



ARGOS

Dichroic and auxiliary control unit

Doc. No.	CAN 652g950
Issue	A
Date	2014/01/10

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Released	N. Surname	yyyy/mm/dd
	Name	Date

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Change Record

Issue	Date	Section/ Paragraph Affected	Reasons / Remarks	Name
A	2013/01/24	all	created	Ziegleder

1 Scope

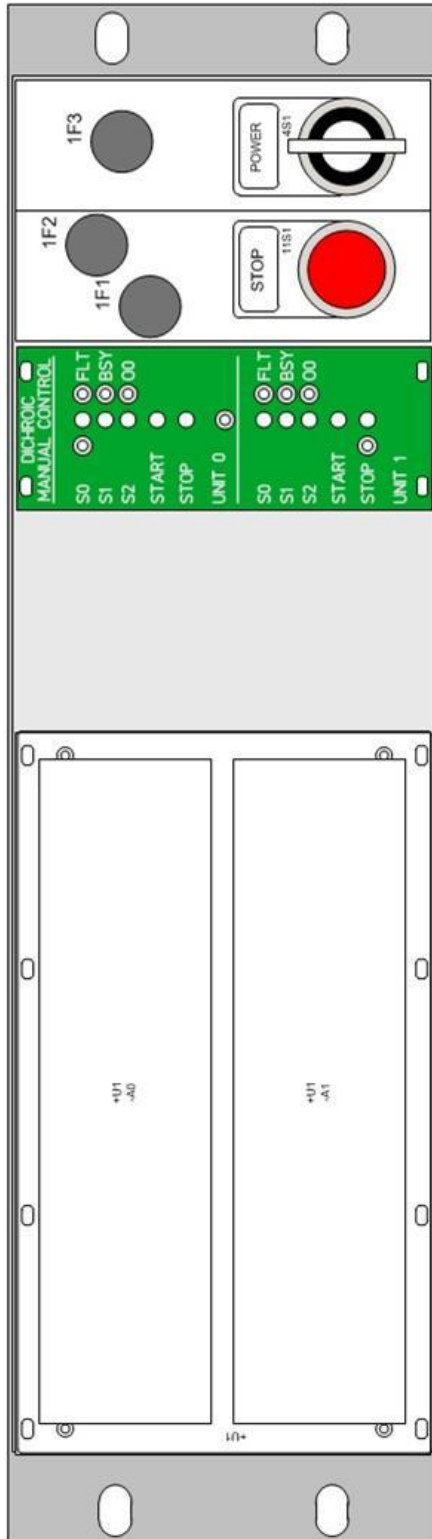
This document describes the usage of the Dichroic and auxiliary control unit.

2 Applicable documents

See the following documents for further details:

No.	Title	CAN number
AD 1	Dichroic, LED & Aux. Control	652g910a
AD 2	Commercial Manual BME Pockels Cell Driver PCD_dpp2v	652g940a
AD 3	Commercial Manual W&T Web-IO Digital #57637, #57630M	650g830a
AD 4	MPE Diode Current Source DSQ3K User Manual	650g840a
AD 5	Commercial Manual Kniel CPA 24.5 Primary Switched Power Supply 19"/3U 120W	650g824a
AD 6	Commercial Manual Schaffner General Purpose EMI Filter FN 2030	650g822a
AD 7	Commercial Manual Moxa NPort 5100 Series User's Manual, Seventh Edition, April 2013	650g829a
AD 8	Dichroic Manual control PCB and schematics	652g912a
AD 9	Dichroic Manual control front panel	652g913a
AD 10	Commercial Manual RTA X-MIND K Series Instruction Manual	652g915a
AD 11	Commercial Manual RTA X-MIND K Series Programmer's Manual	652g916a
AD 12	ARGOS DICHROIC ASSEMBLY DESIGN DESCRIPTION 3.0 2013-02-22	M130218 LBT-ARG
AD 13		
AD 14		
AD 15		
AD 16		
AD 17		

3 Front panel



Dichroic controllers

The upper controller is used to drive the Dichroic linear drive, the lower one is used to turn the mirror drive.

Dichroic manual control.

The upper part controls controller 0 (DICHROIC DRV.), the lower part controls controller 1 (MIRROR DRIVE)

Use S0..2 to select a program. The switches represent a binary number. Left position is 0, right 1.
 FLT: Fault (default on)
 BSY: Busy
 O0: Output 0 status

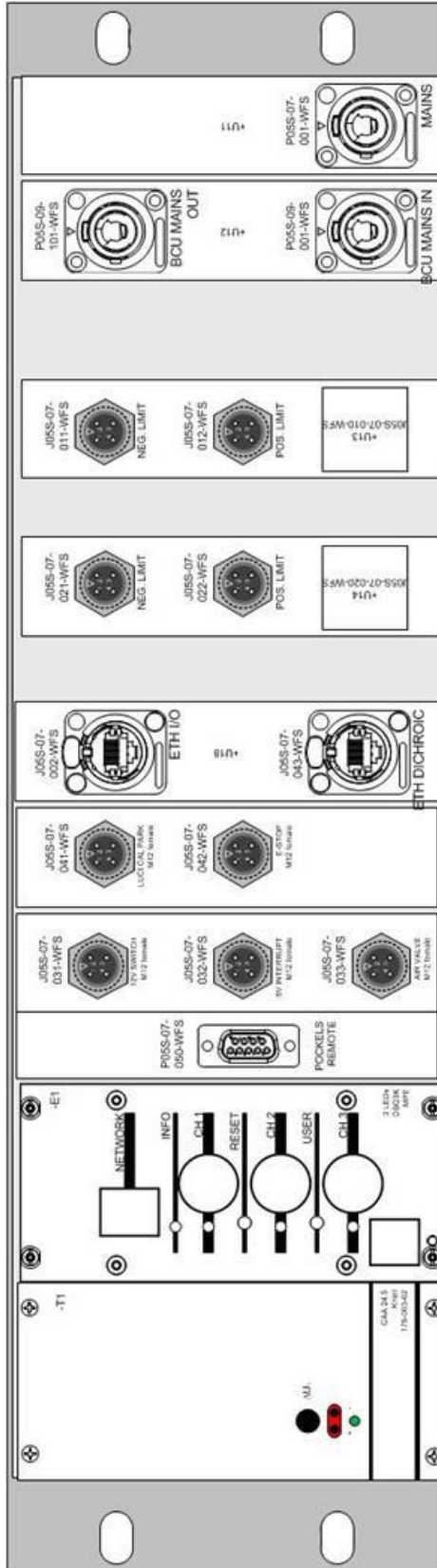
Motor fuse and stop switch.

The fuses protect line and neutral power connection of the motor controllers. The stop switch causes an emergency stop of the motor controllers. The motors will stop immediately and hold by the hold current.

Power switch.

This switches on the unit. The switch is illuminated when power is on. If not, check the fuse above the switch.

4 Rear side



- 24V power supply
- DSQ3K LED Light source
- Pockels cell remote interface
- Control patrol camera 12V switch in the MoCon
- Control signal for the THOR power reset in the MoCon
- switched 24V for air valve
- Ethernet connectors
 - Digital I/O
 - Motor controllers
- Mirror drive connectors.
 - Negative limit switch
 - positive limit switch
 - motor power connector
- Dichroic drive connectors.
 - Negative limit switch
 - positive limit switch
 - motor power connector
- BCU power reset. Connection between IN and OUT can be remotely interrupted.
- Mains in

5 The dichroic motor controller

Two RTA X-Mind B4 are used to operate the dichroic linear drive and the mirror rotational drive. The controllers are remotely accessible by a serial device server, where both controllers are connected in daisy chain. A control panel is foreseen for manual operation without a remote computer.

Interlocks / emergency stop

The dichroic drive system interferes with the LUCI calibration source. To avoid damages both systems provide interlock signals to block the other system while itself is not in a safe parking position. It is not possible to move the dichroic while the LUCI calibration source is in front of LUCI and the other way round.

The dichroic controllers get an emergency stop signal when the LUCI calibration source leaves its parking position. This prevents the dichroic motor controller from executing any motion command and blocks the motors by turning on the holding current.

In total there are three emergency stop hardware sources in a line:

1. LUCI Calibration interlock.
2. optional external E-stop signal
3. big red stop button on the controller subrack.

The status of the external sources can be monitored by the subrack internal digital I/O. The internal signal, the big red stop button, is monitored by the controllers itself. See below for further details.

5.1 Manual operation



SO, S1, S2

To start a stored program the user must first select using SO, S1, S2 (inputs SEL0..2) the memory cell containing the first instruction of the sequence and then he has to activate “Start” that starts the program execution. The relationship between memory cells and S, S1, S2, S3 status is showed below. The controller will execute a dedicated memory cell, which is programmed with a jump command to the relating program. See 652g916a for further details.

Use the S0..2 switches for the selection of one of 8 programs that can be activated through the start switch. The switches are binary coded.

	0 / Off
	1 / On

Memory cell relationship:

100	101	102	103	104	105	106	107

Use the Start knob to start the execution of a program (input ST) and the Stop knob to stop it (input ES).

Status LEDs:

FLT: Fault. Red when no error occurred, off if an error occurred.

BSY: Busy. Green while a program is executed.

O0: Output 0. Status is program defined and can be used for user feedback.

Big red STOP button

The big red STOP button triggers an emergency stop of the motors (input EE). The motors will stop immediately and will be hold by the holding current. After releasing the button the holding current will remain activated.

5.2 Remote operation

Both motor controllers are connected to a serial device server, they are daisy chained on a RS485 port. The controllers have different addresses (0: dichroic linear drive, 1: mirror rotational drive).

The X-MIND K series drives have a baud rate of 9600 (half duplex). Every transmitted single element of a string (corresponding to an ASCII character) is composed by ten bits: one start bit, eight bit of the ASCII code and stop bit. There is no parity bit. Line termination character is carriage return (CR, \r, 0x0D; ascii CODE 13).

See 652g916a for further details.

Digital I/O

The status outputs of the controllers and external interlock signals are monitored by the subrack's digital I/O.

Input	Name	Comment
I0	LUCI CAL	Reports if the LUCI calibration source is in park position (1/on) or not (0/off). Motors are blocked if the calibration source is not parked.
I1	E-STOP	Reports the status of the optional external emergency stop signal. Motors are blocked if the signal is 0/off and released if 1/on.

Recommended high level software command set

All motion control instructions are stored as programmes in the controller's memory. The high level software should only start and stop these programmes, send data requests, receive answers and confirmation messages.

The status outputs of the controllers are monitored by the subrack's Web I/O. During program execution (Busy signal on) the controller does not answer any requests. Only the free run stop and emergency stop commands will be received. By reading the busy signal the high level software knows when the controller is ready to receive and execute commands.

The controller moves the motor unit if it reaches a limit switches. The negative limit switch is connected to input I0, the positive one is connected to I1. Logic is normally closed, the controller reports a 0/off when a switch is active and 1/on if the switch is not activated. E.g. I1=0 means the drive has reached the positive limit switch.

Programm execution

Code	Name in RTA manual	Description
PS	4.2.5 Stored instruction execution	Execution of a stored instruction.
ES	4.2.7 Free run stop	Stop the execution of a free run instruction.
EE	4.2.6 Emergency stop	Stop the execution of any instruction or command, immediate block of any program running.

Hardware status

Code	Name in RTA manual	Description
QA	4.3.1 Absolute position request	Request of steps counter content
QI	4.3.3 Hardware input status request	Request hardware input status. ST, ES, EE, I0, I1, S0..2 are used.
QO	4.3.4 Hardware output status request	Request hardware output status, O0 is used on manual control panel.

Configuration requests

RTA manual: 4.3.2 Preset value request, code QS.

Parameter	Name in RTA manual	Description
IN	Set current	Request set current
RS	Operation mode (resolution)	Steps/rev setting
EQ	Equalization selection	Torque boost mode

Confirmation messages

AA = drive address

AA Y: Command was executed

AA N: Command was not executed

No confirmation: Drive is not responding because it's busy or offline.

See 652g916a, chapter 4.4 for further details.

Examples

// Check negative limit switch status:

00QI,I0 ↵

→00QI,I0,0 ↵

// Check positive limit switch status:

00QI,I1 ↵

→00QI,I1,1 ↵

// Drive dichroic slide motor in positive direction, until it reaches the limit switch. This is a program which

// has to be stored on the controller.

00PS,100 ↵

→00Y ↵

// Drive mirror rotation motor in negative direction, until it reaches the limit switch. This is a program which // has to be stored on the controller.

01PS,101 ↵

→01Y ↵

6 Pockels remote control

The subrack internal digital I/O is used to control the pockels cell power supply.

See 652g940a for further details.

Input/Output	Name	Comment
I3	HV ERROR	Reports if the high voltage was turned off due to an error.
O4	HV RESET	Reset the HV error and restart the HV.
O3	HV ON	Turn on and off the high voltage. This is the most important user interface.

7 Auxiliary remote control

The subrack internal digital I/O is used to control several auxiliary devices.

Output	Name	Comment
O0	BCU RESET	Turn off the BCU's power supply to reset it.
O1	12V SWITCH	Turn on and off the patrol cameras
O2	5V INTERRUPT	Turn off the THOR's power supply to reset it.
O5	AIR VALVE	Turn on and off the air valve.

8 Digital I/O summary

A W&T digital I/O is used for controlling and monitoring the controller subrack.

Output	Name	Comment
O0	BCU RESET	Turn off the BCU's power supply to reset it.
O1	12V SWITCH	Turn on and off the patrol cameras
O2	5V INTERRUPT	Turn off the THOR's power supply to reset it.
O3	HV ON	Turn on and off the high voltage. This is the most important user interface.
O4	HV RESET	Reset the HV error and restart the HV.
O5	AIR VALVE	Turn on and off the air valve.

Input	Name	Comment
I0	LUCI CAL	Reports if the LUCI calibration source is in park position (1/on) or not (0/off). Motors are blocked if the calibration source is not parked.
I1	E-STOP	Reports the status of the optional external emergency stop signal. Motors are blocked if the signal is 0/off and released if 1/on.
I3	HV ERROR	Reports if the high voltage was turned off due to an error.
I6	FAULT 0	1/on when no error occurred, 0/off if an error occurred. Related to controller 0, dichroic linear drive.
I7	BUSY 0	1/on while a program is executed. Controller is responsive when 0/off. Related to controller 0, dichroic linear drive.
I8	O0 0	Output 0. Status is program defined and can be used for user feedback. Related to controller 0, dichroic linear drive.
I9	FAULT 1	1/on when no error occurred, 0/off if an error occurred. Related to controller 1, mirror rotational drive.
I10	BUSY 1	1/on while a program is executed. Controller is responsive when 0/off. Related to controller 1, mirror rotational drive.
I11	O0 1	Output 0. Status is program defined and can be used for user feedback. Related to controller 1, mirror rotational drive.

List of acronyms

:-)	A smiley-face emoticon
BCU	Basic Computational Unit
BME	Bergmann Messgeräte Entwicklung
BSY	BuSY
CAN	Church of All Nations
CRE	C-ring extension
DX	Right telescope, seen from gallery
E-Stop	Emergency stop
FLT	FauLT
HV	High Voltage
INAF	Institute of Nutraceuticals and Functional Foods
INAF	Istituto Nazionale di Astrofisica (Italian: National Institute for Astrophysics)
LBT	Lesbian Bisexual Transgender
LLP	Laser launch platform, upper ARGOS platform
LSP	Laser supply platform , lower ARGOS platform
LUCI	The instrument formerly known as LUCIFER
LUCIFER	LBT Near Infrared Spectroscopic Utility with Camera and Integral Field Unit for Extragalactic Research
MPE	Max Planck Institut für extraterrestrische Physik
MPIA	Ministry of Pacific Island Affairs
MPIA	Max Planck Institute for Astronomy
SX	Left telescope, seen from gallery
V	Voltage
WFS	wavefront sensor

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Doc_info_start
Title: Dichroic and auxiliary control unit
Document Type: *Technical Manual*
Source: MPE
Issued by: *J. Ziegleder*
Date_of_Issue: 2014/01/10
Revised by:
Date_of_Revision:
Checked by:
Date_of_Check:
Accepted by:
Date_of_Acceptance:
Released by:
Date_of_Release:
File Type: MS Word
Local Name: Dichroic and auxiliary control unit
Category:
Sub-Category: Assembly: 652
Sub-Assembly:
Part Name:
CAN Designation: 652g950
Revision: A
Doc_info_end