

PAUL SCHERRER INSTITUT 	Projekt / Project SLS 2.0
Titel / Title SLS 2.0 Naming Convention	Dokument Nummer / Document Identification SLS2-SA81-001-11
Autor(en) / Author(s) Masamitsu Aiba and Andreas Streun	Datum / Date 09. 09. 2020

Modification History

changes in version 11 (9.9.2020)

Position index (third field) was extended from 3-digits to 4-digits upon request from vacuum group

changes in version 10 (7.7.2020)

Modified naming of bending magnet source points / beam lines for compatibility with existing names.
Girder layout picture updated. Examples refer to lattice B062.

changes in version 9 (7.5.2020)

Minor changes with regard to geometry markers and lattice version (B052).

changes in version 8

Completely new concept with simplified names.

Previous modification are irrelevant now and may be looked up in version 7.

SLS Device Naming Convention V.11

History and concept

The SLS naming convention [1] was established from a functional rather than a geometrical point of view. Thus it turned out to be inconvenient for engineers and technicians, who have to deal with physical elements and locations. Based on this experience, the naming convention was modified for SwissFEL [2] emphasizing the spatial arrangement of the elements, which is more natural for a linear machine anyway. The naming convention for the SLS-2 storage ring aims to combine both aspects and to take the best from the **old SLS** and the **SwissFEL** naming conventions, however in previous version (up to V.7) this resulted in a complicated and inconsistent naming.

In V.8 we decided to make **simple names**: It is not required to express any functionality in the naming, because this functionality is different depending on the point of view, i.e. seen from beam dynamics, magnet design, power supply, control system, mechanical engineering etc. Thus the device name is just a name, nothing more. Different groups working with the devices will anyway establish different look-up tables to manage the properties relevant for the group.

Name structure

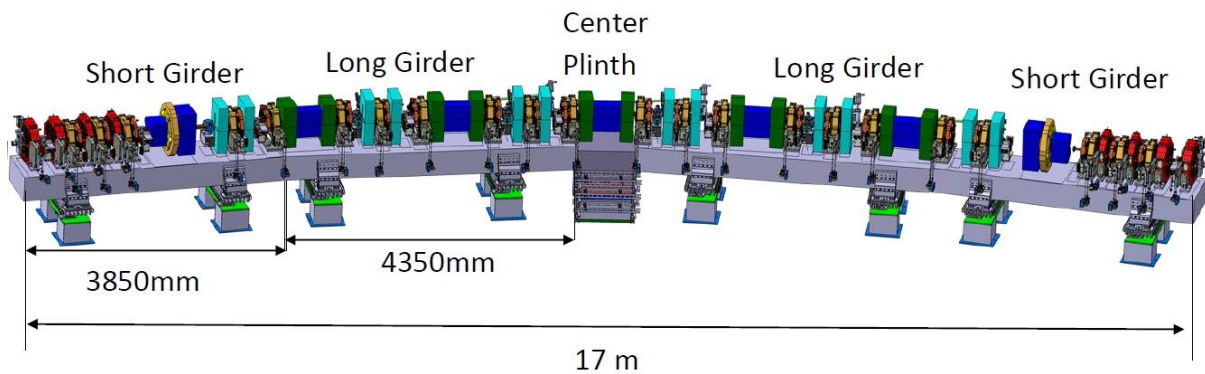
The element name is made up from 3 fields separated by 2 hyphens.

1. According to [1], the first field is 5 characters for <kingdom><domain><subdomain>. **Kingdom A is kept to identify the SLS.** Domain RI is replaced by **RS** for ring sector. **<subdomain> was the functional system before (MA, DI etc.), but this is replaced by the sector number 01...12.** In this way any overlap of old and new names is avoided, **and the first field already tells in which sector of the ring the element is located.** **<Section> as introduced for SwissFEL is not needed, keeping the first part of the Device Name at 5 characters length.** We also keep the existing beam line domains, where kingdom is X, domain is sector and subdomain is beam line type (e.g. X04SA).
2. The second field is exactly 4 characters long. The first character identifies the device group: **M**(agnets), **D**(iagnostics), **V**(acuum), **R**(F-systems), **S**(afety systems), **A**(lignment), **G**(eometry markers [virtual]), etc. The remaining 3

characters identify the type of element within its group. Don't use underscore (_) as part of name!

3. The third field is a 4-digit position number indicating where in the sector to find the element, where numbers increase along the beam direction. For better readability, the number is separated by another hyphen.

Note, that each element name is unique (it corresponds to a device in the control system.)



Girder Layout, taken from M. Wurm, "SLS 2.0 Girder Overview", June 10, 2020

Position number

The SLS-2 lattice has 12 arcs and 12 straights, where the straights are in front (upstream) of the arcs. Each arc contains four girders and a support for the centermost dipole, which is counted as a girder too, see figure. The position number has 4 digits where the first one is the "girder number", running from 1 to 5, for the straight sections the girder number will be 0 (zero). The second and third digits run from 000-999 for each girder. With a maximum length of 11.22 m ("girder 0" in long straights; lattice B052), this gives a resolution of <1.2 cm, which should avoid same position numbers for adjacent elements.

Some components/functions are indeed located at the same place, for example the built-in regular and skew quad correctors, which are realized as additional coils in the octupole magnets. Here, the same position numbers is assigned on purpose for these components, which also will facilitate cabling.

The girder number will be convenient during construction because the assembly is performed girder by girder: for example, one will not put a component with position

number 2450 (2 = Girder number, 450 = Position number within Girder 2) to the first girder, girder 1.

Beam line names and source point markers

Beam lines are named **Xnnab** where **nn** is the sector and **ab** identifies the type of beamline:

Straights: **ab** = {**SA**, [**SB**], **LA**, **LB**} for short and long straight. **A** and **B** could be used for first and second half of straight, or for clearly distinguishable beamlines from the same straight.

Dipoles (new in V.10):

The potential beamlines from the 7 dipoles (see figure above) per arc are named

ab = {**DD**, **DC**, **DB**, **DA**, **DE**, **DF**, **DG**} **D** the first, **A** the middle, **G** the final one,

Note, bends **DC**, **DB**, **DA**, **DE**, **DF** and of same type (standard PM 1.35 T), where only **DA** can be replaced by a superbend, and bends **DD**, **DG** are dispersion suppressor half bends.

This naming is not logical but a compromise with maintaining the existing beam line names. At the existing SLS we have A and B ports of the center bend, where the B-port is 4° upstream of the A-port. At SLS 2.0 the present A-port beamlines stay where they are, while the B-port beamlines will move to the next upstream dipole. Therefore the center bend is called **DA**, and the next upstream dipole is called **DB**. The diagnostics beam line for emittance measurement will be **X01DD**.

References

[1] A. Streun, S. Staudemann, D. Vermeulen, Device Naming Convention,
<http://ados.web.psi.ch/dnc>

[2] E. Zimoch, T. Korhonen, S. Reiche, L. Schulz, H. Lutz, R. Krempaska, SwissFEL Naming Convention, FEL-ZE84-002-1

Examples (only for illustration)

The following table is a typical excerpt from a “Heilige Liste” to explain some names (so far mainly magnets and diagnostics). Note that the naming convention refers only to “Name”. The “Type” identifier can be anything as defined by the system responsables.

Here we go along sector 06 (vacuum devices are only examples, more to come):

Name	Type	Description
ARS05-MQUA-5940	QPHO	Last element (quad) of sector 05
ARS05-VVGP-5985	VVPG_DN40_RF	RF shielded gate valve DN40
ARS06-GMRK-0000	GINI_SEC	Geometry marker to start sector 06
X06SA-GSRC-0500	SRC_STR_S	Source point marker in mid of straight 06, Origin of beam line X06SA
ARS06-GMRK-1000	GINI_ARC	Geometry marker to start arc 06
ARS06-VVGP-1015	VVPG_DN40_RF	RF shielded gate valve DN40
ARS06-MQUA-1050	QPHI	First quad after straight 06
ARS06-DBPM-1080	BPM	Beam position monitor (numbering not done here)
ARS06-MCOR-1100	CHV	Corrector (x and y)
---- Now we jump to the third bend on girder 2 ---		
ARS06-MBLG-2590	BNV	Longitudinal gradient bend (dipole C): it is composed from VB-BN-VB
X06DB-GSRC-2590	SRC_DIP	Potential beam line starting here
ARS06-MSOQ-2710	SOQO	SOQ magnet (sext/oct/quad)
ARS06-MBCF-2800	AN	Combined function bend (this one is a reverse bend)
ARS06-MSOQ-2840	SOQOW	SOQ magnet, type SOQOW is with wider yoke
ARS06-MBCF-2890	AN	The other reverse bend in this cell
ARS06-DBPM-2900	BPM	Beam position monitor
ARS06-MCOR-2930	CHV	Corrector
ARS06-MSOQ-2970	SOQI	Another SOQ magnet (reversed SOQO)
ARS06-MBCF-3250	VB	Standalone combined function magnet for vertical focusing to be used with superbend.
ARS06-MBSC-3500	BS27	Superbend, type BS27 is 2.7 Tesla superbend.
X06DA-GSRC-3500	SRC_SUPERB	Origin of beam line
ARS06-MBCF-3750	VB	The combined function magnet VB on the other side of the superbend
--- jump to end of sector ---		
ARS06-MQUA-5940	QPHO	Last quad of sector 06
ARS06-VVGP-5985	VVPG_DN40_RF	RF shielded gate valve DN40
ARS07-GMRK-0000	GINI_SEC	Geometry marker to start sector 07