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Medium voltage switchgear

10 The invention relates to a medium voltage switchgear, e.g. gas insulated switchgear, which consist of an arrangement of several switching device panels, like feeder panel, coupler panel and riser panel, each with a separate housing and further interconnecting means between the housings.

Basic definition for the use of the nomenclature in the invention is needed.

15 Medium voltage switchgear panels have furthermore three basic functions beside there main function of switching devices, which are according to the interconnection of several switchgear panels and the interconnection with the main cable. So there are so called feeder panels in which is arranged the interconnection to the distribution to cables in the cable cellar under the switchgear. There is furthermore a so called
20 coupler panel, in which an interconnection is located between the busbar and a switching device. The coupler panel devides the busbar into two sections. And furthermore, the riser panel, in which is arranged the "rising" interconnection back to busbar. Therefore a coupler panel and a riser panel are each time arranged beside.

25 The dimensions of the panels of switchgear manufacturerare not unified. They depend on the design and the ratings. Nevertheless for primary GIS a panel width of 600 mm became quite common, at least for ratings up to 1250 A. For higher ratings different panel width are used, e.g. 800 mm.

30 As customers prefer to plan their building before finally selecting the supplier of the switchgear, there is a tendency that a grid of 600 mm is used for all panel variants. The existing answers to this requirement are panel width of 600 mm for panels up to 1250 A and 1200 mm for panels > 1250 A. So the measure of 600 mm occur very often, but not exclusively.

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So it is an object of the invention to unify the measure system in a comfortable way, for easy construction and assembly.

5 The requirement for the common grid or base measure is based on the need for the openings in the floor to connect the cables to the panels. The existing solutions are using a panel width of $2 \times 600 \text{ mm} = 1200 \text{ mm}$ for nominal current $> 1250 \text{ A}$. This is independent if the panel type is a feeder or a coupler or riser panel. As coupler and riser panels are always used together, this results in $4 \times 600 = 2400 \text{ mm}$. This is space
10 consuming.

So the invention for a Medium voltage switch gear is, that each functional unit width is dimensioned to a fix base measure x or integer multiples $n \cdot x$ of it.

15 The fundamental or basical advantageous measure is the base measure of 300 mm . On the basis of this base measure, all final width measures of a switchgear, consisting of several panels can be planed.

In a further embodiment, a feeder panel is arranged with a resulting width, given by an
20 integer of $n=4$ according to the base measure X of 300 mm , resulting 1.200 mm .

A riser panel is arranged with a resulting width, given by an integer of $n=3$ according to the base measure X of 300 mm , resulting 900 mm , and a coupler panel is arranged with a resulting width, given by an integer of $n=3$ according to the base measure X of
25 300 mm , resulting 900 mm .

A further advantageous embodiment is, that a coupler panel and a riser panel are arranged next, with a resulting width, given by an integer of $n=6$ according to the base measure X of 300 mm , resulting 1.800 mm .

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As coupler and riser panels always have to be used together, they are forming a functional unit. This functional unit will be selected by the smallest selection of n . By using for ratings $< 1.250 \text{ Ampere}$, 900 mm panels for coupler and riser, this will lead to

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1.800 mm, which is 6*X.

The proposed solution bases on the following facts:

- 5 • Coupler and riser panels are always used together, side by side (except coupler/riser using cable connections and are not placed in a switchgear line, but e.g. back to back).
- Coupler and riser panels have no need for openings in the floor of the building.

10 Taking care of this, coupler and riser panels can be designed using a panel width of 900 mm per panel. This is only requiring 1800 mm = 6x300 mm in total. This is 600 mm less. As no cables have to be connected, 900 mm (3x300 mm) panel width is sufficient for ratings >1250 A. This is saving material for the panels and in the same space one additional outgoing feeder panel can be installed, which is an advantage for the
15 customer.

In an advantageous embodiment, the sectionalisation of the busbar follows the measures in claim 6. This is a result, which can be seen in the Figure 1.

20 An embodiment of the invention is shown in the drawings.

Figure 1: Example measures and arrangements of several panel types to a resulting switch gear

25 Figure 1 shows an example of an arrangement of several feeder panels 3, coupler panels 2 and riser panel 4. The switch gears starts left with two feeder panels 3 beside with a measure of 600 mm each. This is in each case a measure of 2xbase-measure. These feeders are used for a current carrying capability of 1.250 Ampere each. Beneath is arranged a feeder with a current carrying capability of 2.500 Ampere with a measure
30 of 4x300 mm th. m. 1.200 mm. Beside of this feeder panel is arranged a coupler panel for a current carrying capability of 2.500 Ampere with the measure of 3x300 mm, th. m. 900 mm. Beneath this coupler is arranged furthermore a riser panel 4 with a current

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carrying capability of 2.500 Ampere and a measure of 3x300 mm as well. Furthermore are arranged beneath the riser panel 4 two further feeder panels like on the left side.

5 This example shows the systematic arrangement of the several functional panels on the basis of the base measure of nx300 mm.

10 The reduced panel width for coupler and riser will save material. This will mainly be copper for the busbars of 600 mm per phase and stainless steel of the high voltage compartments and steel for the other compartments. The additional benefit of reduced space requirements for the customer is hard to quantify.

Figure 1 also shows the function of a coupler panel 2 and riser panel 4.

15 The coupler panel is provided to interrupt the otherwise persistent busbar into two sections, which are arranged on the top of the panels. So the busbar is connected with switching devices 6. So the direction of the cables or bar is from on top towards the bottom. Therefore a riser panel 4 has to be arranged beneath the coupler panel 2, in order, to connect back upwards running bus with the central busbar on top. Therefore it is called "riser".

20 Like it can be seen in Figure 1, the functional unit, consisting of a coupler panel and a riser panel has an advantageous resulting measure.

25 In this embodiment of the invention the basic measure of 300 mm is used in the complete arrangement in that way, that a sectionalization of 2*300mm, th.m. 600mm each can be provided.

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Position numbers

	1	Switchgear
	2	Coupler panel
5	3	Feeder panel
	4	Riser panel
	5	Busbar
	6	Switching device
	7	Ground level
10	8	Busbar-section
	9	Busbar-section

Claims

- 5 1. Medium voltage switchgear, e.g. gas insulated switchgear, which consist of an arrangement of several switching device panels, like feeder panel, coupler panel and riser panel, each with a separate housing and further interconnecting means between the housing,
characterized in,
- 10 that each panel width or the width of a functional unit consisting of several functional panels, like riser, coupler, feeder, is dimensioned to an integer of a fix base measure x or integer multiples $n \cdot x$ of it.
- 15 2. Medium voltage switchgear, according to claim 1,
characterized in,
that the base measure is 300 mm.
- 20 3. Medium voltage switchgear, according to claim 2,
characterized in,
that the feeder panel is arranged with a resulting width, given by an integer of $n=4$ according to the base measure X of 300 mm, resulting 1.200 mm.
- 25 4. Medium voltage switchgear, according to claim 2,
characterized in,
that a riser panel is arranged with a resulting width, given by an integer of $n=3$ according to the base measure X of 300 mm, resulting 900 mm.
- 30 5. Medium voltage switchgear, according to claim 2,
characterized in,
that a coupler panel is arranged with a resulting width, given by an integer of $n=3$ according to the base measure X of 300 mm, resulting 900 mm.

6. Medium voltage switchgear, according to claim 4; and 5,
characterized in,

5 that a coupler panel and a riser panel are arranged next, to a functional unit,
with a resulting width, given by an integer of $n=6$ according to the base
measure X of 300 mm, resulting 1.800 mm.

7. Medium voltage switchgear, according to claim 6,
characterized in,

10 that the sectionalisation of the busbar follows the measures in claim 6.