

SETUP AND DIAGNOSTICS OF MOTION CONTROL AT ANKA BEAM LINES

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Introduction

The precise motion control in high resolution is one of the necessary conditions for making high quality measurements at beam line experiments. At a common ANKA beam line, up to one hundred actuator axes are working together to align and shape beam, to select beam Energy and to position probes. Some experiments need additional motion axes supported by transportable controllers plugged temporary to a local beam line control system.

In terms of process control all the analogue and digital signals from different sources have to be verified, levelled and interfaced to the motion controllers. They have to be matched and calibrated in the control systems configuration file to physical quantities which give the input for further data processing. A set of hard- and software tools and methods developed at ANKA over the years are presented.

THE MOTION CONTROL SETUP AT ANKA BEAMLINES

ANKA DESIGN GUIDELINES

- The manufacturer/supplier should clearly state the proposed scope of supply for the control system and associated electronics. The beam line control software concept will be provided by ANKA-IT.
- Network Interfaces are preferred for beam lines but alternatively an ANKA-standard hardware Interface is accepted.
- The motion beam line components, use VME-bus as well as various bus protocols working over Ethernet TCP/IP.
- For the system realisation, a Tango interface is preferred, a hardware Interface is accepted. In case of OEM interface all the libraries and component software drivers for setting up motion control should be documented and supplied to ANKA-IT.

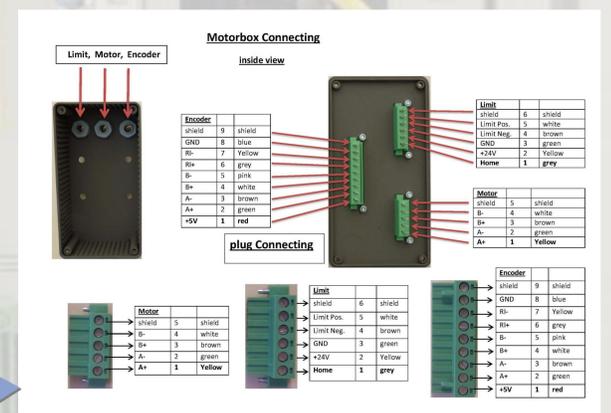
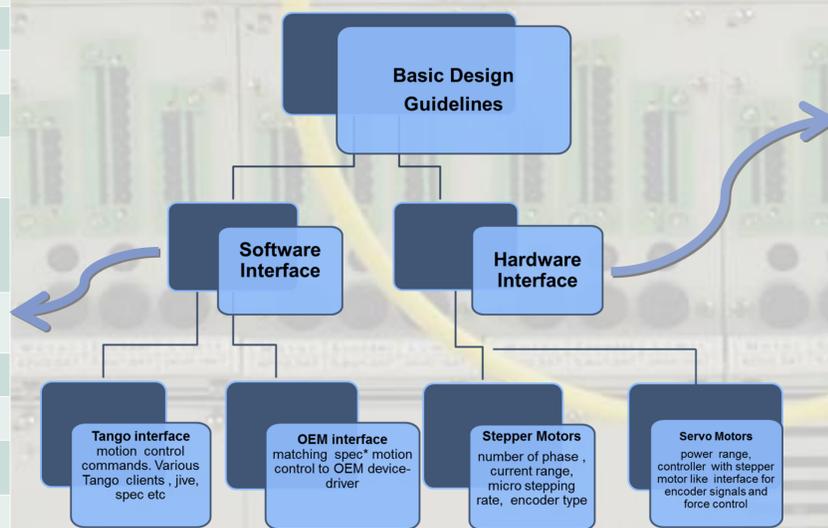


ANKA MOTION CONTROL TEST SYSTEM

- The newest version of ANKA-compact motor test system with display and stand-alone operator pulse control for direct motor drive, which is used for verification of component compatibility to ANKA-Soft and hardware specific interfaces. It is completed by necessary power supplies for two motors, all the limit switches and encoder, has two booster stages and Ethernet connection for control PC/Laptop.
- The set includes a test stepper motor with limit/reference simulation buttons and an rotary encoder.

Argument	Input	Output	Tango Name	Description
DEV_VOID	DEV_VOID	DEV_VOID	Init	initialize motor
DEV_VOID	DEV_VOID	DEV_VOID	Forward	move motor + to limit switch
DEV_VOID	DEV_VOID	DEV_VOID	Backward	move motor - to limit switch
DEV_VOID	DEV_VOID	DEV_VOID	MotorON	init motor driver
DEV_VOID	DEV_VOID	DEV_VOID	MotorOFF	switch off motor driver
DEV_DOUBL	DEV_VOID	DEV_VOID	DefinePosition	new position in encoder units(dial)
DEV_DOUBL	DEV_VOID	DEV_VOID	ComputerNewOffset	's' position user, user-dial deviation, is calculated
DEV_DOUBL	DEV_VOID	DEV_VOID	MoveRefPosition	move position in user coordinates
DEV_VOID	DEV_VOID	DEV_VOID	Stop	stop motor
DEV_VOID	DEV_VOID	DEV_VOID	InitializeReferencePosition	starts homing
DEV_VOID	CONST_DEV_STRING	status string	status string	status string
DEV_VOID	DEV_STATE	status integer	status integer	status integer

Read/Write	Comment	Attribute Name	Tango Datatype
R/W	setpoint in abs. user-dial coordinates, readback is effective position	position	DEV_DOUBLE
R/W	component speed in Units /sec.	velocity	DEV_DOUBLE
R/W	user-dial offset relative to system dial coordinates(s_cmd, ComputeNewOffset)	Offset	DEV_DOUBLE
R	motor in(-) limit switch position	backwardLimitSwitch	DEV_BOOLEAN
R	motor in(+) limit switch position	forwardLimitSwitch	DEV_BOOLEAN



DESIGN REPORT

- A Tango Interface should be described by the manufacturer in his design report. In addition the all system parameters for setup of the motor configuration are needed. During the Factory Acceptance Test (FAT) Tango attributes and system parameters are verified by measurement.
- Network Interfaces are preferred for beam lines but alternatively an ANKA-standard hard-ware Interface Signal Conditioning Terminal Box is accepted. Before setting up a beam line component the manufacturer is supplied by ANKA with SCBTs for installation.

SETUP OF MOTION CONTROL AT ANKA BEAMLINES

- After mechanical installation by supplier/manufacturer at the beam line, the component is plugged to the SCBTs and connected to the local beam line PC and is now working plug and play compatible. If necessary a fine tuning of the motion control of a component can now be done when it is embedded in the local beam line controller configuration.

OUTLOOK

The introduction of standardized soft- and hardware interface in connection with the ANKA motion control test system reduce the effort for beam line motion control diagnostics rigorously. The commissioning of motion control of a complex new beamline can be done in a much shorter period. The test system should be the base for a future expert system to automatise setup of multi axes beam line motion control.