

TECNIPLAST



Release Note DVC 6.0 & DVC® Operator Software Manual



Please keep in mind that all the instruction manuals and release notes are available at the following web address:

https://digitalcage-tecniplast.com/en/manuals.html

RELEASE NOTE 6.0

This DVC[®] 6.0 is a major release because it introduces significant cosmetic changes and new manual tasks.

The most important new features are briefly listed below, together with the new DVC[®] Operator manual as a global and detailed reference.

Feature #1 – New Cage Label Types (Stock, Breeding, Experiment) and their new corresponding fields

Feature #2 – new manual weaning tasks (between 2 cages and between 3 cages)

Feature #3 – New Cage colour associated to the cage types (stock = green, breeding = purple, experiment = blue)

Feature #4 – Cage Add-ons (only for the experiment cage type)

Feature #5 – Treat all animals (only for the experiment cage type)

Feature #6 – Pup as animal type (only for breeding cage type)



Original instructions for use

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Technical Support

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Please refer to the link below to download Tecniplast Environmental Responsibility Policy: <u>http://www.tecniplast.it/en/environmental-responsibility.html</u>

PREFACE



Dear Customer,

This manual aims to provide the user with all the information and safety standards required for the correct and safe installation, use and maintenance of the machine you have purchased.

Keep the manual in an easily accessible place, known by the Installer, the Operator, the Supervisor and the Service Technician, who should carefully read it to have a clear understanding of the installation, use, and maintenance procedures as well as hazardous applications to avoid.

This manual is an integral part of the System and should follow it, even in the event of a change of ownership, until final decommissioning.

Should the manual get damaged or lost, a copy can be requested from TECNIPLAST.

In order to receive technical assistance, spare parts or optional extras not required on order, contact TECNIPLAST and give the machine serial number, version, and year of manufacture (see label on the machine).

The Operator, the Supervisor and the Service Technician must know all the standards reported in this manual before using the machine or carrying out maintenance procedures.

COMPANY CONFORMITY TO ENVIRONMENTAL POLICIES

At TECNIPLAST, both our production facilities and our end products reflect our commitment towards environmental policies in terms of:

- Compliance with the principles and contents of current laws and regulations concerning the environment;
- Reduction of the environmental impact deriving from our activities, maintaining the right balance between environmental, social and economic responsibilities;
- On-going request for innovative applications in order to reduce the environmental impact deriving from waste materials, energy consumption and to improve the use of natural resources and raw materials.
- Preventive evaluation of the environmental impact of new plants and processes and improvement of existing ones using all possible and economically sustainable solutions to increase our environmental performances.
- Incentivisation and co-responsibility of employees towards this policy by means of adequate training
- Use of effective tools to communicate principles and goals of such an environmental policy to our dealers during meetings and training courses;
- Defining during the design and development of new products the correct use and dismantling instructions to minimize environmental impact.

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1. Introduction

The DVC® System is an infrastructure consisting of several hardware and software parts linked together to provide extraordinary and revolutionary opportunities to the final user. It is mainly designed for Facility Managers and Operators. It provides different and flexible features to improve several aspects of the Facility: from streamlining workflow management to enhance animal welfare, from real-time tracking and billing opportunity to save running costs.

This User Manual will describe the System workflow and how to perform the routinary animal facility tasks using the DVC[®] System.

2. System Description

The DVC[®] System has been designed to track any cage in any position of the DVC[®] Rack in real-time, thanks to a special RFID antenna embedded into the DVC[®] board.

Each IVC Cage top needs to feature a unique RFID tag that uniquely identifies it in the entire Facility.

This RFID tag stuck on the microbiological filter of the cage is mandatory as the related content (Cage ID and Animal information) refers to this unique code in the DVC[®] System.



In order to register the information related to the Cage (Cage ID and Animal information), the RFID tag is to be read by a unique RFID Wireless Reader and the user needs to interact with the DVC[®] Operator Interface.



2.1 **RFID** wireless reader association

The RFID Wireless Reader is a device used to read and transfer the RFID Tag to the $\mathsf{DVC}^{\circledast}$ Master.

To accomplish the various animal Facility tasks, the RFID Wireless Reader needs to be linked to the DVC[®] Master and associated with a specific User every time a task (manual or planned) involves opening the IVC cage.



2.1.1 How to Switch on the RFID Reader: Ready for Association status

To switch on the Reader, proceed as follows:

- Press the central control button with the Tecniplast logo (3) for at least 5 seconds.
- The LED on the Reader (4) will show for about 4 seconds, and then it goes off.
- The Reader is now Ready for Association. RFID Readers Ready for Association are "visible" to the DVC[®] server but not physically associated with any User yet. Anyone in the Facility can use these Readers at this stage.
- The Reader now becomes Ready for Association. RFID Readers Ready for Association are "visible" to the DVC[®] server but not physically associated with any User yet.
- Log in with User credentials in the DVC® Operator interface.
- Check that the numerical field referred to the Reader Ready for Association increases by 1 unit.

Cage ID Q Search cages	Readers	Alarms	252
		Ready for Association	Ø
		1228	

2.1.2 Reader association with a specific User

Every time the user selects a task (manual or planned) that involves opening the IVC cage, he/she needs to associate a specific RFID Reader (Ready for Association) to him/herself.



Reader **>** association required



To associate an RFID Reader:

- Click on the Ready for Association numerical field: a pop-up window shows all the RFID Readers currently in the list. Please note that every RFID Reader has a unique code from the factory, also shown in the device's e-ink display.



- Click on the "chain" icon (Associate to me) to manually associate the RFID Readers to yourself.



2.1.3 How to select a specific RFID Reader

If more than one RFID Reader is associated with the same user, and he/she needs to select a specific one, proceed as follows:



- Click on the number of the currently displayed RFID Readers. A label with the numbers of the other associated RFID Readers is displayed.
- Select the RFID Reader you need. A dedicated message will be displayed on the page right-hand side to confirm that the event has been successfully performed.



2.1.4 How to switch off the RFID Reader

First of all, it is not possible to completely switch off the RFID Readers,

By keeping the central control button pressed for 3 seconds, the Red LED blinks, and the device reboots.

The only proper way to keep the RFID Reader in the correct status is to place it back into the DVC[®] Charger at the end of the working day.

2.2 **RFID Reader status**

The RFID Reader may have a different operating status indicated both by the LED on the device and by the corresponding symbol on the DVC[®] OPERATOR interface.

2.2.1 Normal operating status

Under normal working conditions, the status section of the DVC[®] OPERATOR interface shows the icon below.



2.2.2 Low Battery

When the battery of the RFID Reader is low, the low battery icon is displayed in the $\mathsf{DVC}^{\$}$ OPERATOR interface





To recharge the RFID Reader, put it in the DVC[®] Charger station for about 6 hours. While charging, the RFID Reader LED will be fixed.



2.2.3 Out Of Range

The RFID Reader has a maximum working distance from the DVC[®] Master, which depends on several factors like the battery's charge level, the room layout (obstacles between the RFID Reader and the DVC[®] Master, etc.).

If the RFID Reader maximum working distance is exceeded, the RFID Reader Status is set to out of range.

The icon shown below is displayed in the DVC[®] OPERATOR interface, and the RFID Reader cannot be used until it is moved back next to the DVC[®] Master, below the maximum working distance threshold.



2.2.4 Sleep Mode

If the RFID Reader is not used for more than 10 minutes, its status is set to Sleep mode to save battery.

The RFID Reader red LED will blink (long blink, every 3 seconds). The icon shown below is displayed in the DVC[®] OPERATOR interface.

To return to normal operating mode, press the central control button with the Tecniplast logo.



2.3 Cage opening procedure: Top Holder Usage

In order to ease the procedure of opening and working on a cage, Tecniplast has developed a tool called Top Holder to be used to read the RFID TAG of the IVC Cage properly.





The Top Holder features four housings for the RFID Reader.

If the cage top is placed vertically, the RFID Reader needs to be put in the side housings (either on the right or the left-hand side).







If the cage top is placed horizontally (lying on its side), the RFID Reader needs to be put in the top housings as shown.

The RED LED stays fixed as soon as the RFID Reader reads the IVC Cage top RFID tag. A window with the cage information is displayed in the DVC® OPERATOR interface (only when the RFID Reader is already associated with the user).



3. Software Manual

3.1 Login

Enter your Username and Password. The System Home Page of the DVC® OPERATOR interface is displayed.

Username	
grosati2	
Password	
	Login

**	TAGIS	RACKS	REM REM	NWC	Cage ID Q -	Search cages	እ Readers <u>1</u> 0	🐥 Alarms <u>30</u>	±
Plar	ned Tasks								0
~	□ Show	room &	Pos_A					2 0 0 0	2 Tasks

	Manual Tasks		√ !∕•	√ !	🔁				Animal Management System
--	-----------------	--	--------------	------------	---	--	--	--	--------------------------

The home page is, by default, the Planned Tasks page.



3.2 Manual vs Planned tasks

In the DVC® System, tasks are considered "Manual" when chosen and performed by the user because of his/her needs.

Vice versa, (DVC[®]) Planned tasks are daily generated by the DVC[®] System and represent tasks suggested to be performed by the user.

The possible manual tasks available in the DVC® System are shown in the bottom bar



While the assigned DVC® Planned tasks are shown in the central area of the page.

🔀 🗒				
Planned Tas	ks			
∧ 🗄 sh	owroom & Pos_A			
	Task Type	Task Status	Work Done	
	v∏s Total Bedding Change	Planned	0 of 3	× O
	La Daily Check	Planned	0 of 2	× O

3.3 Manual Task 1: How to register a cage

It is possible to register a cage in two different ways:

- In real-time, while physically working with it under the changing station/working
 - bench using the RFID Readers and clicking the "Cage Edit" icon . The following page appears (the RFID Reader is already associated with the user in this example):





The corresponding electronic cage label appears when physically opening a clean cage following the procedure described in the previous sections.

- **Offline** by selecting it from the corresponding DVC[®] Rack view opened through the DVC[®] Operator interface. Click on the corresponding "Empty" grey Cage, and the electronic cage label appears:



In both cases, this is the electronic cage label at the beginning of the creation:



The DVC® System features three different electronic cage labels:



- Experiment (blue)
- **Breeding** (magenta)
- Stock (green)

They differ for some information that is explained in the following pages. Users can choose the right one by clicking on the "Empty" icon.

A small pop-up appears, and the cage type can be selected.



3.3.1 Register a stock cage

When the "Stock" cage is selected, the following page appears:

Insert cage ID	2 5	
DVC Default Protocol Select owner		Edit all animals
real Animats		
		Save Cancel

The user is requested to insert:

- **Cage ID** (mandatory): by typing directly in the corresponding top-left area.
- Animal(s): As many as need by clicking on the corresponding icon 👛

Once this initial information is set, more fields appear and can be filled by the user:

		-
Test Cage		
DVC Default Protocol Select owner		Edit all animals
Generic animal Generi	Date of birth District date of birth Cage parent N/A	i ×
Generic animat	Date of birth D Insert dote of birth Cage parent N/A	i ×
Generic animal	Date of birth Date of birth Cage parent N/A	i×
		ave Cancel

First of all, the field named "Research Protocol" is automatically filled with the "DVC Default Protocol". Therefore, if the user wants to assign a different Research Protocol, this one has to be preventively created in the DVC[®] Workplace Interface. Then, by clicking this field and deleting the words, all the available ones are listed, and the user can select the right one:

Select research protocol	
DVC Default Protocol	^ <u> </u>
Black Cages	
Breeding	D)
Protocol 1	
Protocol 2	
Protocol 3	
Protocol 4	
Red Cages	- 2
Researcher 3	. 1
Pupping Whools	•

Same working principle for the "Owner" of the Cage (this can be a Researcher or a Group of Researchers who have been preventively created in the DVC[®] Workplace interface)





Then, if they share similar information, all the inserted animals can be edited together by

clicking on the button

A pop-up appears, and the animal fields can be edited (Sex, Strain and DoB):

🖋 Edit all animals								
Change values you want	to upo	late, v	will b	e ap	plied	to al	l anim	als.
Sex:	ç	ď	0	•				
Strain:	C57B	16J						
	<	Au	igust	\sim	2021	/	>	
	S	М	Т	W	Т	F	S	
	0	2	3	4	5	6 12	7	
Date of birth:	15	16	17	18	19	20	21	
	22	23	24	25	26	27	28	
	29	30	31	1			4	
		6			9		11	
						Ô	Clear	
							Ok	Cancel

By clicking the "OK" button, the same information is assigned to all the animals.

Test Ca	ige	23			
DVC Default Protocol	Researcher 1	·		E	dit all animals
دک Animais	Q Generic animal		Strain CS766 Markings Jesert monkings	Date of birth 10 8/1/2021 Cage parent N/A	i×
	Seneric animal		Strain CS766 Markings beert monkings	Date of birth 10 8/1/2021 Cage parent 10/A	i ×
	? Generic animal		Strain CS7866 Maringa Intern markings	Date of birth B/1/2021 Cage parent ///A	i×
				s	ave Cancel

Please note that the field "Marking" is not included in the "Edit all animals" functionality because it cannot be the same for all the animals, but it can be manually selected and assigned.

The field "Cage Parent" can be manually assigned (if the user wants to track such information). Moreover, for clarity, this field is automatically filled when pups are weaned in a different cage.



The same information regarding animals can be edited one by one by clicking on the corresponding fields (this functionality is needed, especially when the animals are not sharing similar information).



Then, by default, when an animal is added to the electronic cage label, it is defined as "Generic animal":



The user can assign a specific Animal ID if needed by simply clicking on the corresponding area and directly typing it:



Finally, by physically closing the cage (in case of real-time creation) or by clicking the "Save" button (in case of offline creation), all this information is assigned to the cage itself that starts being monitored by the DVC[®] System and generating corresponding data.

A small green pop-up, appearing on the right side of the page confirms that the cage has been successfully created:





The DVC® Rack view is updated consequently:



3.3.2 Register an Experiment cage

Compared to the previous workflow, the "Experiment" cage brings more fields to be filled. More specifically, new fields refer to the cage information:

- **Experiment ID** (it can be created from scratch or picked from a list of existing ones)
- **Experiment group** (it can be created from scratch or picked from a list of existing ones)
- **Experiment start date** (by default, it is today's date, but it can be modified)

DVC Default Protocol	Select owner	
Insert experiment	Insert experiment group	Insert experiment start date

Thanks to these new fields, the hierarchy structure of any experiment is covered by this new cage label.

More specifically, for instance:

- **"Protocol**" is the highest level. Usually, it is also called License or IACUC number (in the US). It can be more generally interpreted as the ethical approval to perform several experiments.



- "Experiment ID" is the code assigned to the experiment under running.
- **"Experiment Group**" is the name assigned to a group of cages running the experiment. Usually, in any experiment, there should be at least a control group and an experimental group. Nevertheless, the number of groups can be, obviously, many more depending on the design of the experiment (Control, Sham, Treat 1, Treat 2, etc.)

A simple synoptic table recap is the following:



Furthermore, also new buttons appear:

- "Cage add-ons" Cage add-ons
- "Treat all animals"

"Cage add-ons" refers to the possible types and devices inserted into the cage itself.

🚔 Cage add-ons	
Q Search	
 Black cage Cage divider Leddy Red cage Running wheel 	
Ok Cance	1



Depending on the selected add-ons, the correspondent icon appears just below the animal number.

EXPERIMENT Test Cage	e 2		o3 冬日 13 電 電
DVC Default Protocol	Researcher 1		
ABC	Control	9/15/2021	

Please pay attention that, in the case of the DVC[®] Running Wheel, it is mandatory to select such add-on to start generating corresponding data. Therefore, if the user forgets to select such add on, the DVC[®] Running wheel data are not collected adequately by the DVC[®] Analytics platform.

The "Treat all animals" button lists all the possible treatments preventively created in the DVC[®] Workplace interface, which can be assigned to all the animals at once.

🖋 Treatments report	
🖋 Treatments	Generic information
Q Search	
 other Treatment 1 Treatment 2 Treatment 3 	
	Ok Cancel

Like for the Stock cage, all this information (except "Cage add-ons") can be individually assigned to each animal by clicking on the corresponding field.

DVC Default Protocol	ge 2 23 Select comer Inset experiment group ☐ 9/15/2021		Cope add-ors Edit all animalis
animais	6 Generic animal	Strain Broof Brain Markings Broof Institutions	Date of birth.
	6 Generic animal	Strain Inner Istaina. Mateinga Innert interkinga.	Date of birth.
l l	6 Generic animal	Sorain Interf statum, Markings Interf markings.	Date of birth 10 Anoth dution of birth Cage parents 2004
			Save

3.3.3 Register a Breeding cage

Compared to the previous types of cages, the breeding cage is the only one where pups can be managed.

More specifically, when a female animal is created in the electronic breeding cage label, an extra dedicated button named "Add delivery" Add delivery appears at the animal level.

BREEDING Test C	age 3	🔹 🔋 🚮						
DVC Default Protocol	Select owner							Edit all animals
عطے Animalis	Q Generic animal		Strain CS7816J Markings Insert markings		Date of birth D 8/1/2021 Cage parent /V/A	Mating date 10 9/15/2021		i × Add delivery
	Generic animal			Strain C57816J Markings Insert markings			Date of birth 80 8/1/2021 Cage parent N/A	i ×
								Save Cancel

By clicking this button (when delivery occurs and the user wants to track it), a new line is added just below the female animal:

Generic animal		Strain C578/6J Markings Insert markings		Date of birth B 8/1/2021 Cage parent ///A	Mating date 19/15/2021 Last delivery 19/15/2021	i × Add delivery
Age Pups 0 day no pu	s Strain up (nsert str	ain	Date of birth 9/15/2021	1 Add pu	×]



The delivery information includes:

- Age of the pups in days: this is automatically calculated
- # of pups in the delivery
- The **strain** of the pups. This information will be applied automatically to all the created pups. If the user needs to specify different strains, this is still possible, pup by pup.
- The **DoB** (automatically created by clicking the "Add delivery" button) corresponds to today's date. However, it can be changed to a past date if the delivery event is registered later in time.
- Button to **add pups**. This activity can also be performed days after the registration of the delivery itself.

Once ready to also add pups, as anticipated, there is a dedicated button where the number of pups can be inserted and then, by clicking it, the corresponding pups are created.

Generic animal		Stra C57 Mai Inse	aln 1816/ ert markings	Date of birth 8/1/2021 Cage parent N/A	Mating date 한 9/15/2021 Last delivery 한 9/15/2021	Add delivery
Age P O day 5	ups pups 0 5	Strain Insert strain	Date of birth 9/15/2021	1 Add pu	P X	•
O Generic animal	Generic animal	Generic animal	Generic animal			
Strain Insert strain Markings Insert markings	Strain Insert strain Markings Insert markings	Strain Insert strain Markings Insert markings X	Strain Str Insert strain i Markings Insert markings X Inse	ain ert strain erkings ert markings		

Each pup has potentially the following information to be included (all optional):

- Sex
- Animal ID
- Strain
- Marking

3.4 Manual Task 2: How to change the bedding of a cage

As previously anticipated, the DVC[®] System supports two different ways of performing dirty bedding change:

- **Cage Change Total**: dirty cage is entirely substituted by a full clean cage.
- **Cage Change Partial:** the cage top of the dirty cage is moved (shared) to the cage bottom of the clean cage.

Please pay attention that correctly performing these tasks supports DVC[®] system algorithms to interpret better animal activity inside the cage. Therefore, also the Cage Change Partial, although it seems unnecessary (due to the fact the RFID tag remains the same with the same "content"), it is crucial to be performed (also) through the DVC[®] Operator interface because the specific event is tagged and managed by the DVC[®] system algorithms.

3.4.1 Cage Change Total

Clicking on the Cage Change Total button the DVC[®] system shows the request to associate two different RFID Readers with the user to perform the task.



The dirty cage coming from the DVC[®] Rack can be opened as the first or second cage on the right RFID Reader or the left one. There is no specific requirement for this task in terms of proper cage opening workflow.

Once both dirty and clean cages are opened, the electronic cage label is automatically transferred from the dirty cage to the clean one.



TASKS RACKS REM NWC			Cage ID Q + Search cages	م Readers <u>2</u> و 🐥 Alarms <u>32</u>
Cage Change Total - Manual	Bedding change done: please remove any cage to save.	0		
	Reader		Reader > (6)	5) (B)
EMPTY		5 BREEDING	c-310	i
		Ø 72		i ×
		() 28		
▲ The cage is	Too dirty Flooding Pups Com	ing		
Manual Tasks				Animal Management System

Moreover, this task should be requested by the DVC® System (as a planned task) thanks to the dedicated DVC® Bedding algorithm outcomes. If the user is performing it manually, the user can leave different potential feedback to explain better why the task has been performed manually. This feedbacks can help the Tecniplast team to refine the DVC® Bedding algorithm in the future.

▲ The cage is	Too dirty	Flooding	Pups Coming

Lastly, if the user wants to undo the operation, click on the corresponding icon located

between the two cage labels

3.4.2 Cage Change Partial

If the Cage Change Partial button is selected , the DVC® System asks to use only one RFID Reader because the System reads only the (shared) cage top of the dirty cage.



When the dirty cage is opened, the registered cage content is shown in the interface.

.	TASKS RACKS						Ca	ge ID Q + Search cage:	s พ	Readers <u>2</u> <u>0</u>	🐥 Alarms <u>32</u>	*
<pre>√! Cage</pre>	e Change Parti	ial - Manual	Close cage to	confirm 🔞		5	Undo	I	Reader 1253			
	BREEDING	c-310				ç1 ơʻ1			a Q	Registered: Changing protoco	8 days ago bl: DVC_STANDARD	
	DVC Default	Protocol	Select owner								Edit all animals	
	t▲ Animals 读	Ø	72				Strain C57Bl6J Markings Insert markings			Date of birth Dinsert date of birth Cage parent N/A	i X	
	Daily check	. 📀	28			Strain C57816J Markings Insert markings		Date of birth Dirth Date of birth Cage parent N/A	Mating date 9/9/2021		Add delivery	
	Alarms histor	v										
	:= Animal report	8										
			⚠ The cage is	_	Too dirty F	looding Pups	Coming				Save	
Manual		<u>]</u>	• 一行う		€ ≣ }							it System

By simply closing the cage top over the clean cage body, the task is accomplished and tracked.

If the user wants to undo the operation, click on the corresponding icon

3.5 Manual Task 3: How to split animals between cages

As previously described, when the user needs to move already registered adult animals from a registered cage to another, the DVC[®] System offers two different opportunities:

- **Cage Split Standard** where existing registered adult mice are moved between two registered cages.



- **Cage Split Advanced** where existing registered adult mice are moved between three registered cages.

Please pay attention that it is mandatory to move animals only between previously registered cages to enable the split functionality (i.e., with a valid Cage ID already assigned). Moreover, only adult mice can be selected and moved across registered cages. Indeed pups can be moved (most likely weaned) thanks to dedicated functionalities explained later in this manual.

3.5.1 Cage Split Standard

By clicking the corresponding button , the DVC[®] System requires two RFID Readers to be associated with the user.



Then, the corresponding content (i.e., the animals) is shown by opening registered cages with animals.

To move one or more animals from one cage to another, click on it/them. The DVC® Operator

interface highlights the ones selected, and a new button appears ^{Click to move here} on the other cage.

Please pay attention that animals can be moved only between registered cages.

The user can easily register a new cage while performing such split task.

						×
TASKS RACKS REM NINC				Cage ID Q - 313	م Readers <u>2</u> 0	🐥 Alarms <u>30</u> 💄
은 Cage Split Standard - Manual	Please select animals to be moved and	click on the "Click to Move He	re" button 🕜			
	Reader . (2) (2) (2) (2) (2) (2) (2) (2) (2) (2)			Reader 57875	0 %	
BREEDING C-310		i	болоск с-313			i
♂ 72		i 🕱	d 48			X
28		× ×	♂ 47			8 🗶
			♂ 41			i X
				Click to mo	ve here	
						Cancel
Tasks Tasks I vi						Animal Management System

3.5.2 Cage split advanced

The same workflow can be performed by using three different RFID Readers and opening three already registered cages parallel.

By clicking the corresponding icon, the DVC® Operator interface shows them.



Then, the corresponding content (i.e., the animals) is shown by opening registered cages with animals.

To move one or more animals from one cage to another, click on it/them. The DVC® Operator

interface highlights the ones selected, and a new button appears Click to move here on the other cages where the animals can be moved.



3.6 Manual Task 4: How to wean pups

As described in the previous section for the adult mice, in case the user wants to perform and track the weaning task, the DVC[®] Operator interface offers two possibilities:

- **Cage Weaning** where existing registered pups mice are moved between two registered cages.
- **Cage Weaning Advanced** where existing registered pups mice are moved between three registered cages.

Please pay attention that it is possible to move pups only between previously registered cages to enable the weaning functionality (i.e., with a valid Cage ID already assigned). Moreover, only pups mice can be selected and moved across registered cages. Please refer to the previous section to know how to move adult mice between registered cages.

3.6.1 Cage weaning

By clicking the corresponding button, the DVC[®] System requires two RFID Readers to be associated with the user.



Then, the corresponding content (i.e., pups) is shown by opening the registered breeding cage with pups to be weaned.

To move one or more pups from one cage to another, click on it/them. The DVC[®] Operator interface highlights the ones selected, and a new button click to move here appears on both cages. Only pups can be selected. The already existing registered adult mice cannot be selected.

	Cage ID Q - 313 🔊 Readers 2 0 🔺 Alarms 30 🚨
Cage Weaning Please select pups to be moved and click on the "Click to Move Here" button @	
Reader) 🛞 🛞 💿	Reader 57875 • @ @ 0
BREEDING c-310	i
• 72 i M	Ø 4
 ≥ 	Ø 47 🔋 🕱
Click to move here	d ti I I I I I I I I I I I I I I I I I I
	Canal
·····································	Animal Management System

When a pup is weaned, it becomes an adult in the cage where it is moved. This action can be reversed by clicking again to the (adult) animal just weaned and move it back to the original pup status.

When the cage is saved (by closing the cage top or by clicking the "Save" button), the weaning action is saved, and the animal cannot be back as a pup anymore (user has to register it again if needed).

Please note that a pup(s) can also be weaned in the same original cage, becoming an adult mouse for that cage.

3.6.2 Cage Weaning Advanced

By clicking the corresponding button, , the DVC[®] System requires three RFID Readers to be associated with the user.





Then, the corresponding content (i.e., pups) is shown by opening registered cages with animals.

To move one or more pups from one cage to another, click on it/them. The DVC® Operator

interface highlights the ones selected, and a new button appears ^{Click to move here} on the other cages.

Please note that a pup(s) can also be weaned in the same original cage, becoming an adult mouse for that cage.

3.7 Manual Task 5: How to terminate a cage

The DVC® System offers different ways to terminate a cage:

- Single cage termination because all the animals have been culled/removed
- **Bulk cage termination** because the user wants to terminate multiple cages simultaneously (i.e., the experiment is completed).
- Missing cage termination

3.7.1 Single Cage Termination

Either the user is culling/removing animals by opening the cage top over the RFID Readers or opening the cage through the DVC[®] Rack interface, whenever all the animals are removed, the DVC[®] interface asks if also the corresponding cage has to be terminated:

с-315	25 91	🚡 Regis	dered: 6 days 🗙go ging protocol: Test Biweekly
DVC Default Protocol			
zak Animals			
Dely check Generations Dely check Generations Dely check Micconstructions NWC	17 Terminato case		
Alarms history	Do you want to terminate cage 'c-315?		

The cage is terminated by clicking "OK" and becomes empty (available again for another registration and/or cage change).



3.7.2 Bulk Cage Termination

As anticipated earlier, in case the user wants to terminate simultaneously multiple cages, it is possible to do so by following the below-described procedure:

First, select the DVC® Rack where cages to be terminated are currently inserted:

÷	TASKS	RACKS	REM	(1) NWC								
F	Rack Navigation	ı										
	∧ 🛛 Showr	oom	& Pos_A									
		70010	066A A	в	c	D	E	F	G	н		
		10										
	DVC	9										
	Occupancy	8					Ē					
	Tasks	7										
	Ē	6										
		5										
		4										
		3										
		2										
		1										

Secondly, click on the Cage Termination button.



The DVC[®] Operator interface changes to a specific page where the user is requested to extract physically all the registered cages which need to be terminated:

																			X	
× III	RACKS REM												Cage ID C	Q - Searc	h cages	ھ	Readers 1	<u> </u>	Alarms 32	.
Cage Tern	Cage Termination - Manual Remove from '17001066A' registered cages you want to be terminated 🛞																			
	17001066A									c	ages below w	ill be termina	ated							
	10		c	D	E	F	G	H		_	•									
DVC	9 📑																			
Occupancy	8																			
	7																			
	6				Ē	T														
	5																			
	4				Ē															
	3																			
	2																			
	1																			

By removing, one by one, all the registered cages, these are listed on the right column to visually confirm the Cage IDs that are going to be terminated.

TASKS RACKS REM N	8ı «	Cage ID Q - <u>313</u> & Readers <u>2</u> 0	🜲 Alarms _25 🛛 💄
Cage Termination - Manual	Remove from '17001066A' registered cages you want to be terminated ${}_{\bigcirc}$		Termination Save
17001066A A B C Occupancy I		Cages below will be terminated Test Cage 2 Test Cage 3 Test Cage	

〒 | ① ・ | 日 日 日 🛱

If a cage is removed by mistake, it can be easily inserted back and it will disappear from the left-list.

Once all the cages are removed, the user has to confirm the termination by clicking the button Termination Save and provide a reason for that.

30



Please note that the "death reasons" have to be preventively created in the DVC[®] Workplace interface.

3.7.3 Missing Cage Termination

By default settings, any registered cage in the DVC[®] System has to be inserted in any position of any enabled DVC[®] Rack.

Suppose a registered cage is out of the DVC[®] Rack for more than 12 hrs (this default setting can be changed as needed). In that case, the corresponding cage is declared missing, and a specific alarm is triggered in the DVC[®] Operator and DVC[®] Workplace interfaces.

It is possible to terminate this cage directly from the DVC[®] Workplace by navigating in the Active Alarms section and then by clicking the corresponding icon. Please refer to the DVC® Workplace manual.

3.8 Manual Task 6: Cage Reconciliation

This feature has been implemented mainly to provide the user with a simple way to recover from misspelt cage information.

There are several reasons why a cage can have wrong or missing information.

For instance, the registered cage has been changed without adequately using the RFID Readers, and the cage content has not been moved from the dirty to the clean cage, ending up in a cage that is empty for the DVC[®] System, but it has animals in reality.

In any case, by selecting the DVC[®] Rack where the empty (for the DVC[®] System) cage is located, it is possible to click on a specific button called "Cage Realignment":

	RACIS	REM .			 				 	
ack Navigation	1									
∧ □ Shown	oom	& Pos_A								
1	7001	066A	5.1	925	22.5	22				
			B		E C	-	G	H		
0	10									
DVC	9									
Occupancy	8									
III Tasks	7									
T7	6									
R.	Cage	ment								
	4									
	3									
	2									
	1									

÷

The DVC[®] Operator interface changes to a dedicated page where the user is requested to click on the empty cage to be updated.

By doing so, the corresponding cage is highlighted in the DVC[®] Rack view, and two different search areas appear.

	Cage ID Q & Readers 1 1 🗍 🗍 Alarms 32
$\overline{\mathbb{C}_{\mathbb{D}}}$ Cage Realignment - Manual Select a cage to realign the content ${}_{\mathbb{O}}$	
17001066A	Missing Cages Q. Search missing cages
	No missing cages found
, 🖶 🐨 🐨 🐨 🐨 🐨	
· 🐨 🐨 🗃 🗃 🐨 🐨	
· 🐨 🐨 🗃 🗃 🗃 🗃	Search a Cage ID Q - Search cages
	No cares found
11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Animal Management System

The user can update cage content by either searching the original cage between the currently "Missing Cages" (if any – empty in the above figure) and searching the original cage between the currently registered cages.

In this latter case, the user can type the Cage ID in the "Search cages" box and then click enter.

The registered cage appears in the below box and can be forced to be realigned by clicking the "Assign" button:

		Cage ID Q - Search cages 🕅 Readers <u>1</u> <u>1</u> Alarms <u>32</u>
e Realignment - Manual Select a cage to realign the content ${\scriptstyle }_{\!\!\!\!O}$		-
17001066A A B C D E F G H	Missing Cages	Q Search missing cages
· 💼 🖱 🐨 🐨 🐨 🐨		No missing cages found
ancy s 🐨 🐨 🖬 🖬 🐨		
	Search a Cage	Cage ID Q
	6-313	Assign

The DVC® System requires further confirmation before proceeding. It also shows more in detail the corresponding cage content to provide more confidence about this task.

🔣 B	= III 0 10	Cage ID Q - Search cages	Readers 1 1 🔺 Alarms 32	-
TAS	Confirm to assign cage 'c-313' to rack '17001066A' in position 'C8'			
Cage				
	◎ c-313 stock			
	🕝 હ			
$\overline{\Delta}$				
DVC				
Occupan	41			
			Cancel Confirm	

By clicking the "Confirm" button, the cage ID and its content are moved back to the selected empty cage to realign reality with the DVC[®] status.



3.9 Manual Task 7: How to track animal information

The DVC[®] System supports the possibility to track animals information by tagging them with a specific sickness reason, treatment, generic information or culling reasons.

Any sickness reason, treatment and culling reason have to be preventively created in the DVC[®] Workplace interface. The user can create as many as needed.

Once created, the suggested DVC[®] workflow to follow is described below as an example: During a visual check (or thanks to the NWC task), the user finds an animal in trouble, and

he/she wants to alert the owner of the cage and other people about this issue. The first step is to open the corresponding cage (using the RFID Reader or by the DVC® Rack

The first step is to open the corresponding cage (using the RFID Reader or by the DVC® Rack view) where the animal was already registered:

c-313 stock	Researcher 1		Registered: Changing protoc	7 days ago ol: Test Biweekly Edit all animals
z 📥 Animals	♂ 48	Strain CS7860 Markings Insert markings	Date of birth Dy/1/2021 Cage parent N/A	i X
Open alarms Daily check	♂ 47	Strain CS7860 Markings Insert markings	Date of birth D 9/1/2021 Cage parent N/A	i 🕱
Bedding change	♂ 41	Soain CS7860 Maringa Insert markings	Date of birth D 9/1/2021 Cage parent N/A	i ×
Alarms history ∷≡				
Animal reports				
				Save Cancel

Then, click on the little icon it to open a dedicated pop-up:

Sickness report:	47	
Sickness reasons	🖋 Treatments	Generic information
Q Search		
 Dehydrated Fighting wounds other Tremors 		
		Ok Cancel

Three different sections can be filled with information:

- **Sickness reasons**: list preventively created in the DVC[®] Workplace **Treatments**: list preventively created in the DVC[®] Workplace -
- -
- Generic information: a free field where the user can write any information -

By selecting one or multiple sickness reasons, the corresponding OK button icon appears to confirm such status.



Sickness report:	47	
Sickness reasons	🖋 Treatments	Generic information
Q Search		
 Fighting wounds Tremors Dehydrated other 		
		Ok Cancel

The same selection can be made by picking the proper treatments (if provided).

🖋 Treatments repo	rt: 47	
Sickness reasons	🖋 Treatments	Generic information
Q Search		
 other Treatment 1 Treatment 2 Treatment 3 		
		Ok Cancel

Finally, also the Generic Information field can be filled if needed to explicit any specific information:

🖞 Generic informati	on: 47	
Sickness reasons	🖋 Treatments	Generic information
I found the mouse in bad co	nditions	ŀ
		Ok Cancel

By clicking OK, the animal is tagged with the selected sickness, treatments and generic information. Then, by closing the cage (or saving through the DVC[®] Operator interface), the corresponding alarm, called "Animal in Trouble" is created and sent by email to the Owner of the Cage and all the Users registered to receive notification about this type of alarm.

	Strain C57816J	Date of birth 9/1/2021	8
<u>o</u> 47	Markings Insert markings	Cage parent N/A	

Please note that the user can also only assign a treatment (or multiple), or even more, just generic information to a selected animal. In this case, the alarm is not generated, but the

animal is still tagged with a different icon 🖉 and the information is tracked in the Animal reports section.

Lastly, the same workflow can be applied to the event that an animal has to be culled (for whatever reason).

By opening the corresponding Cage through RFID Readers or from the DVC® Rack view, the

user can click on the little icon and choose from the pop-up page as many culling reasons as needed to justify the removal of the animal.



🕱 Death report for mouse:	: 81
🕱 Death reasons	Generic information
Q Search	
 End of Experiment Fighting wounds Found Dead other 	
	Ok

By clicking "OK", the animal is highlighted as removed from the list.

This action can be reverted by clicking the icon

с-317	۵		Registered: Last bedding change Changing protocol:	6 days ago total. 6 days ago DVC_STANDARD
DVC Default Protocol	Select owner			Edit all animals
Arimats	♂ 81	lana Bibit Ukong Denambiga	Delik of birth El s/1/2021 Ceps.ce.ent NC	C I
Open alarms	6 23	ben Bröc Hateg Jant makigs.	Date of birth 80 6/1/2021 Cape parent /V//	i X
Eedding change				
Alarms history E≣				
Animal reports				
				Save Cancel

When the cage is closed (or saved), the animal is completely eliminated from the cage itself. The corresponding "Animal Report" (see below) is updated with this information:





3.10 Planned Tasks

Unlike manual tasks selected by the Operator, planned tasks have been defined by the DVC[®] System considering different parameters such as the status of the cages, the availability of Operators, and related skills. For details on the DVC[®] Planner settings, please refer to the DVC[®] Administrator Software Manual.

The current version of the DVC[®] System features three planned tasks:

- Bedding Change Task
- Daily Check Task
- Anomalous Animal Activity Task (also called Night Welfare Check NWC)

Planned tasks are scheduled daily. As soon as the user gains access to the DVC[®] System and logs in, the home page immediately shows the several tasks which have been assigned to him/her:



Planned tasks are grouped by location (Showroom -> Pos_A) and by DVC[®] Rack side. Multiple lines might appear if planned tasks are assigned to multiple locations, while multiple DVC[®] Racks (up to 4) might appear in the same line if located at the same place.

The little balloons 2 0 0 0 on the right-side display the **TASK STATUS**:

2 : PLANNED TASKS (2): tasks planned by the DVC® planner

• SUSPENDED TASKS (0): the task has been started but left running (the user has logged out and will log in back later)

• COMPLETED TASKS (0): the task has been entirely performed

• PARTIALLY COMPLETED/CANNOT BE DONE/CANCELLED TASK: the task has not been completed (the user has communicated why the task has not been completed).



3.10.1 Task performing

1. Click on the Sicon to display all the tasks assigned to the location.

In the example shown below, there are two different tasks (Total Bedding Change and Daily Check) which are both still planned.

▲ 🛛 Showro	oom & Pos_A			
	Task Type	Task Status	Work Done	
	ر ایک Total Bedding Change	Planned	<u>0 of 3</u>	× O
	िव Daily Check	Planned	<u>0 of 2</u>	×O

- 2. Click on the led icon to clearly identify the DVC® Rack where these tasks will be performed. The two top rows of the corresponding DVC® Rack will light up the same colour displayed in the interface (RED in this case). This feature is useful when multiple DVC® Racks (up to 4) are attached to the same BUOY (DVC® Master).
- 3. Carry out the selected task (see following paragraphs, according to the task type).

3.10.2 Tasks rejecting

To **reject the task**, click on the corresponding icon and remove this task. The System requires to write a reason of at least three words:

Cag	ge Change - Task on rack 17001066A can't be done
Plea	ise write a reason below (at least 3 words)
T	
	Available characters 255
	Cancel

Click on CONFIRM and close the box





The task will be tracked as "Can't be done" with the corresponding reason attached to all the cages/animals involved in the task.

3.10.3 Bedding Change Task

This task is generated by the DVC[®] Planner when there are dirty cages in the Facility that need to be changed accordingly to the customer's LEARNING Phase (refer to the DVC[®] Administrator Software Manual for details).

Click on the corresponding icon and proceed as described in the previous paragraph related to the Total Bedding Change to perform the task.



To show information related to the cages to be changed, the user can:

• Click on the cage icon on the upper bar ³ to display the Cage ID, the coordinates to find the cage in the DVC[®] Rack and the status of the current task (Planned/Done/Closed)

Tasks found on rack '	I7001066A'	
3 Planned 0 Done	0 Closed	
c-303		С3
c-389		G5
c-52		D6
		Ok

Moreover, the DVC® System supports an important feature related to the possibility to

highlight (in Yellow by clicking the corresponding icon 2) all the dirty cages grouped in the DVC® Rack. This is a revolutionary feature enabling direct interaction between the user and the DVC® System.



If a specific cage cannot be changed, click on the icon and write the reason why the change could not be performed. In this case, the cage is marked as **CAN'T BE DONE**.

Usually, a common reason for rejecting the task is that the cage is still "too clean" and can be left longer in the DVC[®] Rack.

Please pay attention that this cage will be analyzed again the day after, and it could be included again in the list of planned tasks.

While performing the cage change, the Operator can leave important feedback for the DVC® System thanks to a specific icon shown on the interface, related to the **status of dirtiness** of the cage he/she just changed:

- **Too clean**: the suggested cage has been changed, but it was too clean
- **OK**: the suggested cage was "properly" dirty
- **Too dirty**: the suggested cage was too dirty



This feedback will be tracked into the DVC[®] System and shown in the history of the current cage.

Once a specific planned cage change task is performed, the corresponding cage slot position at DVC[®] Rack level, switch off the Yellow LED to confirm that the task has been correctly completed.

Finally all the planned cage changes have been performed, the task is registered as completed. The home page will display the report of the planned tasks (2 cages have been changed and 1 has been rejected in the example shown below)

Task Type Task Status Work Done Image: Dvc Image: Dvc Suspended 0 of 3	▲ 🛛 Show	vroom & Pos_A 17001066A			
Image: Dvc Image: Dvc Suspended 0 of 3 Image: Dvc		Task Type	Task Status	Work Done	
	DVC	√]_∱ Total Bedding Change	Suspended	<u>0 of 3</u>	×C
Daily Check Partially Completed 2 of 3		िव Daily Check	Partially Completed	<u>2 of 3</u>	

3.10.4 Daily Check Task

This task is generated by the DVC[®] Planner when the user wants to track that each cage has been individually (at least visually) checked during the day.

In the example shown below, 18 registered cages on this DVC® Rack need to be checked.

ित Daily Check	Planned	<u>0 of 18</u>	× 0

To perform the task, click on the corresponding icon on and proceed to check the cages visually.

While the task is running, a **time progress bar** is displayed on the page top, showing the current task's remaining time

U Daily Che	ck	18	Pleas	e visual i	nspect cag	ges highlig	tted in b	lue 🔞		
Rack Che Remaining ti	e ck me fo	r visual in:	spection							00 minutes, 32 seconds
-	17001	1066A	_	-	-	-	-	-		
DVC	10					E	F		H	
	9	Ē								
	8			Ē		Ē				
	7									
	6					Ē				
	5					Ē	Ē		Ē	
	4					Ē				
	3									
	2									
	1									

Eventually, LED can illuminate the cages to be checked (in BLUE), by clicking on the

corresponding icon 🚢

ā

Daily Check

Moreover, all the cages to be checked have a coloured (BLUE) background as shown. If a cage is extracted from the Rack during the task because something strange has been noticed, the time bar stops and restarts only when the cage is inserted back into position.

Once all the planned cages have been checked, the task is registered as completed. The home page will display the task as completed.

Completed 18 of 18

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3.10.5 Anomalous Animal Activity Check Task (Night Welfare Check)

The DVC[®] System generates this task. It includes all the registered cages that showed, during the night period, an anomalous global animal activity (compared to the previous nights that are considered as baseline).

When the task is created, it is shown on the home page as any other planned task:

Daily Check	Planned	<u>0 of 2</u>	× O
-------------	---------	---------------	-----

More specifically, it is included in the "Daily Check" task (they can run together or only the NWC task as in this example).

This NWC task requires a physical extraction of each individually tagged cage for a specific time.

In the DVC[®] Workplace interface (and please refer to it), it is possible to set the time required to keep the cage extracted before insertion to confirm the task has been performed.

Running the task by clicking the corresponding icon **2**.

The DVC[®] Operator interface changes to a dedicated one where it is possible to discover which cages are to be physically extracted.

() Daily C	Extract each yellow cage for 3 seconds to complete this task 😡	Reader > (1) (1) (1) (1) (1) (1) (1) (1) (1) (1)
Rack Check	✓ Not required	Anomalous Animal Activity Detected Remaining cages to extract and check 2

These cages are the ones with the yellow background (A10 and B10 coordinates).

The user can either illuminate these cages at DVC[®] Rack level by clicking the corresponding icon

Once the first cage is extracted, the DVC[®] System also provides a graphical explanation (by Line chart and heatmaps) of why this task was requested.



More specifically, the DVC[®] System creates three different NWC task types:

- Hypoactivity detected
- Hyperactivity detected
- No activity detected

These tasks are the outcomes of specific DVC[®] algorithms running during the night and analyzing DVC[®] data from all the registered cages.

Now, it is up to the user if going under the changing station and open this cage for deeper analysis or directly inserting it back in the DVC[®] Rack (no matter which position)

Once the cage has been inspected and inserted back into the DVC[®] Rack, the progress bar will show the task progress and the corresponding yellow LED switched off.

Anomalous Animal Activity Detected	
	Remaining cages to extract and check $oldsymbol{1}$
50 %	

Once all requested cages have been inspected, the corresponding task is completed.

िते Daily Check	Completed	<u>2 of 2</u>	
4. <i>Alarms</i>			
Alarms are grouped by type.	_		
By clicking the Alarms icon	, a dedicated sec	tion appears listing	all the alarms.

	Cage ID Q - Search cages 💦 Readers 1 0 🐥 Alarms 33 💄
Alarms	×
☶ + -	
S Animal in Trouble	0
Missing Bottle	2
V 🛐 Low Food	•
V T No Activity	19

Click on the expanding icon 🔽 to group them by BUOY (location).

Missing Bottle	2
✓ □ Showroom ▲ Pos_A # 17001066A	2

And click again to the icon $\stackrel{{\scriptsize \mbox{\footnotesize C}}}{=}$ to list the cages involved in such alarm

Missing Bottle				2
∧ 🛛 Showroom 🐇 Pos_A 🎟 17001066A				2
				DVC
Created on	Solved on	Cage ID	Cage Position	
September 10, 2021 3:02 PM		c-31	F5	
September 10, 2021 3:02 PM		c-388	E8	

Lighting up all the cages with a specific alarm clicking on the switch on the right icon is possible.

When solved, alarms are shown in green colour with "Solved on" date information

Created on	Solved on	Cage ID	Cage Position
September 17, 2021 11:32 AM		c-313	F7
September 17, 2021 11:32 AM		c-310	C8
September 10, 2021 3:02 PM		c-389	G5
September 10, 2021 3:02 PM	September 17, 2021 11:35 AM	c-100	C5
September 10, 2021 3:02 PM		c-327	E6
September 10, 2021 3:02 PM		c-48	C6

Finally, to clear the alarm status from all the already cleared alarms, it is possible to click on the little bin icon and only all the currently active alarms are finally displayed.



5. DVC[®] system extra features

The electronic card label has been improved to manage specific information not present in the previous releases and new functionalities.

Also, a new specific dedicated table has been included to provide a better understanding of the NWC outcomes.

Lastly, a new device called REM is now managed by the DVC® Operator interface.

5.1 Cage Logbook

Independently from the type of Cage (Stock, Experiment or Breeding), the lateral section is dedicated to some important actual and historical information related to the cage and animals.



- "Animals" is the default view, and it refers to the mice registered in the cage
- "**Open alarms**" refers to the current alarms active in the cage with its creation date & time, the type of the alarm and Animal ID if present



- "**Daily Check**" refers to planned daily checks planned and performed on this specific cage.

د ا	Planned date	Closed date time	Status	User
Animals	包 Search by planned date	E Search by closed date	Search by status	Search by user
00en alarms	Thu. Sep 16, 2021		Planned today	grosati2
Daily check Bedding change	Thu, Sep 16, 2021	Thu. Sep 16. 2021. 1:05 PM	Closed	grosati2
NWC Alerms history III Animal reports				
				Save Cancel

- "**Bedding Change**" tracks how many tasks of bedding change have been performed on such a cage. They can be filtered by date, method (manual or planned), type (total or partial), performed by who and feedback (if any)

۵.	Date time	Method	Туре	User	Feedback
Animals	E Search by date	Search by method	Search by type	Search by user	Search by feedback
Open alarms	Fri, Sep 10, 2021, 2:19 PM	Manual	Total	grosati2	
🔅 Daily check					
Bedding change					
÷ NWC					
Alarms history					
E Animal reports					
					Save

- "**NWC**" shows how many planned tasks have been assigned to this cage, when, if and performed by who and if feedback has been left.

🗠	Planned date	Closed date time	Status	User	Health	Feedback
Animals	El Search by planned date	El Search by closed date		Search by user		Search by feedback
Open alarms						
*						
Daily check						
Ð						
Bedding change						
e NWC						
Alarms history						
Animal reports						
						Save

"Alarm history" refers to the list of the alarms (closed and still open) by type.

-	Туре	Created date time	Closed date time
Animals	Search by type	E Search by created date	E) Search by closed date
10	No activity	Thu, Sep 9, 2021, 6:02 PM	Fri, Sep 10, 2021, 3:00 PM
upen alarms	No activity	Fri, Sep 10, 2021, 8:02 PM	
Daily check	Low food	Wed, Sep 15, 2021, 6:37 PM	
T.	Animal in trouble	Thu, Sep 16, 2021, 3:43 PM	
Bedding change			
NWC			
Alarms history			
Animal reports			
			Save Cancel

- Lastly, the "Animal report" tracks all the manual events triggered by the user, animal by animal of that cage.

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رکے Animals	•	ď 48		C57Bl6	1		Sep 1, 2021				
Open alarms			Date time		Type Search by type		Info	s	User		Note Search by note
Daily check			Thu, Sep 16, 2021, 3:43 PM		TREATED		Treatment 1		grosati2		
Bedding change	•	ď 47		C57Bl6			Sep 1, 2021				
+ NWC			Date time		Туре	Info		User		Not	te
			El Search by date	Search	by type_			Search by user_		Search by note	e
Alarms history			Thu, Sep 16, 2021, 3:43 PM		TREATED	Treatment 1 other		grosati2		I found the mouse	e in bad condi
Animal reports			Thu, Sep 16, 2021, 3:43 PM		SICK	Fighting wounds Tremors		grosati2		I found the mouse	e in bad condi

5.2 Extra Cage information

On the right-top side of the electronic label, new information is added to provide a clear situation of the cage status.

More in detail, from this release, some cage information such as:

- Registered: When the Cage has been registered initially
- Last bedding change: When the last cage change has been performed and what was the type (total or partial)
- **Changing Protocol**: which is the assigned bedding changing protocol (please refer to the DVC[®] Workplace manual)



5.3 Same animal ID but in different Cage IDs

It is now possible to create multiple animals with the same animal ID but registered in different cages.

This functionality is off by default, but it can be enabled on request.

5.4 NWC table

As previously described, the DVC® System daily analyze all the registered cages data during the dark period to generate an NWC outcome.

Only the NWC outcomes generated as anomalous hyperactivity, anomalous hypoactivity and no activity are translated into DVC[®] planned tasks (welfare warnings). All the others remain as NWC evaluations of the animal activity.

The NWC Table recap the latest 30-days evaluations for all the registered cages of any facility:

🔀 🇮 🏭 🕯								cages 🔊 🕅 Read	ers <u>1</u> 0 🐥 Alarms <u>34</u>	. .
Night Welfare Check Report										
Cage ID	Rack Name	Position	Room	▼ Date	Anomaly Score	Welfare Warning	Locate	Sickness Alarm	Task Status	Charts
Cage ID	Rack Name	Position	Room	All 🗸	All 🗸	All 🗸		All 🗸	All Y	
c-303	17001066A	C3	Showroom	September 15, 2021	No activity	Yes	Q	No	Not Assigned	E
c-302	17001066A	E5	Showroom	September 15, 2021	No activity	Yes	Q	No	Not Assigned	H
c-52	17001066A	D6	Showroom	September 15, 2021	No activity	Yes	Q	No	Not Assigned	ш.
c-313	17001066A	D8	Showroom	September 15, 2021	No activity	Yes	Q	No	Not Assigned	ш.
c-310	17001066A	F7	Showroom	September 15, 2021	No activity	Yes	Q	No	Not Assigned	ш.
c-388	17001066A	E8	Showroom	September 15, 2021	No activity	Yes	Q	No	Not Assigned	1
c-31	17001066A	F5	Showroom	September 15, 2021	No activity	Yes	Q	No	Not Assigned	1
c-521	17001066A	E4	Showroom	September 15, 2021	No activity	Yes	Q	No	Not Assigned	ш.
c-315	17001066A	В7	Showroom	September 15, 2021	No activity	Yes	Q	No	Not Assigned	ш.
c-48	17001066A	C6	Showroom	September 15, 2021	No activity	Yes	Q	No	Not Assigned	ш.
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Moreover, it also represents the historical report about planned tasks, when generated, if performed and by who, and if a Sickness Alarm (i.e., "Animal in trouble" alarm) has been triggered for that cage.

Furthermore, the corresponding Chart is available on request for any generated NWC task

(welfare warning) by clicking the corresponding icon 😐 .

5.5 Search Function

The search function allows finding a specific cage or a group belonging to a specific query request.

The search field is located on the top right-hand side of the Main page and is valid for several groups.

The user can search by:

- Cage Name: enter the Cage ID
- Animal Name: enter the Animal ID
- **Protocol**: enter the research Protocol
- **Owner**: enter the researcher or group of research
- Strain: enter the animal strain





The result of the specific search is firstly grouped by location (by BUOY):

	Cage ID Q c-313
Cage Search	inset the cage to and press enter to search 1 Cages found (0.157 seconds)
✓ ☐ Showroom & Pos_A	1 Racks

Then, clicking on the icon \checkmark , the precise location of the searched cage is displayed.



The corresponding cage can be easily illuminated just by clicking on the LED icon 2, and eventually, choose a different colour of the LED by clicking on this icon



Moreover, if the user wants to display the cage information, it is possible by clicking on the corresponding icon *i*, and the cage content appears:

c-313 stock	Researcher 1		Registered: Changing protoco	7 days ago J: Test Biweekly Edit all animals
Aremais Aremais Open atarms Bally check Checking change	 48 47 41 	State CT28 Marking Interface State CT28 Marking Interface State CT28 Marking State CT28 Marking Marking State CT28 Marking Mar	Date of birth B 97/2021 Cage same N/A Date of birth B 97/2021 Cage same V/A Date of birth B 97/2021 Cage same V/A Date of birth B 97/2021 Cage same	i %
Akimal reports		Peri rangu		
				Save Cancel

Suppose the user searches for multiple elements (such as cages belonging to a protocol or an Owner). In that case, the result can be a list of cages, always grouped at DVC® Rack level

that can be illuminated altogether by clicking on the upper icon 2 or also one by one selecting the proper cage to be individually illuminated:

🔀 🗒						owner Q -	Researcher 1	እ Readers <u>1</u> 0	🐥 Alarms <u>33</u>	*
Cage Search									5 Cages found (0.27	79 seconds)
▲ 🛛 Show	room 着 Pos_A								1	1 Racks
	17001066A									
	Cage ID	Cage Position	⊻ -							
DVC	e-313	C8	<u>0</u>	🌲 2	i					
Occupancy	c-48	C6	<u>0</u>	\$ 2	i					
Tasks	c-52	D6	<u> </u>	4 1	i					
62	Test Cage	A9	<u>©</u> •	4 1	i					
	Test Cage 2	A10	<u> </u>	\$ 2	i					

Last but not least, if the cage is in alarm, it can be seen directly at this level because a dedicated icon appears $^{\clubsuit\ 2}$

To discover the alarm, click on the icon i and select the appropriate tab of the cage label.

5.6 REM device management

It is possible to manage the REM device directly from the DVC® Operator interface. *s*²





The first step is to attach the REM to the DVC®Master following the procedure described in the REM manual.

The attached REM appears in the Operator interface with a dedicated icon:



It automatically recognizes the DVC® Master attached to.

To Configure it, click on the corresponding icon and then click the button

All the DVC® Racks (up to 4) attached to the same DVC® Master are displayed.



