Document Type	Report
Document Number	ESS-00000
Date	August 31, 2017
Revision	1
Confidentiality Level	Internal
Page	1 (4)

Chopper EPICS module Documentation

Version 1.0

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List of abbreviations

CEA	Commissariat à l'Énergie Atomique et aux Énergies Alternatives
CSS	Control System Studio
EPICS	Experimental Physics and Industrial Control System
ESS	European Spallation Source
GUI	Graphical User Interface
PV	Process Variable

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1   Scope

This document provides information about the use and control with EPICS of the chopper in the context of the ESS's source at Catania.

2   Context

The `chopper` module have been written to control the timing and the power supply dedicated. This document provides an overview of the module structure and explain the purpose of its signals.

3   Interface Description

3.1.1   Timing

The chopper need another pulse synchronized with the pulse of the source. Then a second **pulser** has been created synchronized on the same event as the pulse source. This configuration is directly done in the startup script on the VME source.

```
# Pulser dedicated to the Chopper
dbLoadRecords("evr-pulserMap.template", "DEVICE=$(EVR), SYS=$(SYS), EVT=$(EVENT_14HZ),
PID=1, F=Trig, ID=1")
```

3.1.2   Power supply

The power supply is controlled by **Ethercat** modules. The database is loaded by the startup script of LEBT.

EQPT	DEVICE NAME	AREA	SIGNALS	DEVICE	CHANNEL
Set voltage of the PS (Chopper)	LNS-LEBT-010:BMD-Chop	gnd	VolS	ES4104	Chan 1
Read voltage of the PS (Chopper)	LNS-LEBT-010:BMD-Chop	gnd	VolR	ES3164	Chan 1
Read current of the PS (Chopper)	LNS-LEBT-010:BMD-Chop	gnd	CurR	ES3164	Chan 2

Each command is prefixed with macros to setup section and device name. Those macros are replaced with values present in the `.substitutions` files.

```
######################## SETTING Volt: OUTPUT ANA 0-10V
#######################################
file ecat2el41xx.template
{
        pattern {PREFIX,CH_ID, SLAVE_IDX,PDO_IDX, EOFF, ESLO, DRVL, DRVH, PREC,EGU}
                {"LNS-LEBT-010:BMD-Chop","VolS", 4 ,2, 0,0.0003051850947599719, 0,
10,2,"kV"}
}

######################## MEASURE Volt and Curent: INPUT ANA 0-10V
#######################################
file ecat2el316x.template
{
pattern {PREFIX,CH_ID, SLAVE_IDX, PDO_IDX,EGU,ESLO,EOFF}
        {"LNS-LEBT-010:BMD-Chop","VolR",3 ,2, "kV", 0.0003051850947599719,"0"}
        {"LNS-LEBT-010:BMD-Chop","CurR",3 ,3, "mA", 0.0003051850947599719,"0"}
}
```

4 Manual

4.1 IOC Configuration

A startup file looks like this:

```
require chopper, 1.0.0
require mrfioc2,2.7.13-ESS0
require pev,0.1.2

#dbLoadRecords("chopper.db")

############################################################
################### Configuration Timing ###################
############################################################
epicsEnvSet("SYS"           "LNS-ISRC-010")
epicsEnvSet("EVENT_14HZ"    "14")

################### Configuration EVG ###################
epicsEnvSet("EVG"           "EVG")
epicsEnvSet("EVG_VMESLOT"   "2")

mrmEvgSetupVME($(EVG), $(EVG_VMESLOT), 0x100000, 1, 0x01)

dbLoadRecords("evg-vme-230.db", "DEVICE=$(EVG), SYS=$(SYS), EvtClk-FracSynFreq-
SP=88.0525, TrigEvt0-EvtCode-SP=$(EVENT_14HZ), Mxc1-Frequency-SP=14, Mxc1-TrigSrc0-
SP=1")

mrmEvgSoftTime("$(EVG)")

################### Configuration EVR ###################
epicsEnvSet("EVR"           "EVR0")
epicsEnvSet("EVR_VMESLOT"   "5")

mrmEvrSetupVME($(EVR), $(EVR_VMESLOT), 0x3000000, 5, 0x026)

dbLoadRecords("evr-vme-230.db", "DEVICE=$(EVR), SYS=$(SYS), Link-Clk-SP=88.0525,
FrontOut0-Src-SP=0, FrontOut0-Ena-SP=1, FrontUnivOut0-Src-SP=0, FrontUnivOut0-Ena-SP=1,
Pul0-Prescaler-SP=77, Pul0-Width-SP=20000, Pul0-Delay-SP=0, Pul1-Prescaler-SP=77,
FrontOut1-Src-SP=1, FrontOut1-Ena-SP=1, Pul1-Prescaler-SP=77, Pul1-Width-SP=10000,
Pul1-Delay-SP=0")
```

4.2   User interface

$(*SYS*):$(*EVR*):Pul0-Width-SP

$(*SYS*):$(*EVR*):Pul0-Delay-SP

$(*SYS*):$(*EVR*):Pul1-Width-SP

$(*SYS*):$(*EVR*):Pul1-Delay-SP

$(*PREFIX*):PowerChopperSystemOK

$(*PREFIX*):ChoppingVoltageAlarm

$(*PREFIX*):Chopper_CMD

$(*PREFIX*):VolS

$(*PREFIX*):VolR

$(*PREFIX*):CurR