Hardware Manual

Document that describes how to connect the different components
of the VECOS W1 Locker Management System.

0. Table of Contents

Revision History:

V0.0	09-10-2024	First release for W1
V0.01	16-10-2024	Several updates and required TUV modifications Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
V0.02	25-11-2024	Added Taiwan text
V0.03	29-11-2024	Updated Taiwan (Chapter 8 text)
V0.04	13-12-2024	Text with SAR info deleted, chapter 8

1. General information

1.1. Introduction.

VECOS Europe B.V is a leading European company in security & efficiency solutions with its own hardware, firmware and software development. The company started in 1996 and is located in Eindhoven, The Netherlands.

Releezme is the trademark name of VECOS Europe B.V. Locker Management System, consisting of a Hardware and Software part.

1.2. Purpose of the manual

This is document is intended as a guide to ensure correct installation of the VECOS Locker Management System hardware.

1.3. How to use the manual

This manual is designed to get you setting up the hardware the correct way.

1.4. The system consist of:

1. Power Supply
2. Power Connection Box
3. Colour Touchscreen Terminal Model no.: LBC 3.0
4. VECOS W1 Connection Box Model no.: VECOS W1 HUB
5. VECOS Locker Lock Model no.: VECOS W1

2. Power supply cabling

Power Supplies used are the Mean Well Enterprises Co., Ltd fanless HLG-185 series and a HEP version

Ordering Code	Type	Specification
AC12009/4	Power supply v3-68/100 (HLG-185H-24TE10)	27V / 6.9A (185W) TE10 (US-JunctionBox)
AC12009/5	Power supply v3-68/100 (HLG-185H-24TE11)	27V / 6.9A (185W) TE11 (C14)
AC12035/0	Meanwell HEP-185-24A	27V / 6.9A (185W)

HLG-Series:

The 24 in the type number of the HLG power supplies indicate the normal output voltage, and are internally adjusted to 27 V. The TE10 and TE11 in the type number indicate custom made power supplies. The input mains side consists of either the C14 connector or a Junction Box and that is also the only difference between the TE10 and TE11 power supply.

The output consists of 1 black/red cable and shall be connected to the Power Connection Box.

One side marked with INPUT will always need to be connected to the main wall outlet (100-240VAC or 277 VAC).

HEP Series

As alternative one the HEP power supply can be applied. It has a C14 connector as input, so it cannot be used in the US and Canada for a Fixed locker bank. Default this PSU is 24v, but is adjusted to its maximum voltage.

Connecting the INPUT:

The side marked with INPUT shall be connected to the mains wall outlet (90-305 VAC 50-60 Hz).
The TE10 versions are provide with a JunctionBox and are for the USA & Canadian market, where the locker bank is at a Fixed location, for example in a Wall. These TE10 Power supplies shall be installed by a qualified and experienced technician. An all-pole mains switch in accordance with UL62368-1 Annex L shall be incorporated in the electrical installation of the building.
The TE11 and the HEP version are provided with a C14 connector and are for all other cases, e.g. lockers put in front of a wall or at the end of desks. Those lockers are also often replaced by customers.

TE10 - JunctionBox

TE11 - C14

If the input is connected to a UPS, you can connect 2 small 185W PSU to 1 UPS of 650VA.

Connecting the OUTPUT:
The output wires of the power supply need to be connected to the Power Connection Box, Red on the + and Black on the – of the 4-level connector.

In the empty position of the 6 level connectors, power extension cables can be connected. The 3 white power connectors can connect directly to HUB's or a Terminal.

The Power Supplies are delivered with the Power Connection Box (AC13009/0) and need to be connected onsite. In case the Power Supplies are mounted in/under/on-top of a metal locker, use self-tapping screws to connect it to ground.
The Power Connection Box has a limit of 18A, so never use a PSU that can supply more then 18A!

2.1. Extending the standard power cable length

If the standard 27Volt power cable is too short, it is allowed to apply longer cables. Please use suitable UL-Listed connectors (WAGO) and cable (2x2.5mm^2 [AWG 13] to be sure the connections are reliable, and the voltage drop over the total supply cable is less than 4 Volt.

For USA & CAN, only VW-1 cables up to 3.05m [10 ft] can be supplied, longer cables need to be sourced locally and require to be in compliance with the Canadian Electrical Code, Part I, CSA C22.1, and the National Electrical Code, NFPA 70

For connecting the cables we advise the WAGO Splicing wire connectors:

Type	No contacts	Specification
Wago 221-413	3 ways	0,14 – 4 mm2 (AWG 24-12)
Wago 221-415	5 ways	0,14 – 4 mm2 (AWG 24-12)

2.2. Connect the Power Supply to the HUB

To be sure everything operates well, always use at least 2x2.5mm^2 [AWG13] cable to extend the power cable over distance.

The VECOS W1 HUB only uses a little amount of power (10mA / 0.27W), so it is allowed to daisy chain the HUBs. If it is limited to 10 HUBs in 1 chain, the max. current is 1A so that should not give a big power drop.

As last, the terminal needs to get power, the LBC 3.0 terminal uses the same cabling as applied between the HUBs. It is not important where the terminal is connected to the power because its power consumption is also very low.

All standard cables between the HUB's and the LBC 3.0 are the same.

VECOS Ordering code	Description
CUL16061/1	HUB Data Cable 3.0m [9.8 ft]
CUL16062/1	HUB Power Cable 3.0m [9.8 ft]

Power Cable:
Cable specification : UL2648 16AWG 2C Colour: black & Red
Jack specification : WR MPC4 Nylon 66 UL94V-2

Data Cable:
Cable specification : UL2725 8C 26AWG VW-1 round cable, 5.0 mm.
Jack specification : 8P8C Modular Jack gold plated, squareness type.

As Data cable, also a normal UTP CAT5E or CAT6 network cable can be used, but never use a shielded cable, always an unshielded cable.

CUL16061/1 CUL16062/1

3. HUB interconnection cabling

3.1. VECOS W1 HUB Connections

Both power connections and both communication ports are the same (internally connected parallel),

3.2. VECOS W1 HUB settings

There are multiple ways to control the block open signal (also called the Emergency Open signal) of the W1 locks connected by BLE to the W1 HUB, see the table below for the possible settings.

Every HUB that has an Block signal setting selected, will pass on the selected Block signal to the Locks once the W1 Locks connects to the HUB. If the signal becomes active, all locks connected to this HUB will be activated (after the lock wakes up by touching it).

The communication lines of the W1 HUB need to be terminated at both ends of the entire communication bus. This means max. TWO no 4 switches are ON in the entire bus, most of the time just 1 because the terminal is connected to the other end and has default termination active.
A simple rule: if there is only 1 RJ45 (data cable) connected, then this is the end of the bus and termination needs to be activated.

Dip switch settings:

No	Function	Default
1	Antenna selection, OFF=Internal, ON=External	OFF
2	Bus Block 1 signal connect to Block open	OFF
3	Bus Block 2 signal connect to Block open	OFF
4	RS485 Termination (activate on last HUB)	OFF

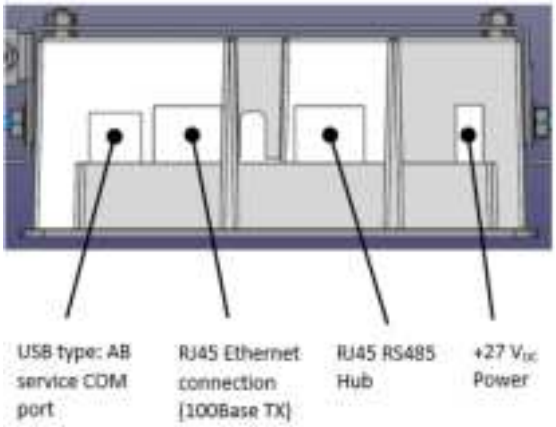
3.3. VECOS W1 HUB Antenna

The HUB W1 has an internal antenna (default) and optionally an external antenna.
Only the by Vecos supplied External antenna can be used and needs to be installed by a trained professional.

4. Terminal cabling

4.1. LBC 3.0 Terminal

The LBC 3.0 terminal can be connected with the same cables as used for connecting HUBs, but only the TCP-IP Network cable needs to be a CAT5E or higher network cable, so NOT the cable used between the HUBs.



A switch and jumper is placed between the 2 RJ45 ports,.
The Jumper is to activate the RS485 termination (default placed), remove the jumper if the LBC 3.0 is not connected to the end of the RS485 cable, in that case terminate the 2 HUBs at the end of the RS485 communication bus.

4.2. LBC 3.0 Key switch

The LBC 3.0 contains the emergency open switch:

Middle position is off.
To back: Block 1 active.
To front: Block 2 active.

To indicate the status active state, a lock symbol is placed in the top line of the display with a 1 or 2 next to it:

If one of them is active, the HUBs configured with the dipswitches to check the Block 1 or 2 signal will activate all locks attached to that HUB accordingly once the lock is woken.

5. Example Technical locker

The picture below shows for example in what way the wiring should be routed and the components should be nicely installed in a wooden locker. It shows how the main outlet, network connection and the terminal in the locker are positioned.

As installer it is very important that the Technical locker is nicely left behind and that cables can't get stuck between the door. Never drop the cables and materials just in there, but fix these as shown below.

Also make sure that no other components of the system are accessible for ordinary persons (HUBs, wires, …).

6. VECOS W1 LED indications

6.1. W1 HUB Led indications

Name	Pattern	Meaning
OFF	off	(not used)
IDLE	green 🟢 (with subtle "breathing" effect)	Operating normally
ASSIGN_ID	alternating red 🔴/green 🟢 (2400ms cycle)	ID assignment active (accept bonding)
PAIRING	blue 🔵 (with subtle "breathing" effect)	Accept bonding
BLOCK_OPEN	orange 🟠 (with subtle "breathing" effect)	Block overrule active
BOOTLOADER_WAITING	alternating red 🔴/green 🟢/blue 🔵 (3600ms cycle)	Bootloader mode, waiting for commands
BOOTLOADER_ACTIVE	alternating red 🔴/green 🟢/blue 🔵 (900ms cycle)	Bootloader mode, has received commands
NOTIFY_CONNECT	single blue 🔵 fade in/out (1000ms)	BLE connection established
NOTIFY_ID_ASSIGNED	single red 🔴/green 🟢/red 🔴/green 🟢 (500ms each)	ID assigned (ID assignment mode only)
NOTIFY_SUCCESS	double green 🟢 blink (500ms each)	Bootloader: update success
NOTIFY_FAILURE	double red 🔴 blink (500ms each)	Bootloader: update failed
HAS_ERROR	red 🔴 (with subtle "breathing" effect)	A crash log is present

Notes:

- The LED intensity is configurable (and can also be set to 0% to effectively disable the LED).
- The HAS_ERROR pattern is only shown after power on, until another pattern is activated.
- When the bootloader is activated, it initially takes several seconds to erase the old application, during which the LED pattern animation is suspended. This means the LED stays red for several seconds (since that's the first color of the pattern). Not to be confused with NOTIFY_FAILURE or HAS_ERROR!

Diagnostic LEDs

The two RJ45 connectors (RS485 LBC/Hub connection) have in total 4 LEDs that show diagnostic status.
Normally all 4 should be on when the hub is powered. The green LEDs are controlled directly by hardware, the orange LEDs are controlled by firmware (can be changed using test interface commands). No blinking or dimming is used.

Details:

- Left port orange: I/O pins initialized
- Left port green: 3V3 supply present
- Right port orange: Firmware (either bootloader or app) fully started
- Right port green: 5V supply present

6.2. W1 Lock Led indications

Name	Pattern	Meaning
OFF	off	Default state
CONNECTING	100ms blue, 100ms off, 2000ms fade blue from 5% to 100%, off	Waiting for connection with hub
OPEN_ALLOWED	200ms green, 200ms off, 200ms green, off	Unlocking done, can now open
OPEN_DENIED	200ms red, 200ms off, 200ms red, off	Unlock not allowed (denied by hub)
LOCKED	500ms red, 500ms fade red from 100% to 0%	Locking done
PAIRING_MODE	200ms red, 200ms green, 200ms red, 200ms green, off	Not bonded, waiting for connection
CONFIRM_ACTIVE	100ms blue, off	Confirm touch action, already busy
CONFIRM_OPEN	100ms green, off	Confirm touch action, already open
MOTOR_FAILURE	50ms orange, 50ms off, 50ms orange, 50ms off, 50ms orange, off	Motor action failed
PAIRING_SUCCESSFUL	500ms fade in cyan, 200ms solid cyan, 500ms fade out	Lock bonded/paired with Hub
UPDATING	200ms dim magenta, 200ms off, repeating	Update in progress (see notes)
UPDATE_SUCCESS	500ms green, 500ms magenta, 500ms green, 500ms magenta, 500ms green	Update finished successfully
UPDATE_FAILURE	500ms red, 500ms magenta, 500ms red, 500ms magenta, 500ms red	Update aborted due to error
BOOTLOADING	repeated red/green/blue	Bootloader active
BOOTLOAD_WAIT	repeated red/green/blue	Bootloader active
	red 10%	Error indication, see below

Notes:

- In the table, a color without percentage means 100%.
- Orange is 100% red + 30% green.
- 100% means the full configured intensity. So if intensity is set to 40%, a 100% in the pattern will correspond to 40% * 100% = 40% duty cycle.
- The bootloader has its own patterns: it uses a repeated red/green/blue pattern in two different speeds (slow=waiting for a serial connection, fast=active)
- A firmware crash will set the led to 10% red, until the watchdog resets the firmware (~1 sec)
- The firmware also shows 10% red when powered via service tool and a crash log is present (until another pattern is activated)
- At start of an update the LED will be dim magenta for several seconds without blinking: this indicates that the Lock is performing an erase of its update region (currently the erase is non-blocking and therefore stops the LED animation from advancing).

Possible colors:
Red
Orange
Yellow
Green
Cyan
Blue
Magenta

7. UL approved system components

Our “Releezme W1 Hardware” is cULus Listed under File no E513979.
The following products are part of this certification:

- Power Supply
  - AC12009/4, Meanwell HLG-185H-24TE10
  - AC12009/7, Meanwell HLG-185H-24TE11
  - AC12035/0, Meanwell HEP-185-24A
- Power Connection Box, needed after every power supply
  - AC13009/0, Power Connection Box
- LBC 3.0 Locker Bank Controller with 7” color display
  - TM15001/1, LBC 3.0 Colour Touchscreen Terminal
  - MO17011/0, LBC 3.0 Protector
- VECOS W1 HUB Controller to connect W1 Locks
  - PC18009/0, W1 HUB w/o cables
  - PC18009S0, W1 HUB
- VECOS W1 lock
  - AC17016/x, VECOS W1 Lock
  - AC11007/0, VECOS W1 Service Tool
- RJ45 Data cable between HUBs and to the LBC 3.0 terminal
  - CUL16061/1, HUB Communication cable 3m
- Red/Black power cable between HUBs and to the LBC 3.0 terminal
  - CUL16062/1, HUB Power cable red/black 3m

8. Compliance Statement about RF, Safety and EMC

Power Connection Box, W1 Lock, W1 HUB and LBC 3.0 Colour Touchscreen

Hereby VECOS Europe B.V. declares that the subject equipment is in compliance with:

CE:

- EMC directive 2014/30/EU
- Low Voltage Directive2014/35/EU
- RED directive 2014/53/EU
- RoHS Directive 2011/65/EU (RoHS 2), (EU) 2015/863 and (EU) 2019/171
- REACH Regulation 1907/2006/EC

UK CA:

- The Radio Equipment Regulations 2017 (S.I. 2017.1206) of the UK Legislation relating to radio.
- UK Legislation Environmental Protection 2012 No. 3032 Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012.

FCC and ISED:

- Model: W1 Lock FCC ID: 2ACYAW1LOCK and IC: **25896-W1LOCK**
- Model: W1 HUB FCC ID: 2ACYAW1HUB and IC: **25896-W1HUB**

FCC Statement:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital devices, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.
This equipment generates, uses and can radiate radio frequent energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.
If this equipment does not cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
- Consult the dealer or an experienced radio/TV technician for help.
- To ensure compliance with FCC regulations, use only the interface cables provided with the product, or additional specified components or accessories that can be used with the installation of the product.

Changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and a human body.

ISED EMC Declaration:
This Class B digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de Classe B est conforme à la norme Canadienne ICES-003.

ISED Statement:
This device contains license-exempt transmitter(s) that comply with Innovation, Science and Economic Development Canada's license-exempt RSS(s). Operation is subject to the following two conditions:
(1) this device may not cause interference,
(2) this device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :
(1) L'appareil ne doit pas produire de brouillage;
(2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and a human body.
Cet équipement est conforme aux limites d'exposition aux rayonnements ISED établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec une distance minimale de 20 cm entre le radiateur et un corps humain.

Electrical Safety USA & Canada:
The equipment supplied is part of the "Releezme W1 Hardware" system and is cULus approved with File number **E513979**, CCNs AZOT/AZOT7 according to UL 62368-1 and CSA C22.2 No. 62368-1-14 Audio/Video, Information and Communication Technology Equipment – part 1: Safety requirements - Edition 3 – 2019

India:

The LBC3 terminal is approved under License R-41261793 by the Bureau of Indian Standards (BIS) and is in compliance with:
- IS 13252 (PART 1):2010
- IEC 60950-1 : 2005

In India only power supply Mean Well HLG-480H-30TE11 may be used, because only this one has BIS approval.

Taiwan:
NCC Statement:
本器材須經專業工程人員安裝及設定，始得設置使用，且不得直接販售給一般消費者

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