

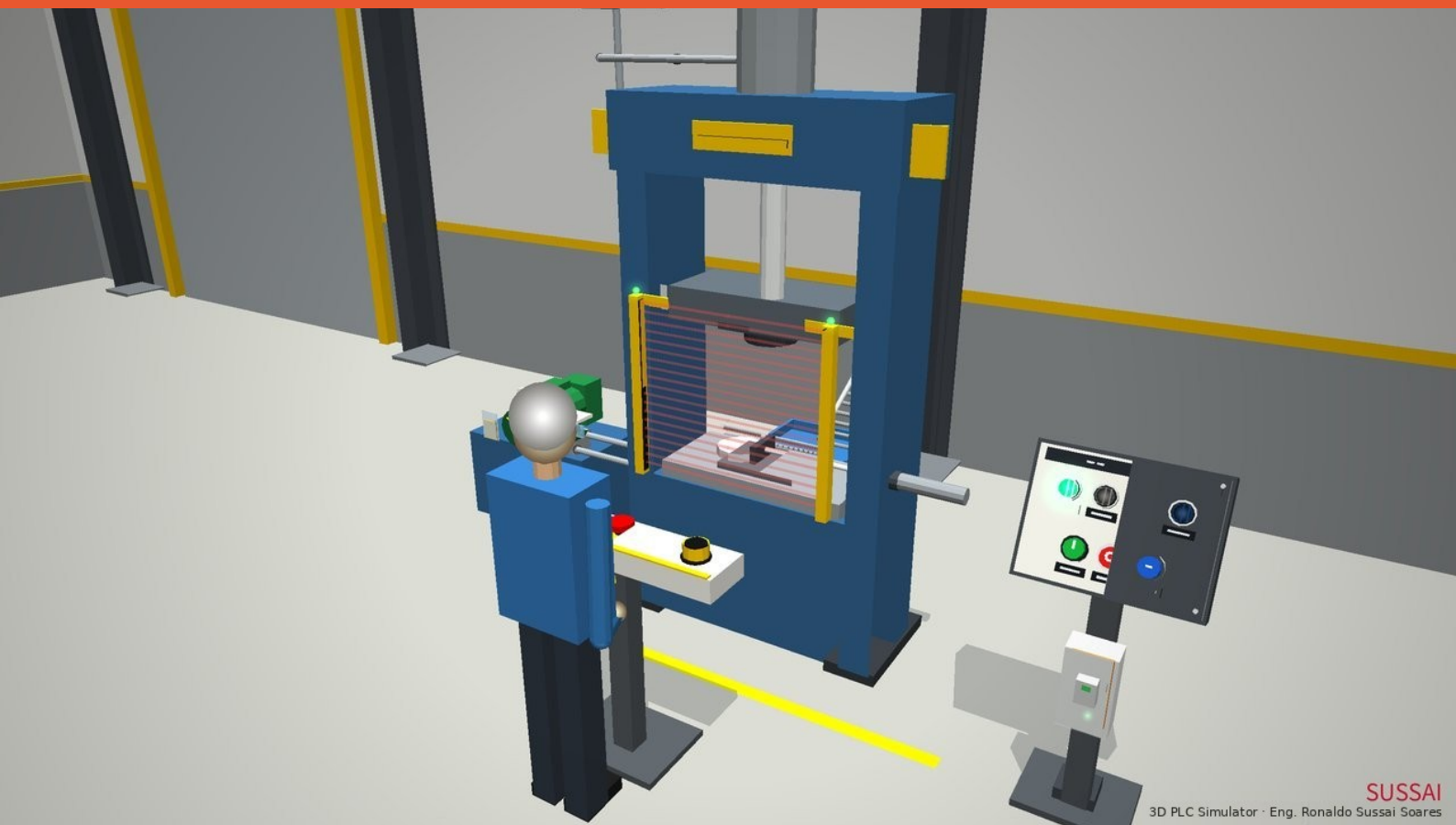
SussaiLab

SUSSAI CLP

3D PLC Simulator

User Manual

Version 1.0 (rev. 66n) - Clic02 and LogixPro style Ladder - 15 machines in 3D - Gamification



SUSSAI
3D PLC Simulator - Eng. Ronaldo Sussai Soares

15

machines in 3D

12

graded exercises

2

PLC styles

3

languages

7

free days

NEED HELP?

contato.sussai@gmail.com - <https://sussailab.com.br>

In the program: Help > Report a problem (the message is ready to send). See chapter 14.

SussaiLab - Designed and developed by Ronaldo Sussai Soares, Electrical Engineer

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Language: SUSSAI is available in **English (US)**, **Spanish** and **Portuguese (Brazil)**. Choose the language in the language box on the top bar (PT-BR / EN-US / ES) of the program or with the links on the login screen; the whole program, the help and this manual follow the chosen language. Only the I/O addresses and tags (I0, Q1, B1, K1, T0, C0...) are the same in every language.

1. Introduction

Welcome to **SUSSAI CLP**, the 3D PLC simulator from **SussaiLab**. Here the student programs a Programmable Logic Controller in **Ladder** (IEC 61131-3), in the style of **WEG Clic02** or **Allen-Bradley LogixPro**, and sees the industrial machine run in **3D**, reacting to the program in real time - with sound, real faults for maintenance training and safety according to **NR-12**.



Real program image: scene 08 - two-way traffic light with pedestrians.

What you will find

Feature	In short
15 machines in 3D	From the simple conveyor to the 4-floor elevator, each one with real PLC inputs and outputs, ready programs and challenges.
Ladder editor	NO/NC contacts, edges, coils, SET/RESET, TON/TOF, CTU/CTD; Clic02 (I01, Q01) or LogixPro (I:1/0, O:2/0) addresses.
Maintenance	Real faults: thermal relay with smoke, dirty sensor, broken wire, welded contact, burnt lamp.
Gamification mode	12 guided exercises graded 0 to 10 and a hint lamp that shows where the error is.
Realistic sound	Motors, pumps, liquids, horns, traffic and clicks, with volume per type ("Quick guide" chapter).
3 languages	Portuguese (Brazil), English (US) and Spanish: program, help, website and this manual.
SussaiLab (launcher)	A single program with your account login and all SussaiLab simulators: CLP (paid) and Electrical Controls, Panel Assembly and Basic Electricity (free, no launch date yet).

Who it is for

- Students and instructors of technical and industrial apprenticeship courses (electrician, electromechanics, mechatronics, automation).
- Beginners in electrical controls and PLCs who want to practice without risk before going to the workbench.
- Instructors who need standardized hands-on assessment (Gamification Mode).

Requirements

- Windows 10 or 11, with Microsoft Edge (included in Windows) or Google Chrome.
- Google account (Gmail or school Google account) to sign in and activate the license.
- Internet to sign in and release the license. After that it works offline and checks the license from time to time (every day in the 1st week, then every 30 days).
- Recommended: screen of 1366 x 768 or larger. On slower computers, use Low image quality.

IMPORTANT - read before you start

- Always use the **same Google account**: the license is tied to it.
- The **free trial lasts 7 days** (scenes 01, 02 and 03), once per account and per computer.
- On the first access on each computer a **6-digit code** arrives in your e-mail.
- **Do not set the Windows date back**: the program locks until the date is fixed.
- To use it on another computer, **Sign out (logout)** or "Disconnect this computer" on the old one.

NEED HELP? CONTACT SUSSAILAB

E-mail: contato.sussai@gmail.com - **Website:** <https://sussailab.com.br>

Inside the program: Help > Report a problem (bug), Send a suggestion or Question for the creator
- the message is ready to send, with the technical information.

To speed things up, send: the Google e-mail of the license, what happened (step by step), a screenshot (Win+Shift+S) and the build number (Help > About).

2. Installation and first access

SUSSAI CLP comes inside **SussaiLab**, a single program (launcher) with your account login and all SussaiLab simulators. No installation needed: it is a single file. The same file works for the free trial and for the full version - your license decides.

Your account	What opens when you click SussaiLab CLP > Open
Free trial (7 days)	Scenes 01, 02 and 03 (normal and gamification mode). The remaining time shows on the CLP card.
Paid license (Monthly, Semiannual, Annual, Group)	Full version: 15 scenes , 12 exercises and extra scenes (.cena).



Step by step (first access)

- Download **SussaiLab.zip** from **sussailab.com.br** (sign in on the website and click **Download SussaiLab for Windows**).
- Unzip it (right click > **Extract all**) and double-click **SussaiLab.exe**. It opens in its own window using Edge or Chrome.
- On the **Sign in to your SussaiLab account** screen, type your **name** and **mobile/WhatsApp with area code** (first time only - if you already have an account on the website, leave them blank).
- Click **Sign in with Google** and choose your account. Type the **6-digit code** sent to your e-mail (first time on this computer only).
- The **SussaiLab programs** screen opens with the 4 programs on a single screen: 01 **SussaiLab CLP**, 02 Electrical Controls, 03 Electrical Panels and 04 Basic Electricity. On the CLP card click **Open**. Done: **7 free days** right away.

The SussaiLab programs screen (launcher)

Where	What it does
SussaiLab CLP card	Shows the plan and the remaining time. Open starts the simulator (trial or full, according to the license). During the trial there is also Buy license .
Free program cards	Electrical Controls, Electrical Panel Assembly and Basic Electricity: free, no launch date yet . Notify me puts your e-mail on the launch list.
PT / EN / ES (top)	Changes the language of SussaiLab and the simulator.
My license (top)	Opens the license window: plan, expiry, remaining time, check now, buy/renew.
Sign out (top) - logout	Click twice (confirmation). Signs out, frees this computer in the license and goes back to the login screen. Your circuits and grades stay saved.

Inside **SUSSAI CLP**, the **License** window (top bar or Help > License) also has **Back to SussaiLab programs** and **Sign out (logout)**.

Windows warning: because it is a new program, Windows may show "Windows protected your PC". Click **"More info" > "Run anyway"**. If a blocked pop-up window warning appears, allow the Google sign-in window.

Entry screen (internal login)

After the license, SUSSAI shows the entry screen with the machines running in the background. Use **user: guest** and **password: 1235** (or your own user name, to keep each student's scores separate on the same computer).

Where your files are stored

Saved circuits, scores and the license are stored on the computer itself, in the folder **%LOCALAPPDATA%\SUSSAI**. Deleting this folder resets SUSSAI on that computer (circuits and scores are lost).

Already used SUSSAI_CLP.exe or SUSSAI_CLP_Test.exe? They keep working with the same account. SussaiLab is the recommended way: a single file, with login, logout and all programs.

3. License, plans and computers

Plans and prices

Plan	Duration	Computers at the same time	Card (up to 12x)	Pix (5% off)
Free trial	7 days	1	free	free
Monthly	1 month	2	R\$ 19,90	R\$ 18,90
Semiannual	6 months	2	R\$ 59,90	R\$ 56,90
Annual (most chosen)	1 year	2	R\$ 99,90	R\$ 94,90
Group (schools, labs, companies)	1 year	up to 20	R\$ 999,90	R\$ 949,90

Prices in this edition of the manual (Brazilian reais). Updated prices are always at <https://sussailab.com.br>. There is no lifetime license: every plan has a term.

How to buy (automatic release)

- **In the program:** the purchase window appears when the trial opens and in License > Buy / renew. Choose the plan and click **Pay with Pix** or **Pay with card**.
- **On the website:** sussailab.com.br > Plans > Buy. Enter your name, **Google e-mail** (you sign in to the program with it) and WhatsApp.
- Payment is made on **Mercado Pago**. Once approved, the license is **released by itself** within minutes: **SussaiLab** starts opening the full version and you get an e-mail with the download link. No need to send a receipt.
- Renewing before the end **adds** the new period to the remaining time.

Manual license (bank transfer, bank slip or school)

Paying by bank transfer, school purchase order or got a courtesy license? Use **Request a manual license** (on the entry screen, in the purchase window or on the expired license screen):

- Fill in name, WhatsApp, the desired plan and a message (payment method, school name) and click **Sign in with Google and send the request**.
- The request reaches SussaiLab. SUSSAI CLP stays on the **Waiting for approval** screen and checks by itself every 20 seconds (you can close it and open it later).
- When the request is **approved**, SUSSAI CLP opens by itself (full version) and you get a confirmation e-mail. If it is refused, a notice appears.
- The license is always **online**: there is no license file to copy.

SussaiLab account and confirmation code

- The **SussaiLab account** is your Google account. The same account works on the sussailab.com.br website and in all SussaiLab programs: if you have already signed up on the website or in another program, you **do not need to fill in name and WhatsApp again** (leave them blank and click Sign in with Google).
- The **first time** on a computer, SUSSAI CLP asks for a **6-digit code** sent to your Google e-mail (subject "Your SussaiLab code"). Type the code on the **Confirm it is you** screen. The code is valid for 15 minutes.
- The code is requested **only once per computer**. After that the program opens directly. A computer already confirmed in one SussaiLab program is valid for the others.

- Did not arrive? Check the spam folder and use **resend the code**. Wrong 5 times? A new code is sent automatically.

License rules

- The license is tied to the **Google account**. Always use the same account.
- The term starts when the license is released (purchase on the website: when you sign in to the program for the first time).
- **Remaining time** always visible in the top bar, in **months and days** (e.g. "3 months and 12 days"). It turns **yellow** with 30 days or less and **red** with 15 days or less.
- When the plan ends, SUSSAI CLP **stops opening, even without internet**. Your circuits and scores stay saved.
- In the **first 7 days** after release SUSSAI CLP checks the license once a day; after that, every 30 days (when there is internet).
- **Changed computers?** Use **Sign out** in SussaiLab (logout) or License > "Disconnect this computer". The seat becomes free for the new computer.
- **Do not set the Windows date back:** SUSSAI CLP blocks until the date is corrected.
- Withdrawal: within 7 days after release, with a refund (Brazilian Consumer Protection Code, art. 49). The license is then blocked.

How to check the license period

- **In the SUSSAI CLP top bar:** the button shows the time left, in months and days. Hover to see the **exact expiry date**; click to open the license window.
- **In the License window** (button, or Help > License): plan, **valid until** (date), **remaining time**, code, computers and Google account.
- **In SussaiLab (launcher):** the SussaiLab CLP card shows the plan, the date and the remaining time; the **My license** button at the top opens the same window.
- **Colors:** normal = more than 30 days · **yellow** = 30 days or less (time to renew) · **red** = 15 days or less. In the 7-day free trial the notice is yellow, and red in the last 2 days.

How to renew or top up (add more time)

- **From the program (fastest):** License > **Buy / renew** > choose the plan (Monthly, Semiannual, Annual or Group) > **Pay with Pix** or **Pay by card**. Once payment is approved, the new time is added by itself within minutes.
- **From the website:** sussailab.com.br > SussaiLab CLP > Plans > Buy, using the **same Google e-mail** as your license.
- **Time is ADDED:** renewing before the end, the new months start after what is still left (you lose no days). If it has already expired, it counts from the renewal day.
- **Manual top-up (school, bank transfer, courtesy):** request it on the **Request manual license** screen or write to contato.sussai@gmail.com with the license Google e-mail and how much time you want to add. SussaiLab does the **top-up** (7 or 15 days, 1, 2, 3 or 6 months, 1 year...) and you get an e-mail.
- **After renewing or topping up:** SUSSAI CLP checks by itself; to update right away, open License > **Check now**. The button goes back to normal (no yellow/red).

SUSSAI CLP License window

Shows the Google account, the plan, the expiry, the **remaining time**, the code, how many computers can use it and the ID of this computer. Buttons: **Check now** (looks for renewal), **Buy / renew**, **Disconnect this computer** and, in SussaiLab, **Back to SussaiLab programs** and **Sign out (logout)**.

4. Welcome screen: Normal Mode or Gamification

Mode	What it does	Best for
1 - Normal Mode	You program in Ladder freely. The diagram opens blank; the Program menu has the ready-made programs (COMPLETE) and the CHALLENGES (one contact missing / one link missing).	Classes, free study, building and testing logic.
2 - Gamification Mode	Exercises with a ready circuit and a sequence of steps: operate the machine, answer, find a hidden fault and fix the program. At the end the score from 0 to 10 is shown.	Hands-on assessment, review and healthy competition.

To change mode: **File > Welcome screen**. To return to the login: **File > Exit**.

Quick guide: every SUSSAI CLP feature

Everything the program has, organized by topic. The next chapters explain each part in detail.

Ladder programming

Feature	Where	What it does
Ladder editor	Diagram area	Left click inserts, Delete erases, double click opens properties (Clic02 style). Parallel branches get their own numbered row (000, 001...).
Advanced instructions	Edit > Advanced instructions	SET/RESET, rising/falling edges, TOF, CTD and RES.
PLC style	View > PLC style	WEG Clic02 (I01, Q01, M01) or LogixPro/RSLogix 500 (I:1/0, O:2/0, B3:0/0). The program is the same.
Names (aliases)	Edit or Tools > Names of contacts and coils	Gives a name to each address (e.g. PUMP_ON). It applies to every contact/coil with the same address and is saved with the circuit.
Extra I/O	Any address up to I100/Q100	I01-I100, Q01-Q100, M01-M256, T01-T100, C01-C100. Extra input = virtual switch; extra output = virtual lamp on the panel.
Check the program	Diagram bar button / Tools > Go to the first error	Checks whether your program does the same as the complete program and takes you to the first error or warning.
Undo / redo	Ctrl+Z / Ctrl+Y	Undoes or redoes the last diagram changes.

Simulation and machines

Feature	Where	What it does
RUN / STOP	F5 / F6 or Simulation	Runs or stops the PLC. In RUN energized rungs turn green.
3D button panel	In the scene (Button panel window)	Click and hold to press. Emergency stop latches/unlatches (NR-12). Double-click a lamp or button to change its color (IEC 60204-1).
Machine actions	Simulation > On this machine	Place a box, call a pedestrian, number of cars, automatic box feeding (Low: 1 every ~9 s; Medium: ~5 s; High: ~2.5 s), clear.
Faults (maintenance)	Simulation > Faults and training / Tools > Maintenance	Turns on real faults, including a hidden fault for the student to find.
I/O table and forcing	Tools > Inputs and Outputs	Shows the state of each input/output and allows forcing for tests.
Memories, timers, counters	Tools > Memories · Timers · Counters	Real-time values (elapsed time, count, done bits).
Events	Tools > Events	Log of what happened on the machine (starts, trips, alarms).
Your video here	Help > Your video here · sussailab.com.br/videos-en.html	Recorded a class, challenge or project with SussaiLab? Publish it (YouTube, Instagram, TikTok...), sign in with Google on the page and send the link. Once approved, it shows on the website with your name and school.
Extra scenes (.cena)	Scene > Add new scene	Extra scenes store (Scene > Store): new machines regularly – browsing is free, downloading is for the paid license; scenes encrypted and tied to your account. Also installs your own .cena files. Chapter 10.

Teaching and assessment

Feature	Where	What it does
Ready programs	Program / File > Open ready program	Complete ones (from the simplest to the most complete) and the description of each.
Challenges	Program > Challenges - one part missing	"One contact missing" and "one connection missing" for each program: the student completes the diagram.
Hint lamp (Show where)	Lamp button in the challenge / Fix the program step	Blinks every point that is missing or different on the diagram. In gamification it counts as a hint (costs points).
Gamification mode	Welcome screen > 2	12 exercises graded 0 to 10, saved in My results per user. Chapter 9.

Feature	Where	What it does
Tutorial	Help > Tutorial	PLC, Ladder, seal-in, TON, counters - step by step for beginners.
Machine help	Help > Help and I/O map	Explains the current machine and shows the input/output map.
Users (internal login)	File > Exit (switch user)	Each student signs in with their own name to keep circuits and grades separate on the same computer.

Files, printing and reports

Feature	Where	What it does
My circuits	File > Save (Ctrl+S) / My circuits	Saves on the computer; each item has a trash button. "Continue my last work" reopens where you stopped.
.json file	File > Download / Open .json file	Takes the circuit to another computer, USB drive, e-mail or Teams. Switches scene by itself when opened.
Technical sheet (PNG)	File > Export the diagram as image	Creates the diagram on an A4 or A3 technical sheet with title block (project, author, date, machine), margin and SussaiLab mark, ready for reports or printing.

Screen, 3D image and windows

Feature	Where	What it does
Image quality	View > Quality / Show in scene box	High (soft shadows), Medium or Low (PC without graphics card). Lowers itself if the image stutters.
Light 3D engine	View > 3D engine	Graphics card (WebGL) or light 3D, which works on any PC.
Cameras	View > Camera / mouse	Initial, Front, Top and Orbit around the machine; drag rotates/moves, wheel zooms.
Windows over the scene	View > Windows over the scene	Cameras, Indicators, Button panel, Show in scene and Frames/s: drag to move, minimize or close; "Open all" restores the default.
Labels and descriptions	View > In the scene / In the diagram	I/Q address on each object, part names and description under the contacts.
Two screens	View > Two screens	Opens the 3D scene in another window (e.g. projector or second monitor) and keeps the diagram on the main one.
Simple screen / Show all	View	Simple screen (recommended) hides what is not essential; Show all opens every panel.
Full screen	F11	Uses the whole screen; F11 or Esc goes back to the window.
Truncated names	Any menu or label	Menus wrap the text; resting the mouse 0.6 s on a truncated text shows the full description.
Language	Language box at the top / login screen	Portuguese (Brazil), English (US) and Spanish. Addresses (I0, Q1...) are the same in all 3.

Sound and volume

SUSSAI CLP has realistic sound generated on the fly: motors and pumps with rotation, liquids (filling, bottling, overflow), compressed air and hydraulics, horns, sirens and beeps, traffic (cars, motorcycles and trucks) and clicks of buttons, contactors and falling boxes. Turn it on or off in **View > In the scene > Sound**; adjust it in **View > Volume...** or with the speaker button on the top bar (right click: on/off).

Sound type	Examples	Default volume
Master volume	Controls all sounds together	50%
Machines	Motors, pumps, hydraulics, compressed air	30%
Liquids	Water, juice, filling, overflow	10%
Horns, sirens and beeps	Alarm, gate horn, elevator beep	10%
Traffic	Cars, motorcycles, trucks at traffic lights	10%
Clicks	Buttons, contactors, falling boxes	50%

In the volume window: **Test sound** plays a sample and **Default** restores the values in the table. In class, keep the master volume low and use headphones when possible.

Account, license and support

Feature	Where	What it does
License	Top bar / Help > License	Plan, expiry, remaining time (months; 30 days or less, days), check now, buy/renew, disconnect this computer, back to programs and sign out.
Login and logout	SussaiLab > Sign out / License window	Sign in with Google (6-digit code only on the first access on each computer) and sign out freeing the computer.
Report a problem / suggestion	Help > Early Access	Ready message with technical information to contato.sussai@gmail.com . Chapter 15.
News and new version	Help > News / automatic notice	Shows what changed and warns when there is a new version on the website; the license stays valid.

5. The work screen

The screen has the **3D machine**, the **Ladder diagram**, the **inputs and outputs** panel and the status bar. All commands are in the menu bar at the top:

Menu	What it contains
File	New, ready-made programs, My circuits, open/download .json file, save (Ctrl+S), export PNG (A4/A3 technical sheet), welcome screen, exit.
Edit	Undo/redo, insert/delete rungs, advanced instructions, Names (aliases for inputs, outputs and memories).
Scene	Choose the machine (01 = easiest) and Adicionar cena nova (.cena) (Add new scene).
Program	Ready-made programs for the current machine: complete, step by step, with an intentional error, and challenges.
Simulation	PLC RUN/STOP, machine actions (place a box, call a pedestrian...) and faults for training.
View	What appears on screen, cameras, quality (Low / Medium / High) , two screens, Clic02 or LogixPro addressing style, language (PT-BR / EN-US / ES).
Tools	I/O table, memories, maintenance, event log, names.
Help	License (time left, buy/renew), tutorial, machine help, button colors (IEC 60204-1), shortcuts, Report a problem, Send a suggestion, What's new and About.

3D camera controls

Mouse action	Result
Drag with the left button	Rotate the view
Drag with the right button	Pan the view
Mouse wheel	Zoom in / out
Double-click an object	Zoom to the object
Click the 3D panel buttons	Press the button (as on the real machine). The emergency stop latches; click again to release it.

"Show in scene" box

In the lower right corner of the scene is the **Show in scene** box (click to collapse it):

Option	What it does
Addresses (I / Q)	Shows a tag with the PLC address on each button, lamp, motor, sensor and valve (green = input, orange = output). It follows the chosen style: I01/Q01 (Clic02) or I:1/0 and O:2/0 (LogixPro). Uncheck it to keep the scene clean.
Descriptions	Shows the names and explanations of the parts.
Pedestrian lights	Only in the 2-way and 4-way traffic light scenes: starts OFF (cars only). Check it to install the pedestrian lights and push buttons and increase the difficulty.
Low / Medium / High	Low: light, no shadows (PC without a graphics card). Medium: balanced. High: game mode (soft shadows, ambient occlusion, lamp glow, anti-aliasing).

Slow computer? Choose **Low** in the Show in scene box (or in View > 3D image quality). SUSSAI also lowers the quality by itself when the image stutters. Hover the mouse over any lamp or button to see its name and address.

Image stuttering even with a good graphics card? Check **Performance** in the Show in scene box and look at the card name. If it shows Intel or AMD (integrated) – SUSSAI also warns "integrated card" – open Windows > Settings > System > Display > Graphics, choose **Microsoft Edge** > Options > **High performance** and open SUSSAI again.

6. The Ladder editor

Ladder is drawn in rows (rungs) between two power rails. Each rung connects contacts (conditions) to an output (coil, timer or counter).

How to draw

- Choose the element on the toolbar (or use the shortcut key).
- Click with the **left button** at the position in the diagram to insert it.
- To delete: click the element once and press **Delete**.
- **Double-click** opens the properties window (address, timer preset, counter value), in the Clic02 style.
- Use the **vertical link** to build parallel branches (for example, the seal-in contact).

Tools

Tool (Clic02)	LogixPro equivalent	Key	Function
Select	Select	Esc	Selects and edits elements
NO contact	XIC	1	Normally open contact: conducts when the bit = 1
NC contact	XIO	2	Normally closed contact: conducts when the bit = 0
Edge (rising) (P)	XIC (rising) (ONS)	-	Conducts for 1 scan on the rising edge of the bit
Edge (falling) (N)	XIC (falling)	-	Conducts for 1 scan on the falling edge of the bit
Line -	Wire -	8	Horizontal line (click and drag to draw)
Link	Branch	9	Vertical link (parallel). Click near the border between columns
Coil ()	OTE	3	Output coil: bit = rung condition
Set (S)	OTL	-	Turns on and holds (retentive). In this course, prefer a regular coil with a seal-in contact.
Reset (R)	OTU	-	Turns off the retentive bit. In this course, prefer a regular coil with a seal-in contact.
TON	TON	6	On-delay timer
TOF	TOF	-	Off-delay timer
CTU	CTU	7	Up counter
CTD	CTD	-	Down counter
RES	RES	-	Resets timer/counter
Eraser	Delete	0	Deletes the clicked element

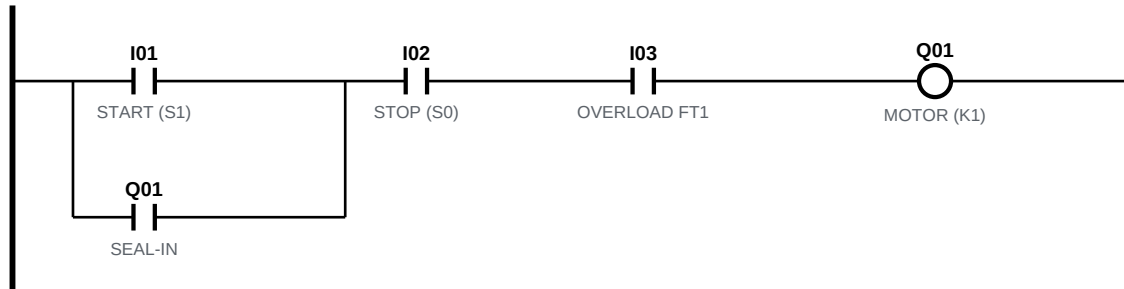
Addressing: Clic02 or LogixPro style

Choose it in **View > PLC style**. The program is the same; only the way addresses are written changes:

Element	Clic02 style	LogixPro style
1st input	I01	I:1/0
2nd input	I02	I:1/1
1st output	Q01	O:2/0
Memory (internal bit)	M01	B3:0/0
Timer / done bit	T01 / T01	T4:0 / T4:0/DN
Counter / done bit	C01 / C01	C5:0 / C5:0/DN

Extra addresses: besides the machine inputs and outputs, there are I01 to I100, Q01 to Q100, M01 to M256, T01 to T100 and C01 to C100. An extra input becomes a **virtual switch** and an extra output becomes a **virtual lamp** on the panel.

Example: direct-on-line start with seal-in (scene 01 - Fan)



START (LIGA) energizes the motor coil; the **seal-in** contact (from the motor itself) in parallel keeps the motor running after the button is released. **STOP** (DESLIGA) and the **overload relay FT1** are **NC in the field**: at rest the input is 1, so in the program we use a **NO contact** for them, in series. Pressing STOP or tripping the overload opens the rung and the motor stops.

Safety rule: stop buttons, overload relays and emergency stops are always NC in the field (fail-safe: broken wire = machine stops). Using an NC contact in the program for a signal that is already NC in the field inverts the logic and is **unsafe**.

Prefer a coil with a seal-in contact over SET/RESET (retentive). All ready-made SUSSAI programs use only regular coils with seal-in.

7. Simulation, faults and maintenance

RUN and STOP

F5 puts the PLC in RUN (executing the program) and **F6** in STOP. In RUN the energized rungs turn green and the active inputs/outputs light up in the I/O panel. You can force inputs and outputs for testing (Tools > Inputs and Outputs).

Machine actions

The **Simulation** menu holds the actions of each scene: place a box, call a pedestrian, change the amount of cars, open the tap, etc. The 3D panel buttons can also be clicked directly.

Faults for maintenance training

In **Simulation > Faults and training** the instructor (or the student) activates real faults: motor overload (the overload relay trips and smoke comes out), dirty or stuck sensor, broken wire, welded contact, burnt-out lamp, two-hand control bypass. The student must observe the machine, read the inputs in the I/O panel and explain the fault. The fault list of each machine is in chapter 8.

Overload reset: after an overload, the machine only restarts after the overload relay is reset and a new START command is given. It never restarts by itself (Brazilian safety standard NR-12).

8. The 15 machines

The machines are in order of difficulty. Every machine with a motor has an **overload relay** wired to a PLC input and every panel has an **emergency stop button** (NR-12). The tables below were generated from SUSSAI CLP itself.

Scene 01 - Industrial fan (direct-on-line start)



Build the direct-on-line start with seal-in, indicator lamps and overload relay. To do it for a SCORE, use Gamification Mode.

Also available in **SUSSAI CLP Teste** (7-day free trial).

Inputs and outputs

Address (Clic02 / LogixPro)	Tag	Name (as shown in the program)	Description
I01 / I:1/0	S1	LIGA (START)	START button - NO contact, green, flush, symbol I (IEC 60204-1)
I02 / I:1/1	S0	DESLIGA (STOP)	STOP button - NC contact, red, raised, symbol O: at rest the input is 1
I03 / I:1/2	FT1	TÉRMICO MOTOR (motor overload)	Overload relay FT1 of the fan motor - contact 95-96 (NC): 1 = normal, 0 = tripped by overload
I04 / I:1/3	EM	EMERGÊNCIA (EMERGENCY)	Emergency stop button - red mushroom on a yellow background, NC with latch (NR-12). At rest the input is 1; when pressed it goes to 0. It only stops the machine through the program (NO contact in series).
Q01 / O:2/0	K1	MOTOR VENTILADOR (fan motor)	Contactor K1 - fan motor (direct-on-line start)
Q02 / O:2/1	H1	LÂMPADA BRANCA (white lamp)	White indicator - fan ON (machine moving)
Q03 / O:2/2	H2	LÂMPADA VERDE (green lamp)	Green indicator - fan OFF, ready to operate
Q04 / O:2/3	H3	LÂMPADA VERMELHA (red lamp)	Red indicator - protective stop: overload relay tripped

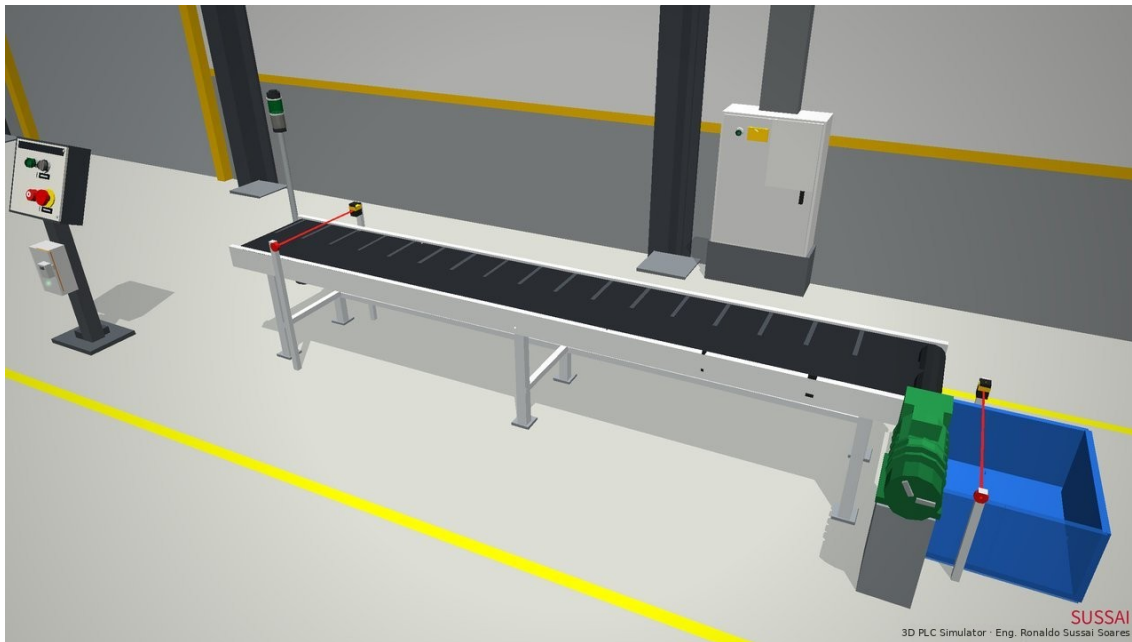
Ready-made programs (Program menu)

- Exercise - build the direct-on-line start yourself (blank)
- Answer key - direct-on-line start with seal-in, indicators and overload
- With an ERROR: no overload relay (the motor burns out)

Training faults (Simulation menu)

- Overload on the fan motor (overload relay FT1)
- Broken wire on the STOP button

Scene 02 - Simple conveyor (sensor + box)



A conveyor with two sensors: B1 at the start of the belt and B2 at the mouth of the bin. A box at B1 starts the conveyor; when it falls into the bin and passes B2, the conveyor stops. One box at a time.

Also available in **SUSSAI CLP Teste** (7-day free trial).

Inputs and outputs

Address (Clic02 / LogixPro)	Tag	Name (as shown in the program)	Description
I01 / I:1/0	S1	LIGA (START)	START button - NO contact, green, flush, symbol I (IEC 60204-1)
I02 / I:1/1	S0	DESLIGA (STOP)	STOP button - NC contact, red, raised, symbol O: at rest the input is 1
I03 / I:1/2	B1	SENSOR ENTRADA (entry sensor)	Optical sensor B1 - box at the start of the conveyor
I04 / I:1/3	B2	SENSOR RECIPIENTE (bin sensor)	Optical barrier B2 at the mouth of the bin - 1 while the box is falling into it
I05 / I:1/4	FT1	TÉRMICO M1 (overload M1)	Overload relay FT1 of conveyor motor M1 - contact 95-96 (NC): 1 = normal, 0 = tripped by overload
I06 / I:1/5	EM	EMERGÊNCIA (EMERGENCY)	Emergency stop button - red mushroom on a yellow background, NC with latch (NR-12). At rest the input is 1; when pressed it goes to 0. It only stops the machine through the program (NO contact in series).
Q01 / O:2/0	M1	MOTOR ESTEIRA (conveyor motor)	Contactor K1 - conveyor motor M1

Address (Clic02 / LogixPro)	Tag	Name (as shown in the program)	Description
Q02 / O:2/1	H1	LÂMPADA VERDE (green lamp)	Green indicator - system on, ready to operate
Q03 / O:2/2	H2	LÂMPADA BRANCA (white lamp)	White indicator - conveyor moving (motor running)

Ready-made programs (Program menu)

- 1 - Box on the sensor starts the conveyor (simplest)
- 2 - Start/Stop with seal-in
- 3 - Automatic with START/STOP
- 4 - Several boxes (CTU/CTD counter)

Training faults (Simulation menu)

- Overload on conveyor motor M1 (overload relay FT1)
- Sensor B1 with dirty lens (does not detect)
- Sensor B2 stuck at 1
- Motor M1 burnt out
- Slipping belt
- Green lamp H1 burnt out

Scene 03 - Barrier / parking gate



ARTICULATED barrier (two arms) on an island in the middle of the road, high enough for a truck to pass. The car arrives, the loop detects it, the barrier opens. With a car underneath it does not lower; after the car passes, it closes. Cars arrive at random intervals.

Also available in **SUSSAI CLP Teste** (7-day free trial).

Inputs and outputs

Address (Clic02 / LogixPro)	Tag	Name (as shown in the program)	Description
I01 / I:1/0	S1	LIGA (START)	START button - NO contact, green, flush, symbol I (IEC 60204-1)
I02 / I:1/1	S0	DESLIGA (STOP)	STOP button - NC contact, red, raised, symbol O: at rest the input is 1
I03 / I:1/2	B1	LAÇO CHEGADA (arrival loop)	Loop detector B1 - car arrived at the barrier
I04 / I:1/3	B2	BARREIRA SEGURANÇA (safety barrier)	Photocells B2 - car UNDER the barrier
I05 / I:1/4	B3	LAÇO SAÍDA (exit loop)	Loop detector B3 - car passed the barrier
I06 / I:1/5	FA	FIM DE CURSO ABERTA (limit switch open)	Limit switch FA - barrier fully open
I07 / I:1/6	FF	FIM DE CURSO FECHADA (limit switch closed)	Limit switch FF - barrier fully closed
I08 / I:1/7	FT1	TÉRMICO CANCELA (barrier overload)	Overload relay FT1 of the barrier motor - contact 95-96 (NC): 1 = normal, 0 = tripped by overload
I09 / I:1/8	EM	EMERGÊNCIA (EMERGENCY)	Emergency stop button - red mushroom on a yellow background, NC with latch (NR-12). At rest the input is 1; when pressed it goes to 0. It only stops the machine through the program (NO contact in series).
Q01 / O:2/0	K1	ABRIR (open)	Contactor K1 - barrier motor up (opens)
Q02 / O:2/1	K2	FECHAR (close)	Contactor K2 - barrier motor down (closes)
Q03 / O:2/2	H1	SINAL VERDE (green signal)	Green light - you may pass
Q04 / O:2/3	H2	SINAL VERMELHO (red signal)	Red light - wait
Q05 / O:2/4	H3	GIROFLEX (beacon)	Amber warning beacon - barrier moving

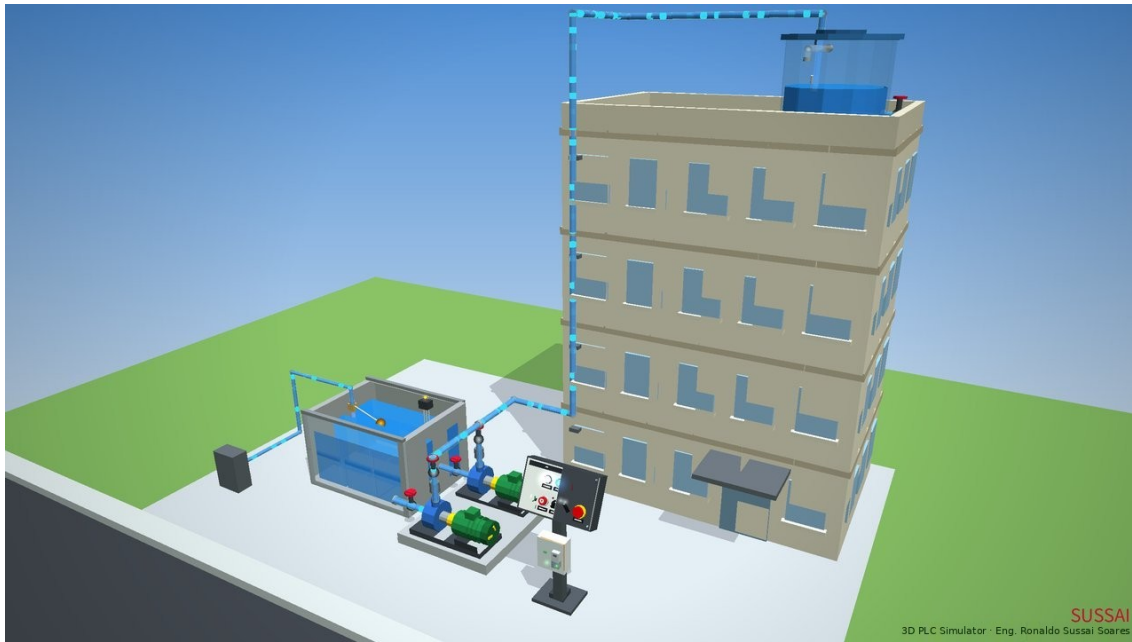
Ready-made programs (Program menu)

- 1 - Automatic barrier with sensors
- 2 - Barrier with timer (closes after 5 s)

Training faults (Simulation menu)

- Overload on the barrier motor (overload relay FT1)
- Safety barrier B2 burnt out
- Faulty arrival loop B1
- Limit switch FA (open) out of adjustment
- Barrier motor burnt out

Scene 04 - Building water tank (pumps A/B)



The ground-floor cistern sends water to the top-floor tank through pump A or B. Automatic by the float switch or manual by the buttons.

Inputs and outputs

Address (Clic02 / LogixPro)	Tag	Name (as shown in the program)	Description
I01 / I:1/0	S1	LIGA (START)	START button - NO contact, green, flush, symbol I (IEC 60204-1)
I02 / I:1/1	S0	DESLIGA (STOP)	STOP button - NC contact, red, raised, symbol O: at rest the input is 1
I03 / I:1/2	SA	MAN / AUTO	Selector switch: 0 = MANUAL (START/STOP buttons), 1 = AUTOMATIC (float switch)
I04 / I:1/3	SB	BOMBA A / B (pump A / B)	Selector switch: 0 = PUMP A, 1 = PUMP B
I05 / I:1/4	LS	BOIA CAIXA SUPERIOR (upper tank float)	Electric float switch of the top-floor tank: 1 = low level (asks for water), 0 = tank full
I06 / I:1/5	LC	CISTERN FLOAT	Cistern level float switch: 1 = has water, 0 = minimum level (protects the pumps)
I07 / I:1/6	FT1	TÉRMICO BOMBA A (pump A overload)	Overload relay FT1 of pump motor A - contact 95-96 (NC): 1 = normal, 0 = tripped by overload
I08 / I:1/7	FT2	TÉRMICO BOMBA B (pump B overload)	Overload relay FT2 of pump motor B - contact 95-96 (NC): 1 = normal, 0 = tripped by overload
I09 / I:1/8	EM	EMERGÊNCIA (EMERGENCY)	Emergency stop button - red mushroom on a yellow background, NC with latch (NR-12). At rest the input is 1; when pressed it goes to 0. It only stops the machine through the program (NO contact in series).
Q01 / O:2/0	KA	BOMBA A (pump A)	Contactor KA - booster pump A
Q02 / O:2/1	KB	BOMBA B (pump B)	Contactor KB - booster pump B
Q03 / O:2/2	H1	BOMBA LIGADA (pump on)	White indicator - pump on (motor moving)
Q04 / O:2/3	H2	AUTOMÁTICO (automatic)	Blue indicator - automatic mode selected (other function)

Address (Clic02 / LogixPro)	Tag	Name (as shown in the program)	Description
Q05 / O:2/4	H3	FALTA D'ÁGUA (no water)	Red indicator - cistern at minimum level

Ready-made programs (Program menu)

- 1 - Complete: manual/automatic + pump A/B selection
- 2 - Step 1: manual start/stop of pump A
- 3 - Automatic by float switch only (with A/B selection)

Training faults (Simulation menu)

- Overload on pump motor A (overload relay FT1)
- Overload on pump motor B (overload relay FT2)
- Pump A burnt out
- Pump B burnt out
- Upper tank float stuck asking for water
- Float stuck at the top (never asks for water)
- Cistern float switch faulty (always 1)
- Cistern float valve stuck (does not close)

Scene 05 - 4 cascading conveyors (accumulation) + operator



Four conveyors in sequence; at the end an operator picks up the boxes and stacks them on the pallet. If boxes accumulate, the conveyors stop in cascade (4 -> 3 -> 2 -> 1) and restart when the operator clears the last one.

Inputs and outputs

Address (Clic02 / LogixPro)	Tag	Name (as shown in the program)	Description
I01 / I:1/0	S1	LIGA (START)	START button - NO contact, green, flush, symbol I (IEC 60204-1)

Address (Clic02 / LogixPro)	Tag	Name (as shown in the program)	Description
I02 / I:1/1	S0	DESLIGA (STOP)	STOP button - NC contact, red, raised, symbol O: at rest the input is 1
I03 / I:1/2	S1	FIM ESTEIRA 1 (end conveyor 1)	Optical sensor S1 - box at the end of conveyor 1
I04 / I:1/3	S2	FIM ESTEIRA 2 (end conveyor 2)	Optical sensor S2 - box at the end of conveyor 2
I05 / I:1/4	S3	FIM ESTEIRA 3 (end conveyor 3)	Optical sensor S3 - box at the end of conveyor 3
I06 / I:1/5	S4	FIM ESTEIRA 4 (end conveyor 4)	Optical sensor S4 - box at the end of conveyor 4 (pick-up position for the operator)
I07 / I:1/6	FT1	TÉRMICO E1 (overload C1)	Overload relay FT1 of conveyor motor 1 - contact 95-96 (NC): 1 = normal, 0 = tripped by overload
I08 / I:1/7	FT2	TÉRMICO E2 (overload C2)	Overload relay FT2 of conveyor motor 2 - contact 95-96 (NC): 1 = normal, 0 = tripped by overload
I09 / I:1/8	FT3	TÉRMICO E3 (overload C3)	Overload relay FT3 of conveyor motor 3 - contact 95-96 (NC): 1 = normal, 0 = tripped by overload
I10 / I:1/9	FT4	TÉRMICO E4 (overload C4)	Overload relay FT4 of conveyor motor 4 - contact 95-96 (NC): 1 = normal, 0 = tripped by overload
I11 / I:1/10	SE	EMERGÊNCIA (EMERGENCY)	Emergency stop button - NC contact with latch: at rest the input is 1
Q01 / O:2/0	K1	ESTEIRA 1 (conveyor 1)	Contactora K1 - conveyor motor 1
Q02 / O:2/1	K2	ESTEIRA 2 (conveyor 2)	Contactora K2 - conveyor motor 2
Q03 / O:2/2	K3	ESTEIRA 3 (conveyor 3)	Contactora K3 - conveyor motor 3
Q04 / O:2/3	K4	ESTEIRA 4 (conveyor 4)	Contactora K4 - conveyor motor 4
Q05 / O:2/4	H1	LÂMPADA VERDE (green lamp)	Green indicator - line on
Q06 / O:2/5	H2	LÂMPADA AMARELA (yellow lamp)	Yellow indicator - accumulation (some conveyor stopped waiting)
Q07 / O:2/6	H3	LÂMPADA VERMELHA (red lamp)	Red indicator - overload relay tripped

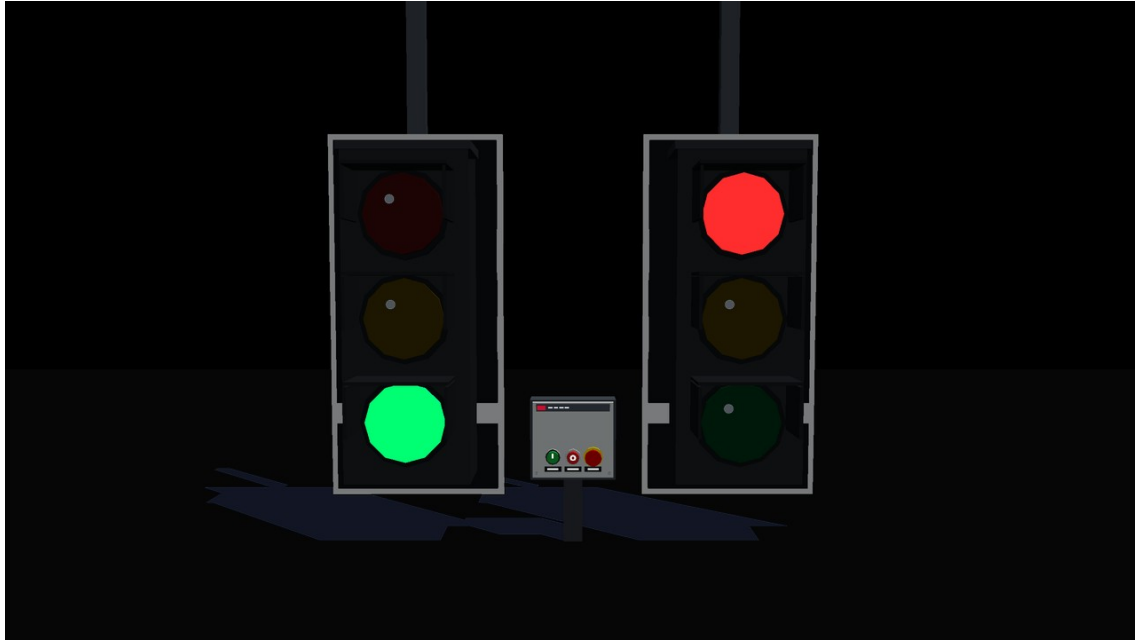
Ready-made programs (Program menu)

- 1 - Complete cascade (accumulation with end sensors)
- 2 - No cascade (intentional ERROR)
- 3 - Step 1: only conveyor 4 stops at the sensor

Training faults (Simulation menu)

- Overload on conveyor motor 1 (overload relay FT1)
- Overload on conveyor motor 2 (overload relay FT2)
- Overload on conveyor motor 3 (overload relay FT3)
- Overload on conveyor motor 4 (overload relay FT4)
- Sensor S4 (end of conveyor 4) with dirty lens
- Sensor S2 stuck at 1
- Conveyor motor 3 burnt out
- Conveyor 2 belt slipping

Scene 06 - Two traffic lights - front view (lamps only)



Teaching scene: two large traffic lights side by side, seen from the front on a black background. No cars, no street - the student programs only the lamps (Q0...Q5) and checks the cycle. Golden rule: while one light is GREEN or AMBER, the other must be RED (otherwise a CONFLICT is shown).

Inputs and outputs

Address (Clic02 / LogixPro)	Tag	Name (as shown in the program)	Description
I01 / I:1/0	S1	LIGA (START)	START button - NO contact, green, flush, symbol I (IEC 60204-1)
I02 / I:1/1	S0	DESLIGA (STOP)	STOP button - NC contact, red, raised, symbol O: at rest the input is 1
I03 / I:1/2	EM	EMERGÊNCIA (EMERGENCY)	Emergency stop button - red mushroom on a yellow background, NC with latch (NR-12). At rest the input is 1; when pressed it goes to 0. It only stops the machine through the program (NO contact in series).
Q01 / O:2/0	S1-VD	LIGHT 1 GREEN	Traffic light 1 - green lamp
Q02 / O:2/1	S1-AM	LIGHT 1 AMBER	Traffic light 1 - amber lamp
Q03 / O:2/2	S1-VM	LIGHT 1 RED	Traffic light 1 - red lamp
Q04 / O:2/3	S2-VD	LIGHT 2 GREEN	Traffic light 2 - green lamp
Q05 / O:2/4	S2-AM	LIGHT 2 AMBER	Traffic light 2 - amber lamp
Q06 / O:2/5	S2-VM	LIGHT 2 RED	Traffic light 2 - red lamp

Ready-made programs (Program menu)

- 1 - Two traffic lights cycle (timers)
- 2 - Flashing amber (caution mode)
- 3 - Step 1: traffic light 1 only

Training faults (Simulation menu)

- Traffic light 1 RED lamp burnt out
- Traffic light 2 GREEN lamp burnt out

- Traffic light 2 AMBER lamp burnt out

Scene 07 - One-road traffic light (two-way) with pedestrian crossing



Two-way street with a mid-block crosswalk. It is an ON-DEMAND light: cars have GREEN all the time and the light only closes when a pedestrian presses the push button. After the minimum green, both car lights go to yellow together, close, and the walking figure turns green.

Inputs and outputs

Address (Clic02 / LogixPro)	Tag	Name (as shown in the program)	Description
I01 / I:1/0	S1	LIGA (START)	START button - NO contact, green, flush, symbol I (IEC 60204-1)
I02 / I:1/1	S0	DESLIGA (STOP)	STOP button - NC contact, red, raised, symbol O: at rest the input is 1
I03 / I:1/2	BP	BOTOEIRA PEDESTRE (pedestrian button)	Pedestrian push button (on the crossing poles) - NO, BLUE button: 1 while the pedestrian presses it
I04 / I:1/3	EM	EMERGÊNCIA (EMERGENCY)	Emergency stop button - red mushroom on a yellow background, NC with latch (NR-12). At rest the input is 1; when pressed it goes to 0. It only stops the machine through the program (NO contact in series).
Q01 / O:2/0	VD	CARROS VERDE (cars green)	Car traffic light - green lamp
Q02 / O:2/1	AM	CARROS AMARELO (cars yellow)	Car traffic light - yellow lamp
Q03 / O:2/2	VM	CARROS VERMELHO (cars red)	Car traffic light - red lamp
Q04 / O:2/3	PV	PEDESTRE VERDE (pedestrian green)	Pedestrian light - green walking figure (may cross)
Q05 / O:2/4	PR	PEDESTRE VERMELHO (pedestrian red)	Pedestrian light - red hand (stop). Flashing = about to close
Q06 / O:2/5	AG	AGUARDE (WAIT)	"AGUARDE" (WAIT) lamp on the push button - crossing request registered

Ready-made programs (Program menu)

- 1 - Crossing with push button (complete)

- 2 - Step 1: car light only

Training faults (Simulation menu)

- Faulty pedestrian push button (does not actuate)
- Car RED lamp burnt out
- Pedestrian RED lamp burnt out

Scene 08 - Two-road traffic light with pedestrians



Intersection of two one-way streets with two traffic lights and a pedestrian crossing with push button. If both roads open at the same time, there is a collision!

Inputs and outputs

Address (Clic02 / LogixPro)	Tag	Name (as shown in the program)	Description
I01 / I:1/0	S1	LIGA (START)	START button - NO contact, green, flush, symbol I (IEC 60204-1)
I02 / I:1/1	S0	DESLIGA (STOP)	STOP button - NC contact, red, raised, symbol O: at rest the input is 1
I03 / I:1/2	SN	MODO NOTURNO (night mode)	Selector switch - night mode (flashing yellow)
I04 / I:1/3	BP	BOTOEIRA PEDESTRE (pedestrian button)	Pedestrian push button (on the crossing poles) - NO, BLUE button: 1 while the pedestrian presses it
I05 / I:1/4	EM	EMERGÊNCIA (EMERGENCY)	Emergency stop button - red mushroom on a yellow background, NC with latch (NR-12). At rest the input is 1; when pressed it goes to 0. It only stops the machine through the program (NO contact in series).
Q01 / O:2/0	A-VD	VIA A VERDE (road A green)	Road A traffic light - green lamp
Q02 / O:2/1	A-AM	VIA A AMARELO (road A yellow)	Road A traffic light - yellow lamp
Q03 / O:2/2	A-VM	VIA A VERMELHO (road A red)	Road A traffic light - red lamp
Q04 / O:2/3	B-VD	VIA B VERDE (road B green)	Road B traffic light - green lamp

Address (Clic02 / LogixPro)	Tag	Name (as shown in the program)	Description
Q05 / O:2/4	B-AM	VIA B AMARELO (road B yellow)	Road B traffic light - yellow lamp
Q06 / O:2/5	B-VM	VIA B VERMELHO (road B red)	Road B traffic light - red lamp
Q07 / O:2/6	P-VD	PEDESTRE VERDE (pedestrian green)	Pedestrian lights (all crosswalks) - green walking figure
Q08 / O:2/7	P-VM	PEDESTRE VERMELHO (pedestrian red)	Pedestrian lights (all crosswalks) - red hand. Flashing = about to close

Ready-made programs (Program menu)

- 1 - Traffic light cycle (timers)
- 2 - With night mode (flashing yellow)
- 3 - With pedestrian crossing (push button)

Training faults (Simulation menu)

- Road A RED lamp burnt out
- Road B YELLOW lamp burnt out
- Night mode switch with welded contact
- Faulty pedestrian push button (does not actuate)

Scene 09 - 4-way intersection (4 traffic lights) with pedestrians



Two two-way avenues: 4 car traffic lights (A1/A2 wired together on road A, B1/B2 on road B) and pedestrian lights with push buttons on the 4 corners.

Inputs and outputs

Address (Clic02 / LogixPro)	Tag	Name (as shown in the program)	Description
I01 / I:1/0	S1	LIGA (START)	START button - NO contact, green, flush, symbol I (IEC 60204-1)

Address (Clic02 / LogixPro)	Tag	Name (as shown in the program)	Description
I02 / I:1/1	S0	DESLIGA (STOP)	STOP button - NC contact, red, raised, symbol O: at rest the input is 1
I03 / I:1/2	SN	MODO NOTURNO (night mode)	Selector switch - night mode (flashing yellow)
I04 / I:1/3	BP	BOTOEIRA PEDESTRE (pedestrian button)	Pedestrian push button (on the crossing poles) - NO, BLUE button: 1 while the pedestrian presses it
I05 / I:1/4	EM	EMERGÊNCIA (EMERGENCY)	Emergency stop button - red mushroom on a yellow background, NC with latch (NR-12). At rest the input is 1; when pressed it goes to 0. It only stops the machine through the program (NO contact in series).
Q01 / O:2/0	A-VD	VIA A VERDE (road A green)	Traffic lights A1 and A2 (road A, wired in parallel) - green lamp
Q02 / O:2/1	A-AM	VIA A AMARELO (road A yellow)	Traffic lights A1 and A2 (road A, wired in parallel) - yellow lamp
Q03 / O:2/2	A-VM	VIA A VERMELHO (road A red)	Traffic lights A1 and A2 (road A, wired in parallel) - red lamp
Q04 / O:2/3	B-VD	VIA B VERDE (road B green)	Traffic lights B1 and B2 (road B, wired in parallel) - green lamp
Q05 / O:2/4	B-AM	VIA B AMARELO (road B yellow)	Traffic lights B1 and B2 (road B, wired in parallel) - yellow lamp
Q06 / O:2/5	B-VM	VIA B VERMELHO (road B red)	Traffic lights B1 and B2 (road B, wired in parallel) - red lamp
Q07 / O:2/6	P-VD	PEDESTRE VERDE (pedestrian green)	Pedestrian lights (all crosswalks) - green walking figure
Q08 / O:2/7	P-VM	PEDESTRE VERMELHO (pedestrian red)	Pedestrian lights (all crosswalks) - red hand. Flashing = about to close

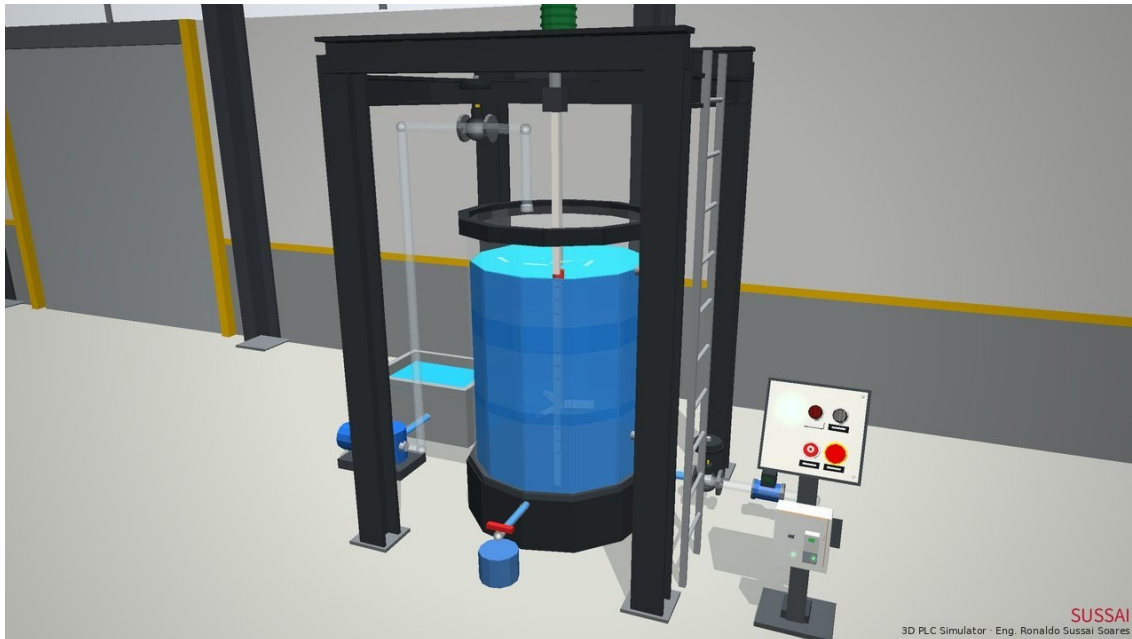
Ready-made programs (Program menu)

- 1 - Traffic light cycle (timers)
- 2 - With night mode (flashing yellow)
- 3 - With pedestrian crossing (push button)

Training faults (Simulation menu)

- Road A RED lamp burnt out
- Road B YELLOW lamp burnt out
- Night mode switch with welded contact
- Faulty pedestrian push button (does not actuate)

Scene 10 - Mixing tank (pump + agitator)



The pump fills the tank, the agitator (propeller) stirs the liquid - after 5 s of mixing it changes color - and the finished product leaves through the outlet valve.

Inputs and outputs

Address (Clic02 / LogixPro)	Tag	Name (as shown in the program)	Description
I01 / I:1/0	S1	LIGA (START)	START button - NO contact, green, flush, symbol I (IEC 60204-1)
I02 / I:1/1	S0	DESLIGA (STOP)	STOP button - NC contact, red, raised, symbol O: at rest the input is 1
I03 / I:1/2	LSL	NÍVEL BAIXO (low level)	Level sensor LSL at 20 % - reads 1 with liquid above it
I04 / I:1/3	LSH	NÍVEL ALTO (high level)	Level sensor LSH at 85 % - reads 1 with liquid above it
I05 / I:1/4	FT1	TÉRMICO BOMBA (pump overload)	Overload relay FT1 of the pump motor - contact 95-96 (NC): 1 = normal, 0 = tripped by overload
I06 / I:1/5	FT2	TÉRMICO AGITADOR (agitator overload)	Overload relay FT2 of the agitator motor - contact 95-96 (NC): 1 = normal, 0 = tripped by overload
I07 / I:1/6	EM	EMERGÊNCIA (EMERGENCY)	Emergency stop button - red mushroom on a yellow background, NC with latch (NR-12). At rest the input is 1; when pressed it goes to 0. It only stops the machine through the program (NO contact in series).
Q01 / O:2/0	K1	BOMBA (pump)	Contactor K1 - filling pump
Q02 / O:2/1	Y1	VÁLVULA SAÍDA (outlet valve)	Solenoid Y1 - outlet valve (product discharge)
Q03 / O:2/2	H1	LÂMPADA VERDE (green lamp)	Green indicator - system on
Q04 / O:2/3	H2	LÂMPADA VERMELHA (red lamp)	Red indicator - alarm (low level / overload)
Q05 / O:2/4	K2	AGITADOR (agitator)	Contactor K2 - agitator motor M2 (propeller)
Q06 / O:2/5	H3	LÂMPADA BRANCA (white lamp)	White indicator - product ready (mixed), discharging (information)

Ready-made programs (Program menu)

- 1 - Pump on/off (manual)

- 2 - Automatic level control
- 3 - Fill and empty (cycle)
- 4 - Mixer: fill -> stir 5 s -> empty

Training faults (Simulation menu)

- Overload on the pump motor (overload relay FT1)
- Overload on the agitator motor (overload relay FT2)
- HIGH level sensor (LSH) burnt out
- LOW level sensor (LSL) stuck at 1
- Pump motor burnt out
- Valve Y1 stuck closed
- Agitator propeller loose on the shaft

Scene 11 - Turntable (sorts by size)



Sensor B4 at the end of the conveyor holds the box until the table is at 0° and free. On the table, the lower sensor sees that the box has arrived and the upper one sees whether it is tall. Tall -> RIGHT, short -> LEFT.

Inputs and outputs

Address (Clic02 / LogixPro)	Tag	Name (as shown in the program)	Description
I01 / I:1/0	S1	LIGA (START)	START button - NO contact, green, flush, symbol I (IEC 60204-1)
I02 / I:1/1	S0	DESLIGA (STOP)	STOP button - NC contact, red, raised, symbol O: at rest the input is 1
I03 / I:1/2	B1	SENSOR ENTRADA (entry sensor)	Optical sensor B1 - box at the start of the conveyor
I04 / I:1/3	B2	SENSOR SUPERIOR (upper sensor)	UPPER optical sensor B2 (on the table, at 30 cm) - only a TALL box breaks the beam
I05 / I:1/4	B3	SENSOR INFERIOR (lower sensor)	LOWER optical sensor B3 (on the table, at 6 cm) - any box that reached the position breaks the beam

Address (Clic02 / LogixPro)	Tag	Name (as shown in the program)	Description
I06 / I:1/5	S0	MESA EM 0° (table at 0°)	Limit switch S0 - table aligned with the conveyor (receives box)
I07 / I:1/6	SD	MESA À DIREITA (table right)	Limit switch SD - table turned +90° (unloads to the right)
I08 / I:1/7	SE	MESA À ESQUERDA (table left)	Limit switch SE - table turned 90° (unloads to the left)
I09 / I:1/8	FT1	TÉRMICO ESTEIRA (conveyor overload)	Overload relay FT1 of conveyor motor M1 - contact 95-96 (NC): 1 = normal, 0 = tripped by overload
I10 / I:1/9	FT2	TÉRMICO ROLOS (rollers overload)	Overload relay FT2 of the table roller motor - contact 95-96 (NC): 1 = normal, 0 = tripped by overload
I11 / I:1/10	FT3	TÉRMICO GIRO (rotation overload)	Overload relay FT3 of the table rotation motor - contact 95-96 (NC): 1 = normal, 0 = tripped by overload
I12 / I:1/11	B4	SENSOR FIM ESTEIRA (end-of-conveyor sensor)	Optical sensor B4 - box at the END of the conveyor, before the table (the conveyor must stop until the table is at 0° and free)
I13 / I:1/12	EM	EMERGÊNCIA (EMERGENCY)	Emergency stop button - red mushroom on a yellow background, NC with latch (NR-12). At rest the input is 1; when pressed it goes to 0. It only stops the machine through the program (NO contact in series).
Q01 / O:2/0	K1	ESTEIRA (conveyor)	Contactor K1 - infeed conveyor motor
Q02 / O:2/1	K2	ROLOS DA MESA (table rollers)	Contactor K2 - table roller motor (moves the box forward)
Q03 / O:2/2	K3	GIRA DIREITA (turn right)	Contactor K3 - turns the table to the right (+90°)
Q04 / O:2/3	K4	GIRA ESQUERDA (turn left)	Contactor K4 - turns the table to the left (90°)
Q05 / O:2/4	H1	LÂMPADA VERDE (green lamp)	Green indicator - system on
Q06 / O:2/5	H2	LÂMPADA BRANCA (white lamp)	White indicator - table turning (machine moving)

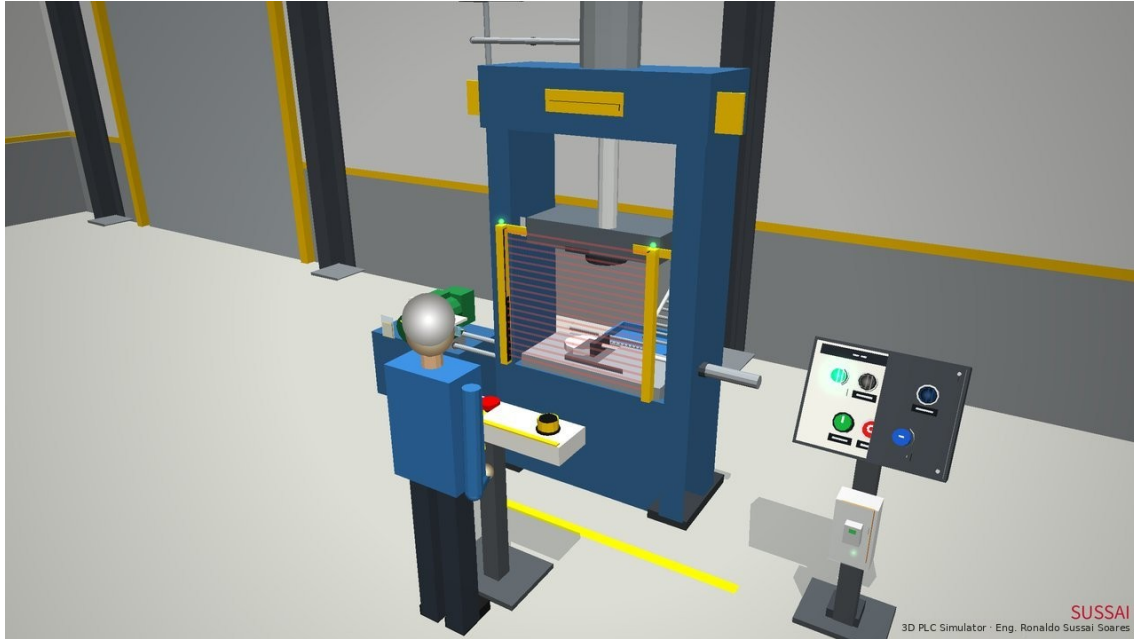
Ready-made programs (Program menu)

- 1 - Complete sorting (end sensor B4 + 2 sensors on the table)
- 2 - Step 1: bring the box to the center of the table

Training faults (Simulation menu)

- Overload on conveyor motor M1 (overload relay FT1)
- Overload on the table roller motor (overload relay FT2)
- Overload on the table rotation motor (overload relay FT3)
- UPPER sensor B2 with dirty lens
- Limit switch SD (right) broken
- Table roller motor burnt out
- LOWER sensor B3 stuck at 1
- Table rotation motor burnt out
- Sensor B4 (end of conveyor) with dirty lens

Scene 12 - Hydraulic press - two-hand control and light curtain (NR-12)



The press only comes down with BOTH hands on the two-hand control buttons (at the same time). The light curtain stops the press if someone puts a hand into the pressing area.

Inputs and outputs

Address (Clic02 / LogixPro)	Tag	Name (as shown in the program)	Description
I01 / I:1/0	S1	LIGA (START)	START button - NO contact, green, flush, symbol I (IEC 60204-1)
I02 / I:1/1	S0	DESLIGA (STOP)	STOP button - NC contact, red, raised, symbol O: at rest the input is 1
I03 / I:1/2	BE	BIMANUAL ESQUERDO (left two-hand button)	LEFT two-hand button - NO, black, with protective ring
I04 / I:1/3	BD	BIMANUAL DIREITO (right two-hand button)	RIGHT two-hand button - NO, black, with protective ring
I05 / I:1/4	CL	CORTINA DE LUZ (light curtain)	Light curtain (OSSD output): 1 = area CLEAR, 0 = beam interrupted (hand/body in the pressing area)
I06 / I:1/5	S2	PRENSA EM CIMA (press up)	Limit switch S2 - ram retracted (up)
I07 / I:1/6	S3	PRENSA EMBAIXO (press down)	Limit switch S3 - ram at the end of the stroke (part pressed)
I08 / I:1/7	SE	EMERGÊNCIA (EMERGENCY)	Emergency stop button - red mushroom on a yellow background, NC with latch: at rest the input is 1
I09 / I:1/8	FT1	TÉRMIICO BOMBA (pump overload)	Overload relay FT1 of the hydraulic pump motor - contact 95-96 (NC): 1 = normal, 0 = tripped by overload
I10 / I:1/9	S4	REARME (reset)	RESET button - NO (blue): resets the safety after the light curtain or the emergency stop has acted
Q01 / O:2/0	K1	BOMBA HIDRÁULICA (hydraulic pump)	Contactor K1 - hydraulic power unit pump motor
Q02 / O:2/1	Y1	DESCE (down)	Solenoid Y1 - directional valve: ram moves DOWN
Q03 / O:2/2	Y2	SOBE (up)	Solenoid Y2 - directional valve: ram moves UP
Q04 / O:2/3	H1	LÂMPADA VERDE (green lamp)	Green indicator - normal condition: hydraulic unit on, ready

Address (Clic02 / LogixPro)	Tag	Name (as shown in the program)	Description
Q05 / O:2/4	H2	LÂMPADA BRANCA (white lamp)	White indicator - ram moving (machine moving)
Q06 / O:2/5	H3	LÂMPADA VERMELHA (red lamp)	Red indicator - protective stop: emergency, curtain interrupted or overload
Q07 / O:2/6	H4	LÂMPADA AZUL (blue lamp)	Blue indicator - operator action: press RESET

Ready-made programs (Program menu)

- 1 - Two-hand control with simultaneity + light curtain (complete)
- 2 - With an ERROR: two-hand control without simultaneity
- 3 - With an ERROR: the light curtain is not in the program

Training faults (Simulation menu)

- Overload on the hydraulic pump motor (overload relay FT1)
- LEFT two-hand button tied down (operator bypass)
- Dirty / misaligned light curtain
- Faulty limit switch S3 (down)

Scene 13 - Passenger elevator (4 floors)



Elevator with ground floor + 3 floors: registered calls, floor sensors, automatic door with light curtain, traction machine with overload relay. Press a call button: YOU appear on the floor, enter the car and choose which floor to go to.

Inputs and outputs

Address (Clic02 / LogixPro)	Tag	Name (as shown in the program)	Description
I01 / I:1/0	BT	CHAMADA TÉRREO (ground floor call)	Ground floor call button (landing and car) - NO

Address (Clic02 / LogixPro)	Tag	Name (as shown in the program)	Description
I02 / I:1/1	B1	CHAMADA 1º ANDAR (1st floor call)	1st floor call button (landing and car) - NO
I03 / I:1/2	B2	CHAMADA 2º ANDAR (2nd floor call)	2nd floor call button (landing and car) - NO
I04 / I:1/3	B3	CHAMADA 3º ANDAR (3rd floor call)	3rd floor call button (landing and car) - NO
I05 / I:1/4	S0	SENSOR TÉRREO (ground floor sensor)	Floor sensor S0 - car level at the ground floor
I06 / I:1/5	S1	SENSOR 1º ANDAR (1st floor sensor)	Floor sensor S1 - car level at the 1st floor
I07 / I:1/6	S2	SENSOR 2º ANDAR (2nd floor sensor)	Floor sensor S2 - car level at the 2nd floor
I08 / I:1/7	S3	SENSOR 3º ANDAR (3rd floor sensor)	Floor sensor S3 - car level at the 3rd floor
I09 / I:1/8	FCF	PORTA FECHADA (door closed)	Limit switch: door fully closed (and locked)
I10 / I:1/9	FCA	PORTA ABERTA (door open)	Limit switch: door fully open
I11 / I:1/10	CL	CORTINA DE LUZ (light curtain)	Door light curtain: 1 = person/object in the doorway
I12 / I:1/11	FT1	TÉRMICO MÁQUINA (machine overload)	Overload relay FT1 of the traction machine motor - contact 95-96 (NC): 1 = normal, 0 = tripped by overload
I13 / I:1/12	EM	EMERGÊNCIA (EMERGENCY)	Emergency stop button - NC contact: at rest the input is 1
Q01 / O:2/0	K1	SOBE (up)	Contactora K1 - traction machine motor UP direction
Q02 / O:2/1	K2	DESCE (down)	Contactora K2 - traction machine motor DOWN direction
Q03 / O:2/2	K3	ABRE PORTA (open door)	Contactora K3 - door operator OPEN
Q04 / O:2/3	K4	FECHA PORTA (close door)	Contactora K4 - door operator CLOSE
Q05 / O:2/4	HT	REGISTRO TÉRREO (ground floor registered)	Registered call lamp - ground floor (blue)
Q06 / O:2/5	H1	REGISTRO 1º (1st registered)	Registered call lamp - 1st floor (blue)
Q07 / O:2/6	H2	REGISTRO 2º (2nd registered)	Registered call lamp - 2nd floor (blue)
Q08 / O:2/7	H3	REGISTRO 3º (3rd registered)	Registered call lamp - 3rd floor (blue)

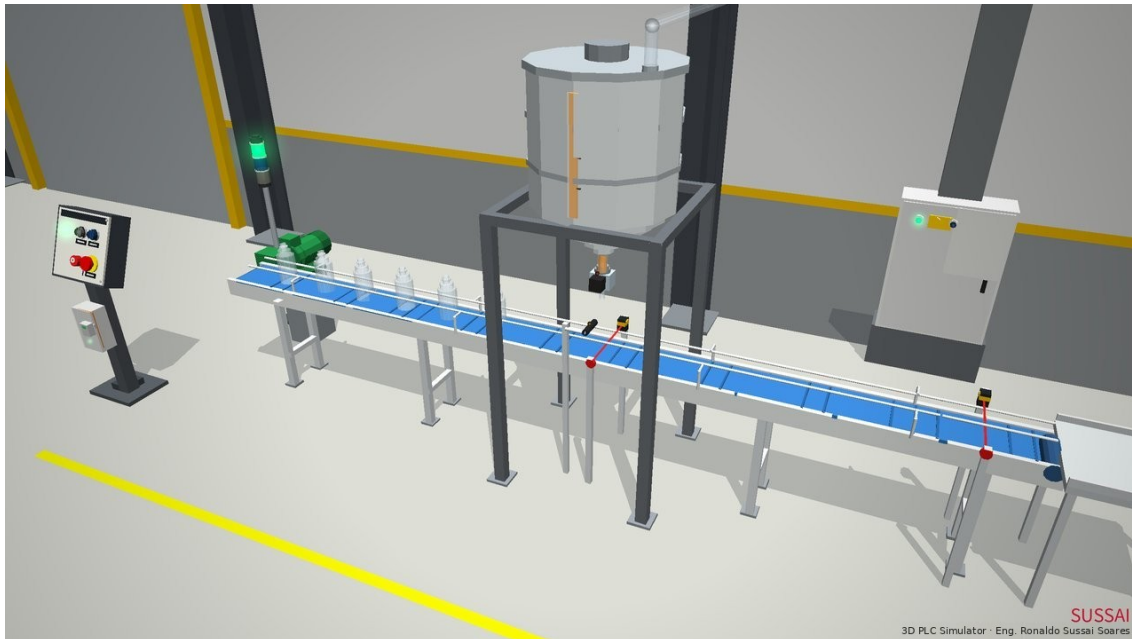
Ready-made programs (Program menu)

- 1 - Complete elevator (calls, door and direction)
- 2 - Step 1: go up and down between ground floor and 3rd floor

Training faults (Simulation menu)

- Overload on the traction machine motor (overload relay FT1)
- Faulty floor sensor S2
- Dirty light curtain (always obstructed)
- Jammed door operator

Scene 14 - Bottle filling (siló + valve)



The bottle stops under the silo, the valve opens and fills it; the full sensor closes the valve and the bottle moves on. Then comes the next one.

Inputs and outputs

Address (Clic02 / LogixPro)	Tag	Name (as shown in the program)	Description
I01 / I:1/0	S1	LIGA (START)	START button - NO contact, green, flush, symbol I (IEC 60204-1)
I02 / I:1/1	S0	DESLIGA (STOP)	STOP button - NC contact, red, raised, symbol O: at rest the input is 1
I03 / I:1/2	B1	GARRAFA NA POSIÇÃO (bottle in position)	Optical sensor B1 - bottle under the filling nozzle
I04 / I:1/3	B2	GARRAFA CHEIA (bottle full)	Capacitive sensor B2 - at the filling height: reads 1 when the product reaches the level
I05 / I:1/4	B3	FIM DA ESTEIRA (end of conveyor)	Optical sensor B3 - bottle at the end of the conveyor (counting)
I06 / I:1/5	FT1	TÉRMICO ESTEIRA (conveyor overload)	Overload relay FT1 of the conveyor motor - contact 95-96 (NC): 1 = normal, 0 = tripped by overload
I07 / I:1/6	EM	EMERGÊNCIA (EMERGENCY)	Emergency stop button - red mushroom on a yellow background, NC with latch (NR-12). At rest the input is 1; when pressed it goes to 0. It only stops the machine through the program (NO contact in series).
Q01 / O:2/0	K1	ESTEIRA (conveyor)	Contactor K1 - conveyor motor
Q02 / O:2/1	Y1	VÁLVULA DO SILO (silo valve)	Solenoid Y1 - filling valve (opens the silo outlet)
Q03 / O:2/2	H1	LÂMPADA VERDE (green lamp)	Green indicator - system on
Q04 / O:2/3	H2	LÂMPADA BRANCA (white lamp)	White indicator - filling (valve operating)
Q05 / O:2/4	H3	LÂMPADA AZUL (blue lamp)	Blue indicator - batch complete: operator ACTION (remove the batch and press START)

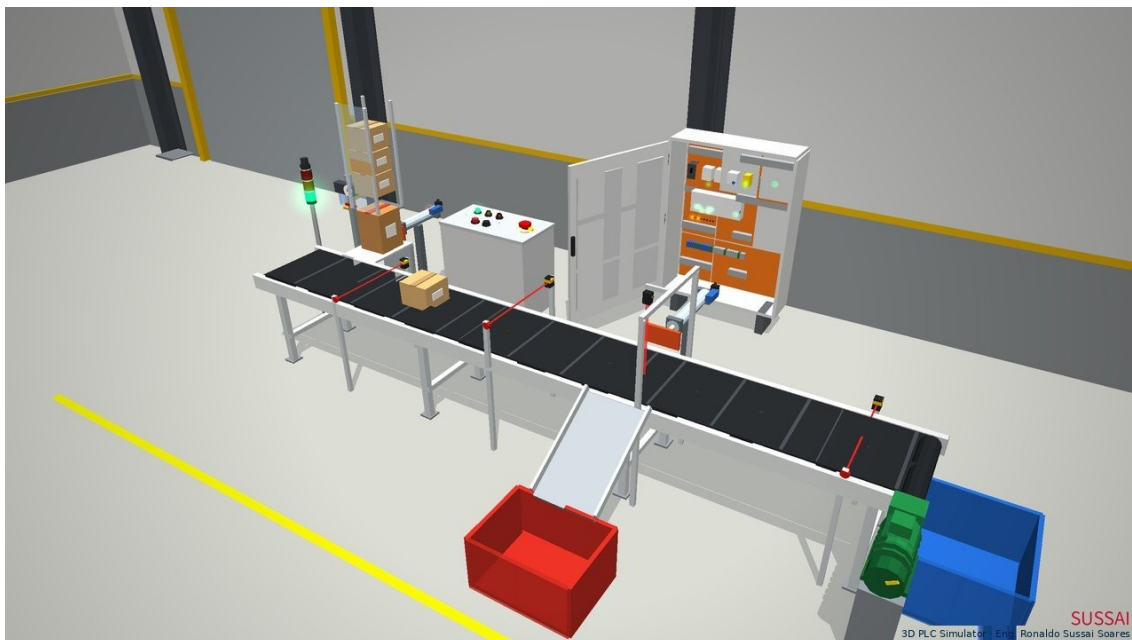
Ready-made programs (Program menu)

- 1 - Automatic filling (position sensor + full sensor)
- 2 - Batch of 6 bottles (counter)
- 3 - Step 1: stop the bottle under the silo

Training faults (Simulation menu)

- Overload on the conveyor motor (overload relay FT1)
- Faulty bottle FULL sensor (B2)
- Position sensor B1 out of place
- Valve Y1 stuck closed
- Clogged filling nozzle
- Conveyor motor burnt out

Scene 15 - Conveyor with sorting (advanced)



Complete line: pneumatic feeder, sensors, diverter, electrical panel, NR-12 emergency stop and overload relay.

Inputs and outputs

Address (Clic02 / LogixPro)	Tag	Name (as shown in the program)	Description
I01 / I:1/0	S1	LIGA (START)	START button - NO contact (green)
I02 / I:1/1	S0	DESLIGA (STOP)	STOP button - NC contact (red)
I03 / I:1/2	SE	EMERGÊNCIA (EMERGENCY)	Emergency stop button - NC with latch (NR-12)
I04 / I:1/3	S2	REVERSO (reverse)	REVERSE button - NO contact, YELLOW (reverse direction - IEC 60204-1)
I05 / I:1/4	S3	REARME (reset)	RESET button - NO, BLUE (a function that is not start, stop or reverse)
I06 / I:1/5	SS	SELETORA (selector)	Selector switch MAN (0) / AUTO (1)
I07 / I:1/6	F7	TÉRMICO (overload)	Overload relay F7 - contact 95-96 (NC)

Address (Clic02 / LogixPro)	Tag	Name (as shown in the program)	Description
I08 / I:1/7	B1	SENSOR INÍCIO (start sensor)	Optical sensor B1 - start of the conveyor
I09 / I:1/8	B2	SENSOR DESVIO (diverter sensor)	Diffuse optical sensor B2 - in front of the diverter
I10 / I:1/9	B3	SENSOR FIM (end sensor)	Optical sensor B3 - end of the conveyor
I11 / I:1/10	B4	SENSOR ALTURA (height sensor)	Optical sensor B4 - detects TALL boxes only
I12 / I:1/11	SA0	ALIM. RECUADO (feeder retracted)	Magnetic sensor - feeder cylinder A retracted
I13 / I:1/12	SA1	ALIM. AVANÇADO (feeder extended)	Magnetic sensor - feeder cylinder A extended
I14 / I:1/13	SB0	DESV. RECUADO (diverter retracted)	Magnetic sensor - diverter cylinder B retracted
I15 / I:1/14	SB1	DESV. AVANÇADO (diverter extended)	Magnetic sensor - diverter cylinder B extended
Q01 / O:2/0	K1	MOTOR AVANÇO (motor forward)	Contactora K1 - motor M1 forward direction
Q02 / O:2/1	K2	MOTOR REVERSO (motor reverse)	Contactora K2 - motor M1 reverse direction
Q03 / O:2/2	H1	SINAL VERDE (green signal)	Green indicator - machine ready to operate / in normal operation
Q04 / O:2/3	H2	SINAL AMARELO (yellow signal)	Yellow indicator - attention (warning before start, batch complete)
Q05 / O:2/4	H3	SINAL VERMELHO (red signal)	Red indicator - abnormal condition: fault / protective stop
Q06 / O:2/5	Y1	ALIMENTADOR (feeder)	Solenoid Y1 - cylinder A (single-acting, spring return)
Q07 / O:2/6	Y2	DESVIADOR (diverter)	Solenoid Y2 - cylinder B (single-acting, spring return)
Q08 / O:2/7	HA1	SIRENE (siren)	Warning siren / buzzer

Ready-made programs (Program menu)

- 1 - Direct-on-line start with seal-in
- 2 - Reversing with interlock
- 3 - Timed start with warning (NR-12)
- 4 - Complete automatic conveyor

Training faults (Simulation menu)

- START button (S1) with damaged NO contact
- STOP button (S0) wire broken at the terminal
- Sensor B1 stuck at level 1
- Sensor B3 with dirty lens (does not detect)
- Height sensor B4 misaligned
- Contactora K1 coil burnt out
- K1 power contacts welded (stuck)
- PLC output Q5 damaged

- No compressed air in the line
- Mechanical overload on motor M1
- Phase loss on motor M1
- Conveyor belt slipping
- Indicator lamp H1 (green) burnt out
- Feeder magnetic sensor SA1 out of adjustment

9. Gamification Mode

Each exercise opens the machine with a ready program and a panel with the steps. Each step is of one type:

Type	What the student does
Do it on the machine	Performs the action on the machine (e.g.: start with seal-in). SUSSAI checks it on the machine itself.
Pergunta (Question)	Answers a technical question about what happened.
Find the fault	A fault is hidden; the student observes, measures in the I/O panel and points out the cause.
Corrija o programa (Fix the program)	The program has an intentional error; the student fixes the Ladder.

Each correct answer adds points; mistakes and hints take points away. At the end the **score from 0 to 10** appears with stars, and it is saved in **My results** (per user). In SUSSAI CLP Teste, only the exercises of scenes 01 to 03 are unlocked. In the **Fix the program** step, the **Show where** button blinks the points to fix (counts as a hint).

Available exercises

Nº	Exercise	Machine	Level	Steps / points
E01	Direct-on-line start with seal-in and overload relay Start, stop, seal-in, motor overload, overload reset and a hidden fault.	02 - Simple conveyor (sensor + box)	Easy	7 steps / 100 pts
E02	Fan: overload and broken wire on STOP Test the direct-on-line start and the overload relay, and see why the stop button is NC.	01 - Industrial fan (direct-on-line start)	Easy	8 steps / 100 pts
E03	Missing START button - unexpected start-up (NR-12) The program has no START button contact. Find the problem and fix the diagram.	01 - Industrial fan (direct-on-line start)	Medium	5 steps / 100 pts
E04	Build it yourself: fan direct-on-line start Blank diagram: build the direct-on-line start with seal-in, indicators and overload relay and complete the 6 missions.	01 - Industrial fan (direct-on-line start)	Medium	6 steps / 100 pts
E05	Level control and burnt-out sensor Automatic filling with low and high level sensors, consumption and a fault that makes the tank overflow.	10 - Mixing tank (pump + agitator)	Easy	6 steps / 100 pts
E06	Traffic light with pedestrian crossing On-demand light on a two-way street: it only closes when a pedestrian asks. Timing, minimum green, all-red and a push-button fault.	07 - One-road traffic light (two-way) with pedestrian crossing	Easy	6 steps / 100 pts
E07	Turntable: sorting by size Test the sorting of small and large boxes and find the faulty sensor.	11 - Turntable (sorts by size)	Medium	6 steps / 100 pts
E08	Cascading conveyors: accumulation Stop the operator, watch the conveyors stop in cascade and restart; find the faulty motor.	05 - 4 cascading conveyors (accumulation) + operator	Medium	6 steps / 100 pts
E09	Filling: overflowing bottle Automatic filling with position and full-bottle sensors; find out why the bottle overflows.	14 - Bottle filling (silo + valve)	Medium	4 steps / 100 pts
E10	Elevator: calls, door and floor sensor Call the elevator, understand the door safety and find the faulty floor sensor.	13 - Passenger elevator (4 floors)	Hard	4 steps / 100 pts
E11	Reversing without interlock (short circuit) The forward/reverse program has no interlock. Cause the short circuit, understand it and fix it.	15 - Conveyor with sorting (advanced)	Hard	7 steps / 100 pts

N°	Exercise	Machine	Level	Steps / points
E12	Hydraulic press: two-hand control and light curtain (NR-12) Two-hand control with simultaneity, light curtain, reset and a hidden bypass fault.	12 - Hydraulic press - two-hand control and light curtain (NR-12)	Medium	8 steps / 100 pts

10. Extra scenes – store and .cena files

Anyone can create a new machine and distribute it as a file with the **.cena** extension (example: Portao_automatico.cena).

- **SussaiLab extra scenes store:** Scene menu > "Extra scenes store" (or the website sussailab.com.br/cenas.html). Everyone can **see** the new machines (photo, description, subject and level); **downloading and installing is exclusive to the paid license** (Monthly, Semiannual, Annual or Group). In the program, 1 click downloads and installs; on the website, sign in with your Google account and click Download.
- **Protected scenes:** each store scene comes **encrypted (AES-256)**, **signed** and **tied to your Google account**. It opens only in the SussaiLab CLP of your account and works while your license is valid (expired license = store scenes locked until renewal). Store scenes cannot be distributed.
- **New scenes and updates:** the store gets new scenes regularly (NEW badge). When a new version of a scene you already have is released, "Update to version ..." appears.
- **Your own scenes:** with a paid license you can also install .cena files created by you or your teacher (see below).
- **Install:** menu Scene > "Add new scene (.cena)..." and choose the file, or drag the .cena file into the window. The scene is added at the end of the Scene menu and is saved on the computer. Installing a file with the same "id" again updates the scene.
- **Automatic test:** before installing, SUSSAI tests the scene; if there is an error, it shows the reason and the line of the file, and nothing is installed.
- **Create:** Scene > Extra scenes > "Download the TEMPLATE" (a commented sliding gate example). Edit it in Notepad or VS Code, change "id" and "name" and install it to test.
- **Distribute / remove:** Scene > Extra scenes > download the .cena of an installed scene (only the ones you created – not store scenes); the trash can removes it.
- The emergency stop button (NR-12) is added automatically if the scene does not have one.

Attention: a .cena file contains a program. Install only scenes from trusted sources. Extra scenes (from the store or created by you) require a **paid license**.

11. Safety and applied standards

Button and indicator colors (IEC 60204-1 / IEC 60073)

Element	Color	Meaning
Button	Green or black	Start / switch on
Button	Red	Stop, switch off and emergency
Button	Yellow	Reverse direction / cancel abnormal condition
Button	Blue or white	Other functions (e.g.: reset)
Indicator	Red	Abnormal condition / danger
Indicator	Yellow	Attention
Indicator	Green	Ready to operate
Indicator	White	In operation (moving)
Indicator	Blue	Other functions

Emergency stop button (NR-12)

Red mushroom on a yellow background, NC contact with latch: at rest the input is 1 and, when pressed, it goes to 0. In SUSSAI the emergency stop is **only a PLC input**: no output, lamp or motor responds to it by itself. The **program** is what stops the machine (NO emergency contact in series with STOP - the ready-made programs already include it). Pressing it latches; to release, click again. With the seal-in in the program, the machine **does not restart by itself**: a new command is needed.

Two-hand control and light curtain (scene 12 - Press)

The press only comes down with **both hands** on the buttons at the same time (simultaneity within 0.5 s, following the principles of ISO 13851). The light curtain stops the press if something enters the danger zone. SUSSAI also simulates the **bypass** (button tied down), so the student can recognize it and understand why it is forbidden.

Programming language

SUSSAI Ladder follows the concepts of IEC 61131-3 (contacts, coils, TON/TOF timers and CTU/CTD counters), with WEG Clic02 or Allen-Bradley LogixPro style naming.

SUSSAI is an educational simulator. It does not replace design, risk assessment, engineering responsibility and the standards applicable to real machines.

12. Keyboard shortcuts

Key	Action
F5 / F6	PLC RUN / STOP
Ctrl+S	Save to My circuits
Ctrl+N	New blank program
Ctrl+Z / Ctrl+Y	Undo / redo
Delete	Delete the selected element
1 2 3 6 7 8 9 0	Diagram tools
Esc	Close the menu / Select tool
Ctrl+Shift+G (entry screen, Completo version)	Record the cover video and scene photos (for promotion)

13. Saving, opening and moving to another computer

- **File > Save (Ctrl+S):** stores it in "My circuits", on the computer itself.
- **File > Download .json file:** creates a circuit file to take to another computer or hand in to the instructor.
- **File > Open file from the computer (.json):** loads a saved circuit. If the file belongs to another machine, SUSSAI switches scenes automatically.
- **File > Export PNG:** saves the diagram on an A4/A3 technical sheet with title block, for reports.

14. Troubleshooting

NEED HELP? CONTACT SUSSAILAB

E-mail: contato.sussai@gmail.com - **Website:** <https://sussailab.com.br>

Inside the program: Help > Report a problem (bug), Send a suggestion or Question for the creator - the message is ready to send, with the technical information.

To speed things up, send: the Google e-mail of the license, what happened (step by step), a screenshot (Win+Shift+S) and the build number (Help > About).

Problem	Solution
SUSSAI does not open and shows "Windows protected your PC".	Click "More info" > "Run anyway".
The Google window does not appear.	Allow pop-ups/windows for SUSSAI and try again. Check the internet connection.
The 6-digit code did not arrive.	Check the spam folder and click "resend the code". The code is valid for 15 minutes; after 5 wrong tries a new one is sent.
"Could not confirm your Google account".	Sign in again with the correct account. It must be the same account used for the purchase.
"Limit of computers reached".	On the old computer: License > Disconnect this computer. Or ask for the release by e-mail.
I want to sign out or switch accounts.	In SussaiLab click Sign out (at the top, twice). Inside the CLP: License > Sign out (logout). Then sign in with the other Google account.
"Incorrect computer date".	Correct the Windows date and time and click Try again.
The free trial has ended.	Buy a plan with Pix or card right on the screen (or on the website), or use "Request a manual license". Your circuits stay saved.
I bought it, but it is still in trial.	Close and reopen SussaiLab (it checks the license when it opens) or click "I already bought - check now". With the paid license, the CLP card shows the plan and Open starts the full version.
I requested a manual license and it says "Waiting for approval".	That is normal: the request is with SussaiLab. Leave the screen open (or open it later). Once approved, the program opens by itself.
"The license sheet is missing CHAVE_..._256" appears.	It is a SussaiLab server setting. Write to contato.sussai@gmail.com - the fix is done on our side.
The 3D image is slow or stuttering.	View > 3D image quality > Low. Close other heavy programs.
There is no sound.	Check View > In the scene > Sound on and the master volume (View > Volume...). Sound starts after the first click in the window (browser rule).
The machine does not start even with the correct program.	Check: PLC in RUN (F5)? Emergency stop latched? Overload relay tripped? Fault active in the Simulation menu?

15. Early Access: reporting problems and suggestions

SUSSAI version 1.0 is in **Early Access** (testing phase). It is already complete and works, but it is being tested on many different computers, so some detail may need fixing. The yellow **ACESSO ANTECIPADO** (EARLY ACCESS) badge appears on the entry screen and at the top of the program; click it to read the notice. The notice also appears by itself once for each new version.

How to report a problem (takes 1 minute)

- Menu **Help > Report a problem (bug)** (or click the EARLY ACCESS badge, or the link on the welcome screen).

- Write **what happened**. If you know, explain **how to make it happen again** (step by step) and **what you expected**.
- Fill in name, WhatsApp and city/school (optional; SUSSAI remembers them for next time).
- Keep the option **Include the technical information** checked: version, build, scene, mode, PLC style, Windows, screen size and the latest program errors. No password or personal file is sent.
- Click **Open in Gmail** (the message already has a ready subject and text, to contato.sussai@gmail.com) or **Other e-mail program**. No e-mail on the computer? Use **Copy the message** and paste it anywhere (even on WhatsApp).
- **Tip:** a screenshot helps a lot. Press Win+Shift+S, cut out the screen and paste it (Ctrl+V) into the e-mail.

Suggestions, questions and compliments

Use **Help > Send a suggestion** or **Help > Question or compliment to the creator**. Ideas for new machines and exercises are very welcome.

What's new and new versions

Help > What's new in this version shows what changed. The **build** (e.g.: 2026.10.19) appears in Help > About SUSSAI. When a new version with fixes is released, SUSSAI shows a notice (at most once a day, with internet): click it to download from the website. **Your license remains valid** in the new version.

16. Contact and rights

NEED HELP? CONTACT SUSSAILAB

E-mail: contato.sussai@gmail.com - **Website:** <https://sussailab.com.br>

Inside the program: Help > Report a problem (bug), Send a suggestion or Question for the creator
- the message is ready to send, with the technical information.

To speed things up, send: the Google e-mail of the license, what happened (step by step), a screenshot (Win+Shift+S) and the build number (Help > About).

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Support, purchases and renewals: contato.sussai@gmail.com - <https://sussailab.com.br>

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