



# HEXAGON

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## Rearrange subgroups (K0080 / K0081) General Settings

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## Document History

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# 1 Rearrange subgroups - functionality

With the option "Rearrange subgroups" a possibility was created to save the subgroup information in the measured values and to use it for generating the subgroups.

For this purpose, the subgroup ID (K0080) and subgroup position (K0081) are saved in the additional data of the measured values. The measured values with the same subgroup ID (K0080) are combined into a subgroup. The subgroup position, the K field "Value position in subgroup" (K0081), is used for sorting within a subgroup.

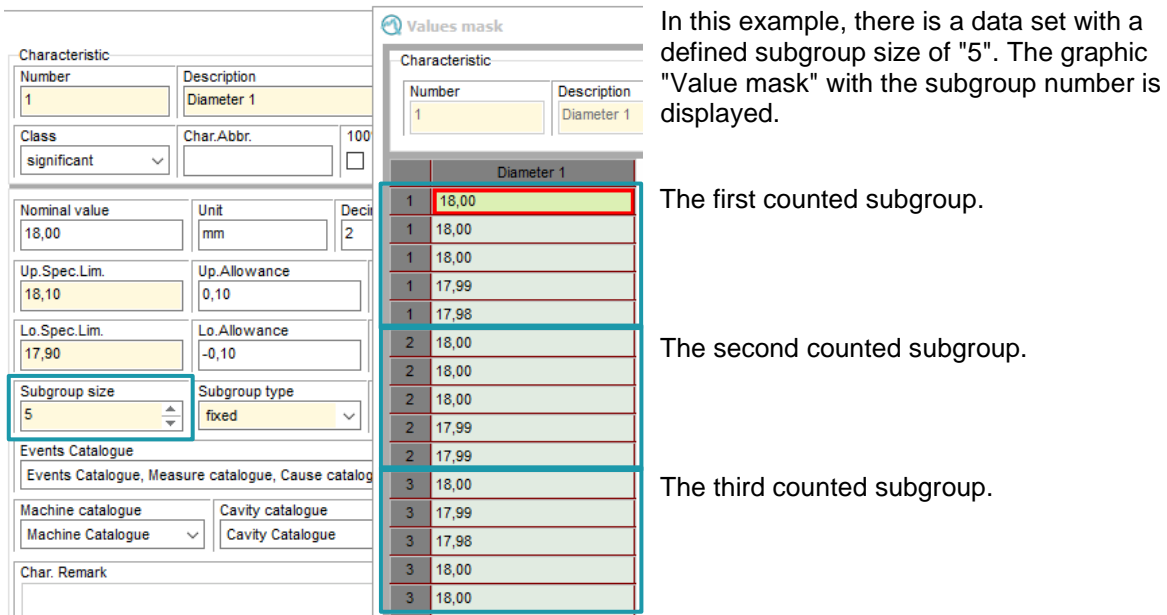
If incomplete subgroups are available, they are filled in. Any measured values with a subgroup position outside the defined subgroup size as well as measured values with multiple occurrences are automatically eliminated.

## 1.1 Advantages of subgroup sorting (Rearrange subgroups)

When loading a data set, whether from a database or a DFQ file, the process analysis always analyses the individual subgroups. The application behaves differently when handling the subgroups without sorting and when using the "Rearrange subgroups" option.

### Handling the subgroups without sorting

Based on the defined subgroup size and the loaded data, the subgroups are identified with a "counting rhyme".



In this example, there is a data set with a defined subgroup size of "5". The graphic "Value mask" with the subgroup number is displayed.

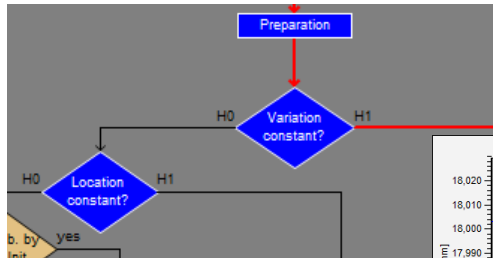
Diameter 1	
1	18,00
1	18,00
1	18,00
1	17,99
1	17,98
2	18,00
2	18,00
2	18,00
2	17,99
2	17,99
3	18,00
3	17,99
3	17,98
3	18,00
3	18,00

The first counted subgroup.

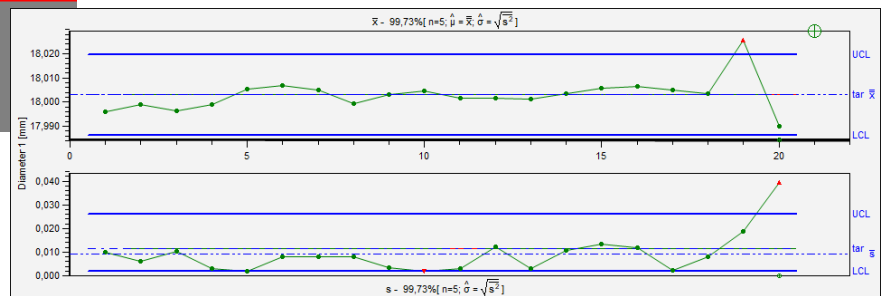
The second counted subgroup.

The third counted subgroup.

With the subgroups identified, the mathematics of the evaluation strategy goes into the calculation. Here, for example, for the control according to location and variation.



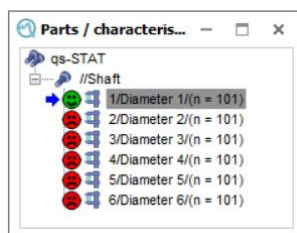
The quality control chart (QCC), as well as its alarm, is also based on the subgroups identified by counting.



Identifying the subgroups by counting is sensitive to errors. There are some cases where the identification of the subgroups by counting does not work. For example, problems occur when:

- Load the last x measured values from the database.
- Loading of measured values for which the number of loaded measured values is not divisible by the subgroup size.
- Loading the complete x time units. However, a subgroup was recorded over two time units.

The following is an extract from the data set "Subgroup\_Shaft\_8081.dfq" of the standard delivery. As specified in the standard delivery, the option "Rearrange subgroups" is deactivated.



With the option "Rearrange subgroups" deactivated, 101 measured values are loaded.

When looking at the additional data field "Subgroup ID" (2), it is easy to see that these do not match the identified subgroups (1). The loaded data does not match the one actually recorded.

	Diameter 1	Subgroup ID	Value position in subgroup	
1	18,00	Sub-Gr 3	4	
	18,00	Sub-Gr 3	5	
	18,00	Sub-Gr 4	1	
	17,99	Sub-Gr 4	2	
	17,98	Sub-Gr 4	3	
1	2	18,00	Sub-Gr 4	4
	2	18,00	Sub-Gr 4	5
	2	18,00	Sub-Gr 5	1
	2	17,99	Sub-Gr 5	3
	2	17,99	Sub-Gr 5	2
3	3	18,00	Sub-Gr 5	4
	3	17,99	Sub-Gr 5	5

1. Identified subgroups by counting.

2. The loaded dataset starts with the third subgroup ID, the "Sub-Gr 3". The subgroup ID "Sub-Gr 3" is loaded incompletely. Three measured values are missing for this subgroup. The subgroup positions 1 to 3.

3. In the subgroup ID "Sub-Gr 5", the subgroup position "3" was measured before the subgroup position "2".

	Diameter 1	Subgroup ID	Value position in subgroup
8	18,01	Sub-Gr 10	5
8	17,99	Sub-Gr 11	1
8	18,00	Sub-Gr 11	2
8	18,00	Sub-Gr 11	3
9	18,00	Sub-Gr 11	4
9	18,00	Sub-Gr 11	5
9	18,00	Sub-Gr 12	1
9	18,00	Sub-Gr 12	2
9	18,01	Sub-Gr 11	5
10	18,00	Sub-Gr 12	4
10	18,00	Sub-Gr 12	5
10	18,00	Sub-Gr 13	1

The subgroup position "5" of the subgroup ID "Sub-Gr 11" is duplicated and appears again in the subgroup ID "Sub-Gr 12".

The subgroup position "3" of the subgroup ID "Sub-Gr 12" is missing.

	Diameter 1	Subgroup ID	Value position in subgroup
11	18,00	Sub-Gr 13	5
11	18,00	Sub-Gr 14	1
11	18,00	Sub-Gr 14	2
11	18,00	Sub-Gr 14	3
12	18,01	Sub-Gr 14	4
12	18,01	Sub-Gr 14	5
12	17,99	Sub-Gr 14	6
12	17,99	Sub-Gr 15	1

The subgroup ID "Sub-Gr 14" contains six measured values.

### Dealing with subgroup sorting (Rearrange subgroups)

	Diameter 1	Subgroup ID	Value position in subgroup
1	18,00	Sub-Gr 13	5
1	18,00	Sub-Gr 14	1
1	18,00	Sub-Gr 14	2
1	18,00	Sub-Gr 14	3
1	18,01	Sub-Gr 14	4
1	18,01	Sub-Gr 14	5
1	17,99	Sub-Gr 14	6
1	17,99	Sub-Gr 15	1

By setting the option "Rearrange subgroups", the missing measured values are filled, the duplicate measured values are eliminated and the subgroup is sorted.

101	Measured values	Loaded data set without "Rearrange subgroups".
+3	Measured values	The missing measured values of "Sub-Gr 3" are filled in.
-1	Measured value	Double subgroup position "5" of "subgroup 11" is eliminated.
+1	Measured value	Missing subgroup position "3" of "subgroup 12" is filled in.
-1	Measured value	The subgroup position "6" of "Sub-Gr 14" is eliminated.
= 103	Measured values	which are loaded with the activated "Rearrange subgroups" option.

	Diameter 1	attribute	Subgroup ID	Value position in subgroup
1		255	Sub-Gr 3	1
1		255	Sub-Gr 3	2
1		255	Sub-Gr 3	3
1	18,00	0	Sub-Gr 3	4
1	18,00	0	Sub-Gr 3	5
2	18,00	0	Sub-Gr 4	1

The subgroup positions 1 to 3 of the "Sub-Gr 3" are filled in.



	Diameter 1	attribute	Subgroup ID	Value position in subgroup
8	18,01	0	Sub-Gr 10	5
9	17,99	0	Sub-Gr 11	1
9	18,00	0	Sub-Gr 11	2
9	18,00	0	Sub-Gr 11	3
9	18,00	0	Sub-Gr 11	4
9	18,01	0	Sub-Gr 11	5
10	18,00	0	Sub-Gr 12	1
10	18,00	0	Sub-Gr 12	2
10		255	Sub-Gr 12	3
10	18,00	0	Sub-Gr 12	4
10	18,00	0	Sub-Gr 12	5
11	18,00	0	Sub-Gr 13	1

Double subgroup position "5" of "Sub-Gr 11" is eliminated. The missing subgroup position "3" of "Sub-Gr 12" is filled in.

The number of measured values in the subgroups "Sub-Gr 11" and "Sub-Gr 12" now corresponds to the defined subgroup size "5".

	Diameter 1	attribute	Subgroup ID	Value position in subgroup
11	18,00	0	Sub-Gr 13	5
12	18,00	0	Sub-Gr 14	1
12	18,00	0	Sub-Gr 14	2
12	18,00	0	Sub-Gr 14	3
12	18,01	0	Sub-Gr 14	4
12	18,01	0	Sub-Gr 14	5
13	17,99	0	Sub-Gr 15	1

The subgroup position "6" of the "Sub-Gr 14" is eliminated.

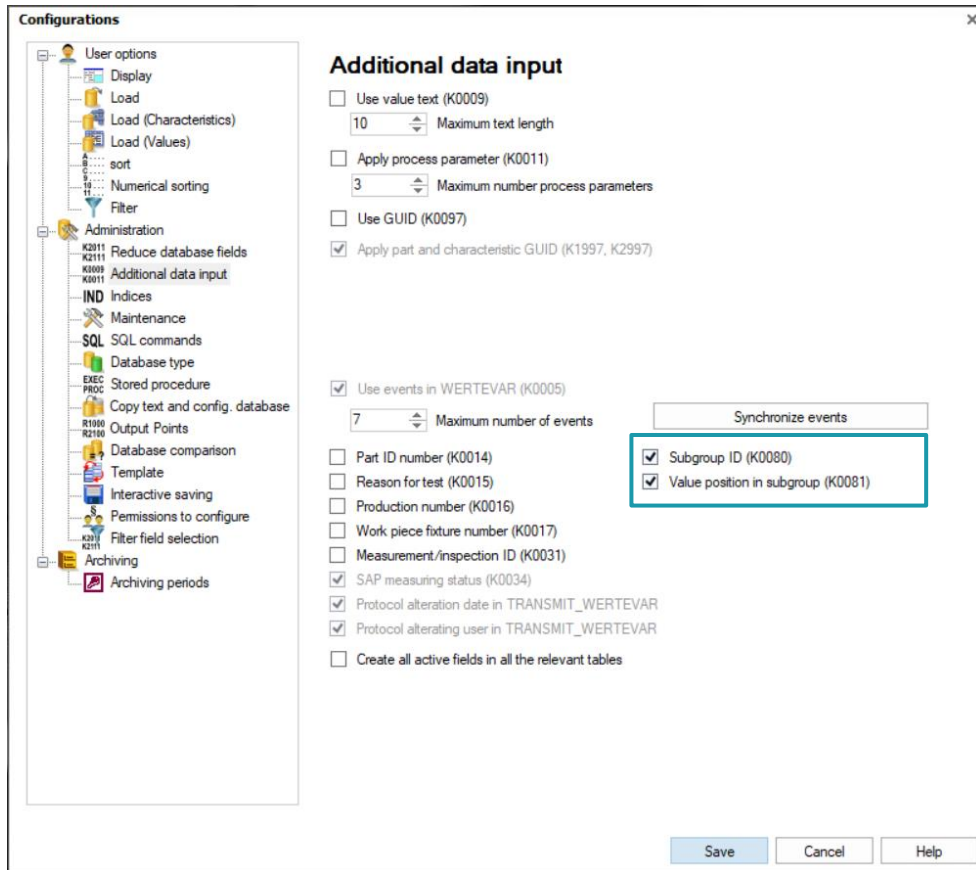
The number of measured values in the subgroup "Sub-Gr 14" now corresponds to the defined subgroup size "5".





## Create additional data via the database options

The physical creation of the additional data fields, the creation of the fields in the database, is done via the database options. *File | Configuration | Databases | Options | Administration | Additional data input.*

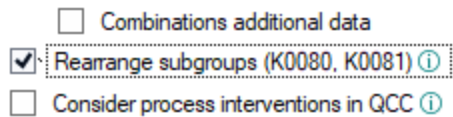


With the option "Rearrange subgroups" activated, the recording of the "Subgroup ID" (K0080) and "Value position in subgroup" (K0081) in qs-STAT Process Analysis and procella is done automatically. To save the information in the database, it is therefore necessary to create the fields beforehand.

## 2.2 Activate the „Rearrange subgroups“ option

If the additional data fields "Subgroup ID" (K0080) and "Value position in subgroup" (K0081) are active in the system configuration and the database options, the option "Rearrange subgroup" can be activated for use.

Activation is done via *File | Configuration | General Settings | General Settings 2* and setting the option "Rearrange subgroups (K0080, K0081)".



## 2.3 Recording "Subgroup ID" (K0080) and "Value position in subgroup" (K0081)

If the option "Rearrange subgroups" is activated, the "Subgroup ID" (K0080) and "Value position in subgroup" (K0081) are recorded automatically in qs-STAT Process Analysis and procella. To save the information in the database, it is necessary to create the fields beforehand.



If part measurement is active in procella, the same "Subgroup ID" is written for all measured values of the associated subgroup inspection using the "Summary/input" window for measurement value recording.



The "Subgroup ID " is NOT recorded in the case of

- characteristics with defined subgroup type "moving".
- using copy and paste via the value mask.



The additional data fields "Subgroup ID" (K0080) and "Value position in subgroup" (K0081) may never be used for other purposes!

## 2.4 Configuration option for the syntax of "Subgroup ID" (K0080)

The content of the additional data field "Subgroup ID" is stored in the %product%.ini. In the standard delivery, the default is formed by the date and time stamp in milliseconds followed by the K field "Test location" (K1206).

`K0080_ID=DATE, TIME, K1206`

Values mask					
Characteristic				Transformation	
Number	Description	Up. Spec.Lim.	Lo. Spec.Lim.	Factor	Constan
1	1			1	0
1	Subgroup ID			Value position in subgroup	
1	10,100	211031_144407446_my_location		1	
1	10,300	211031_144407446_my_location		2	
1	10,200	211031_144407446_my_location		3	
1	10,500	211031_144407446_my_location		4	
1	10,250	211031_144407446_my_location		5	

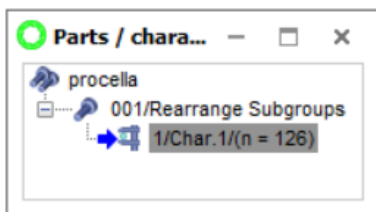


If the default content for the additional data field "Subgroup ID" needs to be adjusted, it is recommended to keep the default date and time stamp.

## 3 Handling the rearrange subgroups in procella - Example

The "Rearrange subgroups" option is crucial in the procella environment. The Q-DAS application procella has an input memory. Normally, the last input position is saved during recording.

In the following, a data set with defined subgroup size "3" and defined subgroup type "fixed" is used. Three test objects are always measured per measurement procedure. The data set is then saved and closed. This means that complete subgroups are always recorded. When the data set is reloaded, the input memory starts recording at the first position of the new subgroup. A total of 126 measured values per characteristic are recorded.

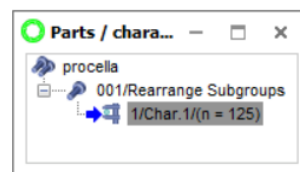
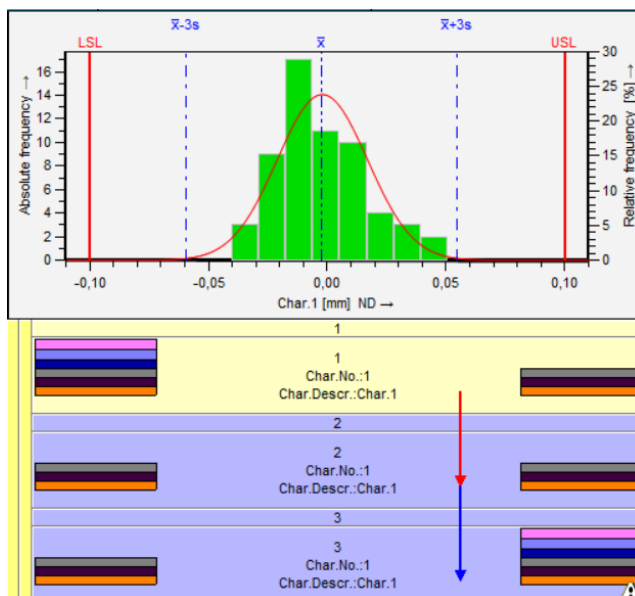


A frequently used procedure in procella is to load the data sets via the "Part selection database" dialogue. Here, the option to load the last 125 measured values is configured by default. If the same data set is loaded via the "Part selection database" dialogue without "Rearrange subgroups" option, the following result occurs.

### Part selection from the database without rearranging the subgroups

The "Part selection database" dialogue loads the last 125 measured values starting from the last saved measurement position. This process is independent of the defined subgroup size.

The last 41 subgroups are therefore loaded completely (125 measured values / subgroup size 3). This corresponds to the last 123 measured values. To fill up the data to be loaded, the application loads two measured values from the previous subgroup.



The subgroups identified by counting do not match those actually recorded.

Char.1	Subgroup ID	Value position in subgroup
1	-0,001	211031_150105604_2
1	0,026	211031_150105604_3
1	0,022	211031_150114037_1
2	0,047	211031_150114037_2
2	-0,014	211031_150114037_3
2	-0,004	211031_150115164_1
3	0,026	211031_150115164_2
3	0,038	211031_150115164_3
3	-0,014	211031_150116276_1
4	0,005	211031_150116276_2
4	-0,010	211031_150116276_3
4	0,000	211031_150116972_1
5	0,013	211031_150116972_2

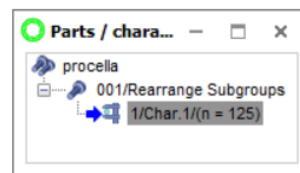
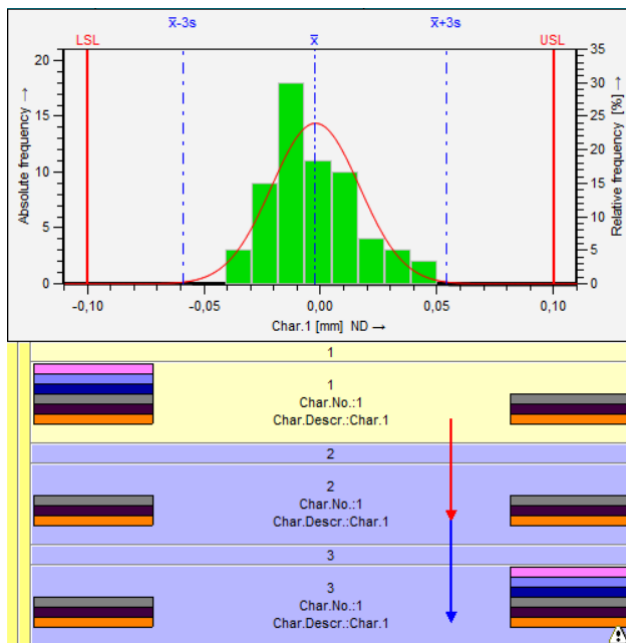
Although the loaded data pool does not correspond to the complete subgroups, the stored measurement position (input memory) ensures that the next recording is the first position of the new subgroup. Any preliminary QCC calculations performed in procella also follow the identification of the subgroups by a count. Thus, the representation of the QCC calculations does not correspond to the actual recorded subgroups.

This misconfiguration in the "Part selection database" dialogue can be dealt with by activating the option "Rearrange subgroups".

### Part selection from the database WITH rearranging the subgroups

Even with the "Rearrange subgroups" option activated, the "Part selection database" dialogue continues to load the configured last 125 measured values. This means the 41 subgroups completely and two measured values from the previous subgroup to fill up the data to be loaded. The missing subgroup position "1" of "211031\_150105604\_" is filled with an empty measured value.

By identifying the subgroups via subgroup ID (K0080) and by filling in missing subgroup position (K0081), the loaded data pool matches the collected subgroups.



With the "Rearrange subgroups" the data pool is loaded according to the recorded subgroups.

Char.1	attribute	Subgroup ID	Value position in subgroup
1	255	211031_150105604_	1
1	-0,001	211031_150105604_	2
1	0,026	211031_150105604_	3
2	0,022	211031_150114037_	1
2	0,047	211031_150114037_	2
2	-0,014	211031_150114037_	3
3	-0,004	211031_150115164_	1
3	0,026	211031_150115164_	2
3	0,038	211031_150115164_	3
4	-0,014	211031_150116276_	1
4	0,005	211031_150116276_	2
4	-0,010	211031_150116276_	3
5	0,000	211031_150116972_	1