PAUL SCHERRER INSTITUT PSI	Projekt / *Project* SLS 2.0
Titel / *Title* **SLS 2.0 Naming Convention**	Dokument Nummer / *Document Identification* **SLS2-SA81-001-13**
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Modification History

changes in version 12 (6.27.2022) – Romain Ganter

- Sub-Device name SOQ is splitted in two distinct names SXT and OCT
- Sub-Device name COR is splitted in COX and COY
- RF Sub-Device name components are in the proto-HL as RCAV and R3HC
- GE (general) is a new Domain name for systems not related to a particular ring component (e.g. Servers)
- Old SLS Naming convention applies for booster and linac
- Two reviewers are defined to check Sub-Device Names (F. Armborst for Storage Ring and Booster to ring transport line, A. Luedeke for Linac and Booster)

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.

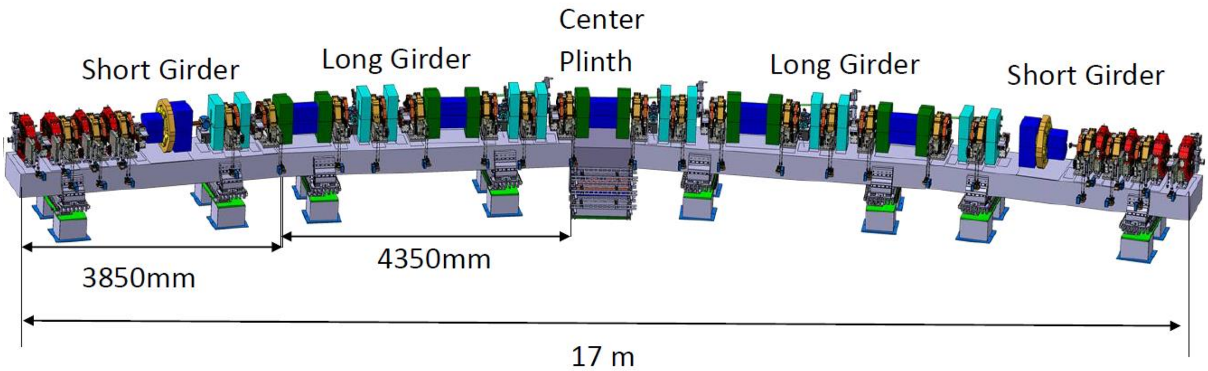
Name structure

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.
    - Systems not directly coupled to a specific ring components (e.g. Servers) should have following domain: **Domain = GE (general)**
    - <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.

2. We also keep the existing beam line domains, where kingdom is X, domain is sector and subdomain is beam line type (e.g. X04SA).
3. The second field is exactly 4 characters long.
    - The first character identifies the <u>device group:</u> **M**(agnets), **D**(iagnostics), **V**(acuum), **R**(F-systems), **S**(afety systems), **A**(lignment), **G**(eometry markers [virtual]), **U**(ndulator) etc.
    - The remaining 3 characters identify the type of element (or sub-device names) within its group. Don't use underscore (_) as part of name! Each expert group can propose a list of **Sub-Device Names** (e.g. QUA, SXT, OCT, CAV, 3HC, …) which will be reviewed by F. Armborst for the Storage Ring and BRTL components.
4. The third field is a 4-digit <u>position number</u> 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° *up*stream 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**.

Linac and Booster names (excluding BTR Transfer Line)

OLD NAMING CONVENTION APPLY (also for new devices to be installed in linac & booster) http://slsbd.psi.ch/pub/slsnotes/naming/slsnamagen.htm !

- ⇨ Like that there will be no mixing of convention in Linac & Booster for all Panels in control room
- ⇨ New Names suggestions (or new Sub-Device definitions) for the Linac & Booster have **to be reviewed by A. Luedeke.**

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 "Proto 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 responsibles.

Here we go along sector 05 (vacuum devices are not shown an appear in "Device Heilige List" used for CAD plotting):

Name	Type	Comments
ARS04-MQUA-5940	QPHO	Last element (quad) of sector 04
ARS05-GMRK-0000	GINI_SEC	Geometry marker to start sector 05
ARS05-RCAV-0060	RFHOMG	Rf cavity
ARS05-RCAV-0140	RFHOMG	Rf cavity
ARS05-RCAV-0230	RFHOMG	Rf cavity
ARS05-RCAV-0310	RFHOMG	Rf cavity
ARS05-MQUA-0400	QPI	quadrupole magnet
ARS05-DBPM-0410	BPM	Beam position monitor (numbering not done here)
ARS05-MCOX-0420	CH	Corrector horizontal
ARS05-MCOY-0430	CV	Corrector vertical
		---- Now we jump to the third bend on girder 2 ---
ARS05-MBLG-2590	BNV	Longitudinal gradient bend (dipole C): it is composed from VB-BN-VB
X05DB-GSRC-2590	SRC_DIP	Potential beam line starting here
ARS05-MSXT-2700	HS2G	SXT magnet (sextupole)
ARS05-MOCT-2730	OS2A	OCT magnet (octupole)
ARS05-MBCF-2800	ANI	Combined function bend (this one is a reverse bend)
ARS05-MSXT-2830	HS2K	SXT magnet (sextupole), type HS2K is with wider yoke
ARS05-MOCT-2860	OS2E	OCT magnet (octupole)
ARS05-MBCF-2890	ANO	The other reverse bend in this cell
ARS05-DBPM-2910	BPM	Beam position monitor
ARS05-MCOX-2920	CHS	Corrector horizontal with shielding plate CHS
ARS05-MCOY-2930	CV	Corrector vertical
ARS05-MOCT-2950	OS2B	Another OCT magnet (octupole)
ARS05-MSXT-2980	HS2H	Another SXT magnet (sextupole)
ARS05-MBLG-3500	BNV	Longitudinal gradient bend (dipole C): it is composed from VB-BN-VB
ARS05-MOCT-1230	OS2A	OCT magnet (octupole)
ARS05-MQUA-1260	QPI	quadrupole magnet
ARS05-MSXT-1300	HS2A	Another SXT magnet (sextupole)
		--- jump to end of sector ---
ARS05-MQUA-5940	QPHO	Last quad of sector 05
ARS06-GMRK-0000	GINI_SEC	Geometry marker to start sector 06
ARS06-GMRK-0500	GMID_STR	Geometry marker for middle of sector 06
X06SA-UIND-0500	U18	undulator mid position U18 type