# Draft: Controls suffix naming guide CLARA/VELA

## Document history

|  |  |  |  |
| --- | --- | --- | --- |
| Version | Author | Amendment | Date |
| 0.1 | RFC | Initial draft | 03-02-20167 |
| 0.2 | DJS | Ammendments | 13-02-1017 |
| 0.3 | RFC | More Epics VELA variables added and Screens from the VM added | 14-02-2017 |
|  |  |  |  |

## Notes:

Get: to read a value from a PV

Set: to put a value to a PV.

Anything marked VM is for the simulation mode only.

The following parameters are what have been used for VELA. Some CLARA systems are already different, and it may not be possible to replicate he functionality.

# Controls suffix naming guide VELA

## Magnets

### Magnet prefix list

### VELA magnets with switchable with polarity

Polarity will only change when read current (:RI) is less than one amp

|  |  |  |
| --- | --- | --- |
| **Normal Current when Sta:On** | **Reverse Current when Sat:On** | **Magnet** |
| VM-EBT-INJ-MAG-PRAN-01 | VM-EBT-INJ-MAG-PRAR-01 | VM-EBT-INJ-MAG-QUAD-01 |
| VM-EBT-INJ-MAG-PRBN-01 | VM-EBT-INJ-MAG-PRBR-01 | VM-EBT-INJ-MAG-QUAD-02 |
| VM-EBT-INJ-MAG-PRAN-02 | VM-EBT-INJ-MAG-PRAR-02 | VM-EBT-INJ-MAG-QUAD-03 |
| VM-EBT-INJ-MAG-PRBN-02 | VM-EBT-INJ-MAG-PRBR-02 | VM-EBT-INJ-MAG-QUAD-04 |
| VM-EBT-INJ-MAG-PRAN-03 | VM-EBT-INJ-MAG-PRAR-03 | VM-EBT-INJ-MAG-QUAD-07 |
| VM-EBT-INJ-MAG-PRBN-03 | VM-EBT-INJ-MAG-PRBR-03 | VM-EBT-INJ-MAG-QUAD-08 |
| VM-EBT-INJ-MAG-PRAN-04 | VM-EBT-INJ-MAG-PRAR-04 | VM-EBT-INJ-MAG-DIP-01 |
| VM-EBT-INJ-MAG-PRBN-04 | VM-EBT-INJ-MAG-PRBR-04 | VM-EBT-INJ-MAG-QUAD-13 |
| VM-EBT-INJ-MAG-PRN-07 | VM-EBT-INJ-MAG-PRR-07 | VM-EBT-INJ-MAG-SOL-01 |
| VM-EBT-INJ-MAG-PRAN-08 | VM-EBT-INJ-MAG-PRAR-08 | VM-EBT-INJ-MAG-QUAD-09 |
| VM-EBT-INJ-MAG-PRBN-08 | VM-EBT-INJ-MAG-PRBR-08 | VM-EBT-INJ-MAG-QUAD-10 |
| VM-EBT-INJ-MAG-PRAN-09 | VM-EBT-INJ-MAG-PRAR-09 | VM-EBT-INJ-MAG-QUAD-11 |
| VM-EBT-INJ-MAG-PRBN-09 | VM-EBT-INJ-MAG-PRBR-09 | VM-EBT-INJ-MAG-QUAD-15 |
| VM-EBT-INJ-MAG-PRAN-10 | VM-EBT-INJ-MAG-PRAR-10 | VM-EBT-INJ-MAG-QUAD-12 |
| VM-EBT-INJ-MAG-PRBN-10 | VM-EBT-INJ-MAG-PRBR-10 | VM-EBT-INJ-MAG-QUAD-14 |

These must be switched together:

|  |  |  |
| --- | --- | --- |
| **Normal Current when Sta:On** | **Reverse Current when Sat:On** | **Magnet** |
| VM-EBT-INJ-MAG-PRN-05 | VM-EBT-INJ-MAG-PRN-05 | VM-EBT-INJ-MAG-DIP-02 |
|  |  | VM-EBT-INJ-MAG-DIP-03 |
|  |  | VM-EBT-INJ-MAG-QUAD-05 |

### VELA, 11 corrector H and V magnets and HVCOR PSU

All the corrector magnets need the power supply, VM-EBT-INJ-MAG-HVCOR, status set to “On==1”

The corrector magnets are single polarity

**PSU:** VM-EBT-INJ-MAG-HVCOR

|  |  |  |
| --- | --- | --- |
| VM-EBT-INJ-MAG-BSOL-01 | 11 horiz. corrector magnets: | 11 vert. corrector magnets: |
|  | nn=01,02…11 | nn=01,02…11 |
|  | VM-EBT-INJ-MAG-HCOR-nn | VM-EBT-INJ-MAG-VCOR-nn |

### Magnet status and current

|  |  |  |
| --- | --- | --- |
| SI | Double  Amps | Set Current |
| RI | Double  Amps | Get Current |
| Sta | Enum | Get status:   |  |  | | --- | --- | | 0 | OFF | | 1 | ON | | 2 | TIMING | | 3 | UNPLUGGED | | 4 | UNDEFINED | | 5 | ON\_FAULT | | 6 | OFFLINE | |

### Magnet PSU

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| On | Enum | Set: Turn on PSU   |  |  | | --- | --- | | 0 | OFF | | 1 | ON | |
| Off | Enum | Set: Turn off PSU   |  |  | | --- | --- | | 0 | OFF | | 1 | ON | |
| Rst | Enum | Set: Reset PLC   |  |  | | --- | --- | | 0 | RESET | | 1 | RESET | |
| RIRAN | Double  VM only | Set Rnd. For VM only. Percent to randomise the PSU. Default at 5% |
| Cmi | MMBI  DIRECT  VM set | Set: 16 flags. This is set from the PLC on VELA or by hand in the VM. In the VM the default is all interlocks are GOOD and equals 65535. Ilk<n> reads these flags |
| Ilk<n> | <n> 1- 16  BI ENUM | Get: Interlock status, see Cmi above   |  |  | | --- | --- | | 0 | BAD | | 1 | GOOD | |

### Magnet Polarity. Note: not all magnets can change polarity

|  |  |  |
| --- | --- | --- |
| PR<A,B>N:<On,Off> | Enum | Set:  Normal polarity “On”. Only changes when RI<0.5 amps  Reverse polarity “Sta” will be set to off. This is identical to reverse “Off”  Normal polarity “Off”. Only changes when RI<0.5 amps  Reverse polarity “Sta” will be set to off. This is identical to reverse “On” |
| PR<A,B>R:<On,Off> | Enum | Set:  Reverse polarity “On”. Only changes when RI<0.5 amps  Normal polarity Sta will be set to off. This is identical to Noraml “Off”  Reverse polarity “Off”. Only changes when RI<0.5 amps  Normal polarity Sta will be set to off. This is identical to Normal “On” |
| PR<A,B>N:Sta | Enum | Get:  Normal polarity on   |  |  | | --- | --- | | 0 | OFF | | 1 | ON | |
| PR<A,B>R:Sta | Enum | Get:  Reverse polarity on   |  |  | | --- | --- | | 0 | OFF | | 1 | ON | |

## BPMs

### BPM prefix list

|  |
| --- |
| VM-EBT-INJ-DIA-BPMC-02 |
| VM-EBT-INJ-DIA-BPMC-04 |
| VM-EBT-INJ-DIA-BPMC-06 |
| VM-EBT-INJ-DIA-BPMC-10 |
| VM-EBT-INJ-DIA-BPMC-12 |
| VM-EBT-INJ-DIA-BPMC-14 |

### BPM controls

|  |  |  |
| --- | --- | --- |
| X | Double  Units mm | Get:  X voltage |
| Y | Double  Units mm | Get:  Y voltage |
| DATA:B2V | Waveform  Size 9 | Get:  Bits to volts |
| RA1 | LONGIN | Get:  Attenuation |
| RA2 | LONGIN | Get:  Attenuation |
| RD1 | LONGIN | Get:  Delay |
| RD2 | LONGIN | Get:  Delay |
| SA1 | LONGIN | Set:  Attenuation |
| SA2 | LONGIN | Set:  Attenuation |
| SD1 | LONGIN | Set:  Delay |
| SD2 | LONGIN | Set:  Delay |

## Camera

### Camera prefix list

|  |
| --- |
| VM-EBT-INJ-DIA-CAM-01:CAM |
| VM-EBT-INJ-DIA-CAM-02:CAM |
| VM-EBT-INJ-DIA-CAM-03:CAM |
| VM-EBT-INJ-DIA-CAM-04:CAM |
| VM-EBT-INJ-DIA-CAM-05:CAM |
| VM-EBT-INJ-DIA-CAM-06:CAM |
| VM-EBT-INJ-DIA-CAM-07:CAM |
| VM-EBT-INJ-DIA-CAM-08:CAM |
| VM-EBT-INJ-DIA-CAM-09:CAM |
| VM-EBT-INJ-DIA-CAM-10:CAM |
| VM-EBT-INJ-DIA-CAM-11:CAM |
| VM-EBT-INJ-DIA-CAM-12:CAM |
| VM-EBT-INJ-DIA-CAM-13:CAM |
| VM-EBT-INJ-DIA-CAM-14:CAM |

### Camera controls

|  |  |  |
| --- | --- | --- |
| ArrayData | Waveform  Size 1447980  DOUBLE | Get:  Data |
| DistribX | Waveform  Size 1000  DOUBLE | Get:  X distribution |
| DistribY | Waveform  Size 1000  DOUBLE | Get:  Y distribution |
| X | DOUBLE | Get:  X |
| Y | DOUBLE | Get:  Y |
| SigmaX | DOUBLE | Get:  Sigma X |
| SigmaY | DOUBLE | Get:  Sigma Y |

## Screens and slits

### Screens prefix list

|  |
| --- |
| VM-EBT-INJ-DIA-YAG-06 |
| VM-EBT-INJ-DIA-YAG-07 |
| VM-EBT-INJ-DIA-YAG-08 |
| VM-EBT-INJ-DIA-YAG-09 |
| VM-EBT-BA2-DIA-YAG-01 |

**Complex Estop**

|  |
| --- |
| VM-EBT-INJ-DIA-YAG-01 |
| VM-EBT-INJ-DIA-YAG-02 |

**Complex Axis**

|  |
| --- |
| VM-EBT-INJ-DIA-YAG-01:H |
| VM-EBT-INJ-DIA-YAG-02:H |
| VM-EBT-INJ-DIA-YAG-01:V |
| VM-EBT-INJ-DIA-YAG-02:V |

### Simple screens and slits

### INJ: 6,7,8,9 BA2:1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sta | Binary | Get:  Status   |  |  | | --- | --- | | 0 | Out | | 1 | In | | 2 | MOVING | | 3 | UNPLUGGED | | 4 | UNDEFINED | | 5 | ON\_FAULT | | 6 | OFFLINE | |
| On | Binary | Set:  Turn on |
| Off | Binary | Set:  Turn off |
| Rst | Binary | Set:  Reset |

|  |  |  |
| --- | --- | --- |
| Ilk<n> | <n> 1- 2  BI ENUM | Get/Set:  Interlocks  On VM, they are active when set to 1 and Std is “On\_Fault” |

### Complex screens and slits global EStop

### INJ: 1,2

|  |  |  |
| --- | --- | --- |
| STOP | Binary | Set:  Estop vertical and horizontal axis |

### Complex: Full Controls for Vertical and Horizontal screens and slits

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| STA | ENUM  Note:  Only 0 or 1 used in the VM | Get   |  |  | | --- | --- | | 0 | Ok | | 1 | Trajectory in progress | | 2 | Historical Pos HW Limit | | 3 | Historical Neg HW Limit | | 4 | Index report available | | 5 | Wraparound occurred | | 6 | Excessive position error | | 7 | Temperature fault | | 8 | Motor is off | | 9 | Index input | | 10 | Pos HW limit reached | | 11 | Neg HW limit reached | | 12 | Maths overflow | | 13 | Index error | | 14 | Syntax error | | 15 | Over current | | 16 | Program checksum error | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| RPOS | DOUBLE  mm | Get:   |  |  | | --- | --- | | Home | 0mm | | Vert:  YAG | 41-61mm | | Vert:  SLIT | 92-122mm | | Vert:  RF | 138-158mm | | Horiz:  Mirror | 32-52mm | | Horiz:  50u Slit | 65-85mm | | Horiz:  25u Slit | 90-110mm | | Horiz:  6.3mm hole | 155-135mm | | Horiz:  10mm hole | 140-150mm | |
| MABS | DOUBLE  mm | Set:  Set screen position (See RPOS for options) |

|  |  |  |
| --- | --- | --- |
| STP | BINARY | Set  Stop this axis |
| RST | BINARY | Set  Reset this axis |
| HOM | BINARY | Set  Home this axis |
| PROT01 | BINARY | Get:  Excessive range protection. Set at 160mm for the VM  See also PROTO1 in VMSET/VMGET |
| PROTO2-5 | BINARY | Get/Set:  Placeholders for the protection in VM. All set to Ok  If you set to 1, then the axis will stop |
| RPWLOSS | BINARY | Get/Set:  Placeholders for the protection in VM. All set to Ok.  If set to 1, then the axis will stop |

### Complex: VM only records for placing screens

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| VMSET  VMGET | ENUM  VM Only | Set: VMSET  Get: VMGET  These are VM only records. In VELA/CLARA the complex screen positions are stored in EDM, not as EPICS records. These were added for convenience.  PROTO1 will trip an excessive position error. A RST or HOM will recover from this.   |  |  | | --- | --- | | Home | 0mm | | Vert:  YAG | Send 50mm: 41-61mm | | Vert:  SLIT | Send 100mm: 92-122mm | | Vert:  RF | Send 140mm: 138-158mm | | Horiz:  Mirror | Send 41mm: 32-52mm | | Horiz:  50u Slit | Send 71mm: 65-85mm | | Horiz:  25u Slit | Send 101mm: 90-110mm | | Horiz:  6.3mm hole | Send 121mm 115-135mm | | Horiz:  10mm hole | Send 145mm 140-150mm | | PROT01 | Send to 161mm | |

## Scope

### Scope prefix list

**Wavepro**

|  |
| --- |
| VM-wavepro-01 |
| VM-wavepro-02 |
| VM-wavepro-03 |
| VM-wavepro-04 |

**Wavesufer**

|  |
| --- |
| VM-wavesurfer-01 |
| VM-wavesurfer-02 |
| VM-wavesurfer-03 |
| VM-wavesurfer-04 |

### Suffix list

|  |  |  |
| --- | --- | --- |
| P1-P4 | DOUBLE | Get/Set |
| TIMEBASE | DOUBLE | Get/Set |
| VRANGE | DOUBLE | Get/Set |
| TR1-TR4 | WAVEFORM | GetSet |

## Photo-Injector Laser Shutters

### Laser prefix list

|  |
| --- |
| VM-EBT-LSR-SHUT-01 |
| VM-EBT-LSR-SHUT-02 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sta | ENUM | Get:  Status   |  |  | | --- | --- | | 0 | On | | 1 | Off | | 2 | Moving | |
| On | ENUM | Set: Open  Set: Open   |  |  | | --- | --- | | 0 | OFF | | 1 | ON | |
| Off | ENUM | Set: Close   |  |  | | --- | --- | | 0 | OFF | | 1 | ON | |

### Suffix list

|  |  |  |
| --- | --- | --- |
| Ilk<n> | <n> 1- 4  BI ENUM | Get/Set:  Interlocks  On VM, they are active when set to 1 |

## LLRF-RF

### Prefix list

|  |
| --- |
| VM-EBT-GUN- |

### Suffix list

|  |  |  |
| --- | --- | --- |
| MOM | LONGIN | Set/Get:  Momentum |
| Asset:RD  Asset:WR | LONGIN | Get:RD  Set:WR |
| Phi:RD  Phi:WR | LONGIN | Get:RD  Set: WR |

## DUMMY VARS

### Prefix list

|  |
| --- |
| VM-EBT-INJ-DIA-DUMMY-01 |

### Suffix list

|  |  |  |
| --- | --- | --- |
| DINT1-DINT10 | DOUBLE | Set/Get:  Ten dummy INTS. Note: EPICS records are all doubles (AI/AO records). This is just a naming convention for the user. |
| DDOUBLE1-  DDBOUBLE10 | DOUBLE | Set/Get  Ten dummy DOUBLE |
| DWAVE | WAVEFORM  Size 1000  Double | Set/Get  1000 array dummy waveform |

## To Do:

Randomise X/Y for BPM. What range should that be?

0-9 array B2V. Plan this

Add Camera image

Add pressure, Ion Pumps/Vacuum