Physik-Institut



DAMIC-M Dark Matter In CCDs at Modane

DCS Manual DAMIC-M Safety System (04 March 2022)

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DCS Manual

1 System Overview

1.1 Structure

The safety part of the DAMIC-M DCS system includes a PLC and various sensors and actuators. This guarantees the safety of the experiment by shutting down parts of the system in the event of a fault. An extension of the system is possible at any time due to the flexible design.



To ensure a reliable operation the DCS system should be buffered by the UPS. This guarantees a proper data logging even when the system is not reachable over Ethernet.

The DCS can be controlled with the touch display and over the Modbus interface.

1.2 DCS Controller

The DCS Controller can be mounted in a 19 in Rack. It is important that there is some free space under the controller, as the air is sucked in from below.



1	Status Lamp	20	Temp. Controller		Dual Gauge Controller
2	USB Port (cRIO)	21	UPS Dry Contracts	31	Turbo Pump
3	Ethernet Port (cRIO)	22	PT100 Channel A	32	Interlock PSU 1
4	Touch Display	23	PT100 Channel B	33	Interlock PSU 2
10	Power In (230V / 10A)	24	PT100 Channel C	34	Interlock Vsub 1
11	Power Out (230V / 6A)	25	PT100 Channel D	35	Interlock Vsub 2
				36	Cryo Power Alarm

1.3 Structure and wiring

The DCS controller is separated in three parts – the power part, the controller part and the I/O part. The cooling with the fan is made that the controller and the power supply has an optimal cooling. The following picture shows the internals of the DCS controller.



2 Firmware

2.1 Action Matrix

2.1.1 Introduction

The safety system of DAMIC-M monitors and controls all sensors and actuators and publishes the values via Modbus and the Webpage. The safety relevant parts are running in the FPGA of the cRIO. That means that the system safe even when the cRIO controller crashes.

The alerts inform in a first step the user, that there is a problem in the safety system. The user has than a defined time to react and solve the problem if possible. After this time, the alert is locked and reaction is triggered to prevent damages on the CCD sensors.

After an alarm has triggered and the problem is solved, the user can reset the alarm message by set the acknowledge flag over Modbus. The acknowledge flags should only be reset manually to guarantee, that the problem is understood and solved bevor the experiment is switched on again.

All thresholds values and safety mechanisms are programmed in the FPGA of the cRIO. If there is any need to change safety parts, the FPGA program must be adapted and recompiled.

2.1.2 Act	ion List
-----------	----------

No	Action Parameter	Parameter	State / Value						
		OutletEnable	FALSE						
	DisableSys_action	InterlockPSU	FALSE						
1		InterlockVSUB	FALSE						
	System disable mode: All CCD power supplies and the DCS power outlets are switched off.								

2.1.3 Alert List

No	Sensor Reference	Persistency Threshold	Trigger	Condition	Condition	Alarm Reference	Delay	Action Reference	
	VacPump_mBar	1E-5 mBar	TOO HIGH	AND		VacPress_alert	10 s	_	
1	CcdPwrEn	1 s	TRUE						
	If the isolation vacuum gets bad the power of the CCD sensors will be switched off. Cause the vacuum gauge on the chamber will be disabled during the operation only the gauge near the turbo pump will be used for this alert.								
	TempTC1_K	80 K – 170 K	OUT OF RANGE	2		QUE CryoTemp_alert			
	TempTC2_K	80 K – 170 K	OUT OF RANGE	ΛI			10 s		
	TempChA_K	80 K – 170 K	OUT OF RANGE						
2	TempChB_K	80 K – 170 K	OUT OF RANGE	1	AND			-	
	TempChC_K	80 K – 170 K	OUT OF RANGE	ΛI					
	TempChD_K	80 K – 170 K	OUT OF RANGE						
	CcdPwrEn	1 s	TRUE	-					
	If the cold head is to warm or sensitive the alert will only b	a temperature sen e triggered when b	sor is disconn ooth 'temperat	iected, t ure con	he syst trolled	em will be shut down in case the C ' and one direct connected sensor i	CCD sensors a s out of range.	re powered. For not to be too	

No	Sensor Reference	Persistency Threshold	Trigger	Condition		Condition		Alarm Reference	Delay	Action Reference
	PumpSpeed_%	80 %	TOO LOW	OR	D					
2	TurboPumpAl	-	TRUE		AN	TurboPump_alert	10 s	DisableSys_action		
3	CcdPwrEn	1 s	TRUE	-						
	If the speed of the turbo pump sinks too low or if the pump controller detects any fault an alert will be activated.									
	CryoPwrAl	-	TRUE			CryoPower_alert	10 s	-		
4	CcdPwrEn	1 s	TRUE	AND						
	If the power supply for the cryo cooler returns an error message, an alert is generated.									
F	UpsFault	-	TRUE	-	-	UpsFault_alert	10 s	-		
5	If any UPS fault, self test failure, or overload occurs, an alert is generated.									
(UpsLowBat	-	TRUE	-	-	UpsLowBat_alert	10 s	-		
6	If the battery of the UPS reached a low level (configuration parameter in the UPS), an alert is generated.									
	TempTC1_K	Max - Min	TOO			Tama Chal alart	10 -			
7	TempTC2_K	> 2 K	HIGH	-	-	TempCtri_alert	10 \$	-		
	If the temperature difference between the two sensors is too large, there is a fault at the cold head and an alert is generated.									
0	LogfileAl	0 s	TRUE	-	-	Logfile_alert	70 s	-		
7	If the logfile could not be writ	tten								

2.2 Modbus Interface

2.2.1 Introduction

The communication to the DAMIC-M DCS system is made by the Modbus TCP protocol. The internal touch panel connects to this interface but also the slow control server and other devices can communicate over the same interface.

The analog values can only be represented as an INT16 value on the Modbus interface. For this reason, the analog values are scaled with different factors.

The Modbus registers can be changed over different Modbus masters an also directly over LabView. This means that the output registers must be read back because the state can change.

2.2.2 Modbus Setup

The Modbus interface has only a few parameters. The default settings for the interface are used:

Protocoll: TCP, Port: 502 Mode: Slave

2.2.3 Analog Inputs (10)

ID	Code	Addr	r/w	Variable	Scale	Туре	Description
01	03	0000	r	VacPump_mBar	10^(x/3000)	int16	HOLDING
01	03	0001	r	VacVessel_mBar	10^(x/3000)	int16	HOLDING
01	03	0002	r	TempTC1_K	1:100	uint16	HOLDING
01	03	0003	r	TempTC2_K	1:100	uint16	HOLDING
01	03	0004	r	PumpSpeed_%	1:100	uint16	HOLDING
01	03	0040	r	TempChA_K	1:100	uint16	HOLDING
01	03	0041	r	TempChB_K	1:100	uint16	HOLDING
01	03	0042	r	TempChC_K	1:100	uint16	HOLDING
01	03	0043	r	TempChD_K	1:100	uint16	HOLDING
01	03	0060	r	TempRIO_C	1:100	uint16	HOLDING
01	03	0061	r	CpuLoadTotal_%	1:100	uint16	HOLDING
01	03	0062	r	CpuLoadMain_%	1:100	uint16	HOLDING

2.2.4 Digital Inputs (6)

ID	Code	Addr	r/w	Variable	Description
01	01	0200	r	UpsOnBat	COIL
01	01	0201	r	UpsLowBat	COIL
01	01	0202	r	UpsBypass	COIL
01	01	0203	r	UpsFault	COIL
01	01	0204	r	CryoPwrAl	COIL
01	01	0205	r	TurboPumpAl	COIL

2.3 Digital Outputs (1)

ID	Code	Addr	r/w	Variable	Description
01	01/05	0300	r/w	CcdPwrEn	COIL

2.4 Alert Flags (8)

ID	Code	Addr	r/w	Variable	Description
01	01	0800	r	VacPress_alert	COIL
01	01	0801	r	CryoTemp_alert	COIL
01	01	0802	r	TurboPump_alert	COIL
01	01	0803	r	CryoPower_alert	COIL
01	01	0804	r	UpsFault_alert	COIL
01	01	0805	r	UpsLowBat_alert	COIL
01	01	0806	r	ColdHead_alert	COIL
01	01	0807	r	ColdBlock_alert	COIL

2.4.1 Alert Acknowledge Flags (8)

ID	Code	Addr	r/w	Variable	Description
01	05	0850	w	VacPress_alert_ack	COIL
01	05	0851	w	CryoTemp_alert_ack	COIL
01	05	0852	w	TurboPump_alert_ack	COIL
01	05	0853	w	CryoPower_alert_ack	COIL
01	05	0854	w	UpsFault_alert	COIL
01	05	0855	w	UpsLowBat_alert	COIL

ID	Code	Addr	r/w	Variable	Description
01	05	0856	w	ColdHead_alert	COIL
01	05	0857	W	ColdBlock_alert	COIL

2.4.2 Actions (2)

ID	Code	Addr	r/w	Variable	Description
01	01	0840	r	DisableCCD_action	COIL
01	01	0841	r	DisableSys_action	COIL

2.4.3 Firmware Version (10)

ID	Code	Addr	r/w	Variable	Description
01	03	0910	r	FirmwareFPGA_high	HOLDING
01	03	0911	r	FirmwareFPGA_low	HOLDING
01	03	0912	r	FirmwareFPGA_day	HOLDING
01	03	0913	r	FirmwareFPGA_month	HOLDING
01	03	0914	r	FirmwareFPGA_year	HOLDING
01	03	0915	r	FirmwareRIO_high	HOLDING
01	03	0916	r	FirmwareRIO_low	HOLDING
01	03	0917	r	FirmwareRIO_day	HOLDING
01	03	0918	r	FirmwareRIO_month	HOLDING
01	03	0919	r	FirmwareRIO_year	HOLDING

2.4.4 IP-Address (12)

ID	Code	Addr	r/w	Variable	Description
01	03	0920	r	IpAddressA-1	HOLDING
01	03	0921	r	IpAddressA-2	HOLDING
01	03	0922	r	IpAddressA-3	HOLDING
01	03	0923	r	IpAddressA-4	HOLDING
01	03	0924	r	IpAddressB-1	HOLDING
01	03	0925	r	IpAddressB-2	HOLDING
01	03	0926	r	IpAddressB-3	HOLDING

ID	Code	Addr	r/w	Variable	Description
01	03	0927	r	IpAddressB-4	HOLDING
01	03	0928	r	IpAddressC-1	HOLDING
01	03	0929	r	IpAddressC-2	HOLDING
01	03	0930	r	IpAddressC-3	HOLDING
01	03	0931	r	IpAddressC-4	HOLDING

2.4.5 Miscellaneous

ID	Code	Addr	r/w	Variable	Description
01	03	0900	r	OperatingDays	HOLDING
01	03	0901	r	CheckByte (0x55AA)	HOLDING
01	03	0902	r	ModbusCon	HOLDING

2.5 cRIO Firmware Compilation & Download

2.6 Basics

The Firmware is programmed with LabView20 and runs on a cRIO-9045 controller. All safety relevant parts are running in the FPGA and the rest on the RT-controller part of the cRIO. For that reason, the firmware is also split in two different parts.

To compile and download the cRIO firmware, following LabVIEW parts must be installed in minimum:

- 1. LabVIEW 2020 (32-bit)
- 2. LabVIEW 2020 FPGA Module
- 3. NI System Configuration
- 4. NI-RIO Driver

2.6.2 Configuration

- 1. Open the LabVIEW Project file "DCS.lvproj"
- 2. Open the 'Properties' menu of the cRIO device
- Set the IP-address of the cRIO under the category 'General'. The IP-address is shown on the touch panel in front of the DCS. Please be aware that the computer and the DCS must be in the same Ethernet network.

DCS.lvproj - Proj	ect Explorer 🛛 🗆	×	Rea	I-Time CompactBIO Pror	erties	
File Edit View P	roject Operate Tools Windo	w He		i inite compactivo i iop	, critics	
* <u>`</u> 🔁 🎒 X	🛍 🛍 🗙 📗 📽 🖌 🛄 🕶	f 🚹	Cate	gory ral	^	G
Items Files			VI Se	litional Disable Symbols rver		Name
🖃 👪 Project: DCS	lvproj	^	Web	Server		NI-cRIO-9045-01E14BCB
	puter /C.vi		User	Access Environment		IP Address / DNS Name
🕀 😵 Depen	dencies		Misc	ellaneous		130.60.164.182
🗄 🖮 🊵 Build S	Specifications		Math	Script: Search Paths		
in in crios	New	•	Scan	Engine		Allow development for this target with ember
🕂 🌆 Cha:	Add	•				
🩆 R	Connect					
🖻 📴 F	Disconnect					
l ±5_	Utilities	<u> </u>				
₽	Deploy					
	Deploy All					
_	Disable Autodeploy Variables					
_	Find Project Items					
	Arrange By	•				
	Expand All					
	Collapse All					
	Remove from Project					
	Rename	F2			~	
	Help					
	Properties					

4. Connect LabVIEW to the cRIO to check the configuration. If successful, the green dot from the NI-cRIO-9045 symbol is lighting up.

If this fails, check if the IP-address on the DCS touch panel under INFO matches the configuration in LabVIEW. You can also try to open the cRIO configuration page. The link is shown on the DCS touch panel under INFO.



2.6.3 Compilation

1. Open the "DCS_FPGA.vi" file

2. Select "Build" under "Chassis -> FPGA Target -> Build Specifications -> DCS_FPGA"

DCS.lvproj - Project D	DCS_FPGA.vi Front Panel on DCS.lvproj/FPGA Target	- 🗆 ×
File Edit View Project Operate Tools V	Vind File Edit View Project Operate Tools Window Help	FPGA
*1 🗃 🗿 🗴 🗈 🕒 🗙 💕 尾 🖸	🛿 🔹 🔿 🛞 🕘 🛛 15pt Application Font 🔹 🏣 🖬 🖬 📽 🌼 🕬	
File Edit View Project Operate Tools A Items Files Items Files Items Files Items Files Files Items Files Items Files Items Files Items For Chassis (cRIO-9045) Items Files Items Files Items For Chassis (cRIO-9045) Items Chassis I/O Items Files File	Vind File Edit View Project Operate Tools Window Help Image: Serie of Control Image: Serie	VacPress_alert CryoTemp_alert TurboPump_alert CryoPower_alert UpsFault_alert UpsFault_alert TempCtrl_alert DecCD_action bleCCD_action
🕂 🤹 Web Check Sig	nature	
Build Specifications	Physik-Institut / University of Zurich / 8057 Zurich	~
Display Co	Target <	>
Download		
Duplicate		
Remove fr	om Project	
Properties		

3. A window with the compilation status opens. The time for the compilation is around 30 min.

Compilation Status			—		\times
Build Specifications	Status Synthesizing		Elapsed 00:02:1	l time 7	
	Reports Configuration		Cance	l Compil	ation
	Project: DCS.lvproj Target: FPGA Target (RIO0, cRIO-9045) Build Specification: DCS_FPGA Top level VI: DCS_FPGA.vi				^
	Compiling on local compile server Compilation Tool: Xilinx Vivado 2019.1 (64-bit) Compilation Submitted: 03.03.2022 09:09				ľ
~					¥
		Close	ł	Help	5

4. Open the "DCS_RIO.vi" file. Probably LabView ask during the opening process for a specific file and give some option. In this case, the suggested file should be selected. If everything is imported correctly the 'run' button is white and the code is runnable.



5. Select '**build**' under "NI-cRIO-9045 -> Build Specifications -> DCS_RIO"



- 6. Go to the same menu as in the last step and select '**Deploy**'. Please retry if this step fails.
- 7. Go again to the same menu and select "**Run as startup**". Before downloading the firmware LabVIEW ask for a password. The default user is 'admin' and the password is 'admin'. The password can also be found on the DCS touch panel under 'INFO'. Please retry if this step fails.

After rebooting the new cRIO firmware is now installed and running.

2.7 cRIO Firmware Deployment

2.8 Basics

A firmware image of the DAMIC-M DCS system can only be created with a fully programmed cRIO device. For this reason, it is necessary to download the code with via a licensed LabVIEW version. If the firmware is tested on the experimental setup, an image can be created from it with the "RAD Utility"¹ from National Instruments.

2.8.1 PC Software Installation

LabView has the best support on Windows operating system, so it is strongly recommended to have a (virtual) Windows PC with a fully functional LabView installed. The minimum requirements for the LabView installation are the following:

- 1. LabVIEW 2020 (32-bit)
- 2. LabVIEW 2020 FPGA Module
- 3. LabVIEW Run-time Engine 2020 (32-bit)
- 4. NI System Configuration
- 5. NI-RIO Driver
- 6. Replication and Deployment (RAD) Utility

¹ Replication and Deployment Utility: http://www.ni.com/example/30986/en/

2.8.2 cRIO Image Generation

Please note the following steps:

- 1. Build the RT-Application in the LabView project
- 2. Download the cRIO firmware to a fully functional DCS system.



- 3. Test the new firmware to get sure, so that the whole firmware is functioning properly.
- 4. Select the cRIO with the new and tested firmware and press "retrieve".

	Replicatio	n and Dep	ploymer	nt Utility								-	- 0	>	<
File	Targets	Images	Help												
	Deploy	vment T	Targe	ets	2 Re	efresh 🖏 Seti	tings		Application Imag	es		R efres	চ 🖓 Set	Exit tings	
	Host Na	me		IP Address	Serial Number	Model	κ.	Í	Application Name	Version	Date/Time		Model	1	
	NI-cRIO	-9045-01E	E14BCI	130.60.164.182	01E14BCB	cRIO-9045			Selected folder is empty.						
	<u> </u>							🔝 🖛 Deploy						_	
	<u> </u>													-	
								Retrieve							
								1100 Compare							
	-					~	9		2						
				Add	Target 🛟 Select	All 😰 Confi	J gure)				a Con	figure	

5. Configure the path for the image file.



7. Generate a "New Application Image".



8. Configure the name and the version of the application image file. After this, add one entry in the blacklist as described below.

😰 Application Image Properties	\times	Configure Plackliste	~
Application Image Properties			
Name		Blacklist Folders / Files	
DAMIC-M_DCS_Safety		Folder / File Path:	1^
Old Version	New Version	/home/lvuser/log	
	0.2.0		
Description			-
Functional version of the DAMIC-M The thresholds and safety mechanis will be finalized later.	slow control system. ms are preliminary and	Folder / File Path:	
Configure Retrieval and Deple Configure Bitfile(s) for FPGA f	oyment Blacklists	Retrieve Deploy	¥
ОК	Cancel	Add Explain This Save Car	ncel

9. Define the application image file. The press "Retrieve image from...". The image of the cRIO will then be generated.

😰 Choose Image Directory 🛛 👋		
Choose Image Storage Directory Application Image Path C:\Users\admin\Desktop\DAMIC_M_DCS\App Images\	Password Login ×	
g DAMIC-M_DCS_Safety0_2_0.lvappimg	130.60.164.182 (00:80:2F:26:0B:	😰 Retrieve Application Image 🛛 🕹
Browse Retrieve image from NL-cRIO-9045-01E148CR (130.60.164.182)	User Name: admin Password:	Retrieving application image
Back Cancel	OK Cancel	Getting file C:\Users\admin\AppData\Local\ Temp\lvtemporary_691422.rad\imageDir\ systemimage.tar.gz

2.8.3 cRIO Image Download

1. Start the RAD Utility and select all cRIO devices to be programmed. Then select the application image and press "Deploy".

5	Replicatio	n and Dep	oloyme	ent Utility								-		\times
File	Targets	Images	Help)										
	Deploy	/ment ⁻	Targ	ets	R e	efresh 🖏 Seti	tings		Application Imag	es	🕄 Refr	esh 8	€ Ex Setting	it Is
	Host Na	ime		IP Address	Serial Number	Model	1		Application Name	Version	Date/Time	Mod	el	£
	NI-cRIO	-9045-01E	14BCI	130.60.164.182	01E14BCB	cRIO-9045			DAMIC-M_DCS_Safety	0.2.0	09/24/2021 06:15:48 PM	cRIC	-9045	
	<u> </u>						-	Deploy						
	<u> </u>						-					_		
							-	🔛 📫 Retrieve				-		
	-						-	HER Compare				-		
							1	- Compare						
							4							x
	1					<i>P</i>			×				2	
				Add	Target ‡∦Select	All 😰 Confi	gure					5=	⇒ Configu	re

2. An overview window will be opened with the selected cRIO devices. The deployment process will be started when pressing the "Deploy Image to Listed Targets".

1	Deploy Application Images			_	\times
	Targets				
	Name	IP Address	Status	Progress	×.
	NI-cRIO-9045-01E14BCB	130.60.164.182			
					-
					-
					-
					-
					<i></i>
	*	;		~	j
	Target Deployment Settings		Deploy Image to Listed Targets	ncel	

3. After a few time, the image is deployed to all selected devices.

	Deploy Application Images			- 🗆		×
	Targets					
	Name	IP Address	Status	Progress	×.	
	NI-cRIO-9045-01E14BCB	130.60.164.182	Executing lib/modules/4.14.146-rt67-cg-8.0.0f1-x64-139/kernel/di	54%		
					ļ	
					ł	
					ł	
					7	
	*			2	j –	
[Target Deployment Settings	ß	Log Results Stop After C	urrent Batch		

2.9 Terminal Assignment

2.9.1 RTD Input (Slot 1)

Ю	Clamp	Variable	Description
RTD0	-	TempChA	Channel A / 4-Wire / RTD100 / Cold block Temperature
RTD1	-	TempChB	Channel B / 4-Wire / RTD100 / Cold block Temperature
RTD2	-	TempChC	Channel C / 4-Wire / RTD100 / Cold block Temperature
RTD3	-	TempChD	Channel D / 4-Wire / RTD100 / Cold block Temperature

2.9.2 Digital I/O (Slot 2)

IO	Clamp	Variable	Description
DI0	BAT	UpsOnBat	UPS runs on battery
DI1	LOW	UpsLowBat	UPS battery level is low
DI2	ВҮР	UpsBypass	UPS is bypassed
DI3	ERR	UpsFault	UPS any fault
DI4	CRY	CryoPwrAl	Alert from the cryo cooler power supply
DI5	PMP	TurboPumpOk	No fault signal from the turbo pump
DO0	RD	StatusLampRd	Red light for indicating an error
DO1	GN	StatusLampGn	Green light for indication no error
DO2	PSU	InterlockPSU	Interlock for the two DC power supplies
DO3	SUB	InterlockVsub	Interlock for the Vsub power supply
DO4	SO	OutletEnable	230 V socket outlet enable

2.10 Analog Input (Slot 3)

IO	Clamp	Variable	Range	Description
AI0	Рр	VacPump_mBar	1.82 – 9.50 V	Vacuum gauge near turbo pump
AI1	Pv	VacVessel_mBar	1E-9 – 1E3 mBar	Vacuum gauge near the vessel
AI2	Tc1	TempTC1_K	0 – 400 K	Temperature 1 of the controller
AI3	Tc2	TempTC2_K	0 – 400 K	Temperature 2 of the controller
AI4	Ср	PumpSpeed	0 – 100 %	Speed of the turbo pump

2.11 Touch Panel

The menu is displayed in the home screen. The overview screen displays all parameters of the DCS system.

	DAMIC-M
Dark Matter In CCDs at Modane	VacPump 1.46e-7 mBar VacVessel 4.64e-7 mBar TempTC1 132.29 K
OVERVIEW COCKPIT INFO	TempTC1 132.25 K Opsbypass Tubol ump_aint TempTC2 132.51 K UpsFault CryoPower_alert PumpSpeed 99.35 % CryoPwrAl UpsFault_alert TempChA 133.51 K TurboPumpAl UpsLowBat_alert TempChB 133.32 K TurboPumpAl TempChB
19/10/2021 TUE 14:18:46	TempChC 133.87 K TempChD 134.05 K

The cockpit view shows the analog parameters in pointer diagrams. This diagrams can be selected to have a larger view.



All information about the cRIO controller and the touch display are shown in the info view.

DA	MIC-M	CCD POWER System Stat	tus	DA	MIC-M	CCD PWWW System Stat	tus
	1/2 Info cRIO				2/2 Info Exter	nal Connections	
	Firmware FPGA	V0.8 / 19.10.2021			Web Panel	http://103.60.164.120:8002/Web/]
	Firmware cRIO	V0.9 / 19.10.2021			cRIO Config	http://103.60.164.120/#home	1
	cRIO Temp.	28.16 °C			Logfiles	http://103.60.164.120/files/u/Logfiles	1
	Operating Time	53 d			Modbus Int.	192.168.0.10:502	
	CPU Total	32.1 %			Modbus Ext. 1	103.60.164.120:502	
	CPU Main	1.82 %			Modbus Ext. 2	127.0.0.1:502	1
	Login Admin	User: "admin" / Password: "admin"			ModBUS Con.	2	1
	Login User	User: "DCS" / Password: "DCS"			PW Touchpanel	Password: "111111"	1
]]

2.12 Webpage

All parameters from the DCS system can be read via the webpage (exact link can be found on the touch panel). Because the web server in the cRIO has limited resources, the number of open web pages should be kept low.

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← → C ①	127.0.0.1:8	002/Web/							4		:
DCS System	nformation	Logfil	es Abor	Dar	D 'k Mc	AMI(Itter In CC	C -1 Ds ar	M t Modane 19.10.	2021 10	6:23:13	3
Analog In VacPump VacVessel TempTC1 TempTC2 PumpSpeed TempChA TempChB TempChD	Value 1.47E-7 4.64E-7 132.29 132.51 99.35 133.51 133.32 133.87 134.05	Unit mBar mBar K K K K K K K	Val 0 0 0 0 0 0 0 0 0 0 0 0 0	Digital I/O CcdPwrEn UpsOnBat UpsLowBat UpsBypass UpsFault CryoPwrAl TurboPumpAl	Val O O O O O O O O O O O O O	Alert Status VacPress_alert CryoTemp_alert TurboPump_alert CryoPower_alert UpsFault_alert UpsLowBat_alert TempCtrl_alert Logfile_alert	Val	Action Status DisableSys_action			
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DCS System In	nformation	Logfiles	About	
DAMIC-M DCS	System Ir	nformatio	ons	
Parameter		Value	Parameter	Value
cRIO Temperati	ure	28.16 (C Firmware FPGA	V0.8 / 19.10.2021
CPU Load Total	l (all Cores)	32.1 9	6 Firmware RIO	V0.9 / 19.10.2021
CPU Load Main	(1 Core)	1.82 9	6 Login User	Usr: DCS / Pw: DCS
Modbus Connec	ctions		1	
Operating Days	5	53 (d	