will be the first formular, skip to Step 19

Step 19 - Create a new, flexible formula column

Step 20 - Click „Show LogiX editor“

Step 21 - with *** you'll reach the variables – please note that the **BI** variables are from the MAIN Protocol, the OI variables are from Object Protocol

Step 22 - go to the *FUNCTIONS* Σ and select STAT_SUM(?)

Step 23 - go back to variables and select OI_FORMULA_X (the formula which you've used in the first part) and OI_FORMULA_Y (the formula which you've used as auxiliary formula)

Step 24 - complete the formula:

100 * STAT_SUM(OI_FORMULA_2) / STAT_SUM(OI_FORMULA_5)

(100 is to get the percentage)

Step 25 - Customize the appearance (customer header, precision, color)

## 9.3 Examples for formulas

***Detection of objects which are > 25% from the average (here lightness mean)***

if OI_L_MEAN > 1.25 * STAT_MEAN(OI_L_MEAN) then 1 end

***Example of using AND / OR***

IF not OI_CLASS = "BADSEED" and OI_COUNT = 1 and OI_L_MEAN > 1.2 * STAT_MEAN(OI_L_MEAN) and OI_I_FRACTION_2 > 2* STAT_MEAN(OI_I_FRACTION_2) or OI_AREA_MM < 10 then 1 end

IF not OI_CLASS = "BADSEED" and OI_COUNT = 1 and OI_L_MEAN > 1.2 * STAT_MEAN(OI_L_MEAN) and OI_I_FRACTION_2 > 2* STAT_MEAN(OI_I_FRACTION_2) or OI_AREA_MM < 0.7* STAT_MEAN(OI_AREA_MM) or OI_I_FRACTION_3 > 2* STAT_MEAN(OI_I_FRACTION_3) then 1 end

***Formula to get a combined impression for "Ident-Nr.  And Date" or other strings***

BI_IDENT + " " + BI_DATE

***Square root calculation***

SQRT **(**9**)**

SQRT **(**variable**)**

***A certain range detection***

if (x > y) and (y < z) then

***Size distribution***

IF not OI_CLASS = "BADSEED" and OI_COUNT = 1 and (OI_AREA_MM <=16) then 1 end

IF not OI_CLASS = "BADSEED" and OI_COUNT = 1 and (OI_AREA_MM >= 16.01) and (OI_AREA_MM <=20) then 1 end

IF not OI_CLASS = "BADSEED" and OI_COUNT = 1 and OI_AREA_MM >= 20.1 then 1 end

### Remarks

- *IF not OI_CLASS = "BADSEED" and OI_COUNT = 1* is a header to exclude clustered objects and BADSEEDS
- "1" is just a marker to count the number of objects

# 10 Info

Most sections are programmed with “C sharp”

MARViN11 itself is a so called “packaged software”