

BUSABOY / USER & INSTRUCTOR GUIDE

Dive Planner V2

Complete manual · Edition 2.1

RC3 · QA6 | 21 October 2026

Equipment. Gas. Decompression. Review.

Updated for independent sidemount reserves, per-cylinder end pressures, the synchronized pressure graph and portrait/landscape A5 slates.

Educational beta: this manual explains the software. It is not a real dive plan or validation of life-support use.

Historical RC2 examples and screenshots are retained and explicitly identified. Current instructions are based on the QA6 replacement package.

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01 / Start here

Using the QA6 edition

Edition 2.1 · 21 October 2026 · Planner V2 RC3 · QA6

This manual describes the repaired equipment-aware open-circuit planner, including independent primary-cylinder reserves, physical end pressures, pressure-history visualization and portrait/landscape A5 slates.

Educational beta

This is interface documentation and software QA material, not an operational dive plan, training qualification or physiological validation. Independently verify real plans using appropriate training and established tools.

Evidence and version scope

The QA6 replacement files and their local Chrome checks are the implementation reference. The original RC2 manual supplied the chapter structure, historical screenshots and worked cases. Those cases retain their explicitly entered inputs; their reserve values are not QA6 defaults. No authenticated account workflow, real dive or physical printer is certified by this edition.

The downloadable PDF and this online guide contain the same revised chapter text. The earlier RC2 edition is retained separately for historical comparison.

Find your way around V2

The page follows the planning sequence from inputs to evidence.

01 - PROFILE Time mode **Time at level**

Your dive profile

Each row is a target depth. In **Time at level** mode, the time excludes travel. In **Leave-level runtime** mode, the number is the runtime at which you leave that level.

DEPTH · M	TIME · MIN	GAS
20	30	Air

+ Add level **Reset profile**

02 - GAS **V2.0 BETA RC2**

Build the diver, then build the plan

The loadout is part of the planning model. In backmount/twinset mode the four carried-cylinder slots are ordered Lean → Rich. In dual sidemount, the left and right sidemount cylinders are the independent primary pair and may intentionally carry the same gas; additional stage/deco cylinders are ordered Lean → Rich separately. Every physical cylinder keeps its own mix, size, material, pressure, reserve and role.

PRIMARY CONFIGURATION

Single **Twinset** **Sidemount**

Choose the primary breathing system. A valid SCUBA configuration always includes at least one primary cylinder.

Loadout logic

Historical RC2 screenshot (19 October 2026). Figure 1. The profile card and beginning of equipment setup. Captured with the initial 20 m / 30 min profile.

AREA	PURPOSE
01 Profile	Depth/time/gas rows and time interpretation.
02 Equipment & gas	Primary system, physical slots, cylinder editor, blends, audit, manifest and helper.
03 / 04	Deeper/longer contingency and expandable model settings.
05 Residual loading	Previous calculated tissues and surface interval.
Calculate & results	Main schedule, gas and exposure reports, contingency, graph and tissue playback.
06 Saved dive profiles	Fixed demo, guest profiles or account-backed profiles.

The shortcut links jump to Profile, Equipment & gas, Model & settings, Calculate & results and Local jobs. The last label still says “Local jobs” even though signed-in storage is account-backed.

02 / What changed in V2

01 / Equipment

Build the diver first.

Single, twinset and sidemount systems now generate the gas resources. Each carried cylinder retains its own mixture, size, material, pressure, reserve and role.

02 / Rules

Configuration changes the workflow.

Recreational systems stay within NDL and depth/MOD limits. Technical-capable architecture opens advanced controls; it does not certify the diver or validate the dive.

03 / Resources

Physical slots, plus a manifest.

Four carry slots use lean-to-rich ordering, with a fixed primary sidemount-pair exception. Up to eight extra resources can be added to the manifest.

04 / Storage

Complete V2 profiles.

The fixed single-EAN32 demo occupies one slot. Guests have four personal slots; signed-in users have fourteen, backed by their account.

Important V1 -> V2 corrections

Enter twinset volume per cylinder in the V2 editor. The observed GF default is 50/85. Selecting a cylinder is distinct from carrying it. Linked sidemount composition does not link pressures. The fixed demo is protected, and full save slots are reported rather than silently replacing the oldest profile.

Current RC3 · QA6 additions

Independent sidemount reserve defaults, manual overrides, physical end pressures, a synchronized gas-pressure graph, enforced repetitive-chain limit, recreational max-stay and portrait/landscape single-page vector slates are covered in this edition.

03 / Quick start

One complete planning cycle

Build the diver first. Review the result as a whole.

STEP	ACTION / CHECK
01	Choose the real primary system: Single, Twinset or Sidemount. Configure every carried cylinder, its role, analysed mixture, water volume, start pressure and reserve.
02	Enter the profile and its time mode. Confirm the gas on every row after changing the loadout.
03	Open Advanced settings. Match GF, rates, RMV, oxygen limits, environment and minimum-gas assumptions to the comparison you intend to make.
04	Check residual loading. For a fresh teaching case, clear history; for a repetitive case, deliberately enable the previous result and enter the surface interval.
05	Set +depth and +time, read the acknowledgement, then select Calculate dive plan.
06	Review warnings, runtime, gas capacity, turn pressure, exposure, minimum gas and contingency. Explore the graph. A calculated schedule is not approval.
07	Name and save the profile. Copy the plan or print its A5 slate only after cross-checking the same inputs independently.

THE THREE REVIEW QUESTIONS

Can the configured gases be breathed on every segment? Is sufficient gas available after reserves, including the contingency? Does the entire ascent agree with an independently verified plan?

After any edit

Recalculate. Profile, equipment and settings changes can clear the displayed result. Saving also calculates first. A screenshot or copied plan is a snapshot of one calculation, not a live view of later edits.

04 / Profile & time modes

Depth, hold time and runtime

Two time modes describe different quantities. Choose one before entering rows.

CONTROL	MEANING / USE
Depth · m	Target depth for this level. The engine-wide range is 0-150 m, but recreational configuration applies a shallower equipment/gas limit.
Time at level	The row time is stationary hold time. Travel and gas-switch time are added.
Leave-level runtime	The row time is elapsed runtime when you leave that level. It must allow enough time for preceding rows, travel and switches.
Gas	A gas resource generated from the loadout. Recheck it after changing mixtures, roles or configuration.
+ Add level	Adds a new row, initially 20 m / 10 min using an available non-bailout gas.
Remove level	Removes that row. At least one level is needed for a calculation.
Reset profile	Replaces the row list with 20 m / 30 min. It is not a reset of all equipment, settings or history.

Worked time conversion

At the default descent rate of 18 m/min, descending to 40 m takes 3 rounded minutes. A 25-minute hold therefore ends at runtime 28. Enter 28 in Leave-level runtime to describe that departure; entering 25 leaves 22 minutes at depth.

Whole-minute travel matters

Travel duration is rounded upward to a whole minute for each leg. Even a 6.0 m to 5.8 m movement can add one minute. This changes gas use, tissue loading and comparisons with a computer using continuous travel.

SUMMARY

Hold time excludes travel. Runtime includes it. Never compare two plans until their time modes and travel conventions match.

Multilevel and travel-gas profiles

Use rows to describe the intended profile; inspect the resulting transitions.

STEP	ACTION / CHECK
1	Enter the first level, its hold or leave runtime, and the gas actually used.
2	Add successive levels in chronological order. In runtime mode, times must allow the travel and any switch between rows.
3	For a change to a deeper level, the new row gas is used during descent. For a move to a shallower level, travel uses the previous gas and the switch occurs at the new level.

STEP	ACTION / CHECK
4	Calculate and expand the detailed event schedule. Confirm the gas before, during and after each transition, not only at the final depth.

A multilevel teaching exercise

Enter 30 m / 10 min, then 18 m / 10 min on the same gas in Time at level mode. Compare the generated schedule with a single 30 m hold. This is an exercise setup, not a validated dive schedule or a guaranteed no-stop result.

Hypoxic mixtures require explicit transitions

A hypoxic bottom blend cannot simply be selected for a descent beginning at the surface. The engine checks the shallow and deep ends of travel against its 0.16 bar lower oxygen threshold and the configured working pO₂ limit. Configure an appropriate carried travel gas and explicit travel level before the bottom gas; verify the return route too.

A VALIDATION THRESHOLD IS NOT A TARGET

The 0.16 bar check is a software boundary, not a recommended breathing limit. Technical and hypoxic-gas planning requires the relevant training and independent verification.

Intermediate ascent checks

This V2 source checks user-entered ascents against the GF ceiling and checks the final trajectory. Do not use manually drawn shallow levels as a substitute for validated decompression planning. The automatic ascent is generated after the last profile row.

05 / Equipment & cylinders

Choose the primary breathing system

The configuration changes the available workflow and planning restrictions.

SYSTEM	WHAT V2 MODELS
Single	One backmount bottom-gas source. Normally recreational: NDL only and no deeper than 40 m or the bottom-gas working MOD, whichever is shallower.
Twinset	A primary twinset. V2 classifies the architecture as technical-capable; it still checks gases, pressures and the profile.
Sidemount: one cylinder	Left-only or right-only primary. Entering Sidemount starts with left S80 Air, 200 bar and 66 bar reserve. Normally recreational.
Sidemount: Pair	Two independent primary cylinders. Both must support maximum planned depth within working oxygen limits to count as redundant bottom sources.
Single + suitable bailout	An active carried-slot cylinder with Independent bottom bailout role can unlock technical mode if suitable at maximum depth. Its usable gas is checked against the available minimum-gas estimate.

Technical-capable is a software classification

It reflects gas-source architecture, not diver competence, valve/regulator configuration, team readiness or verified emergency capacity for every failure. Extra deco gas alone does not turn a single bottom source into redundant bottom gas.

Progressive controls

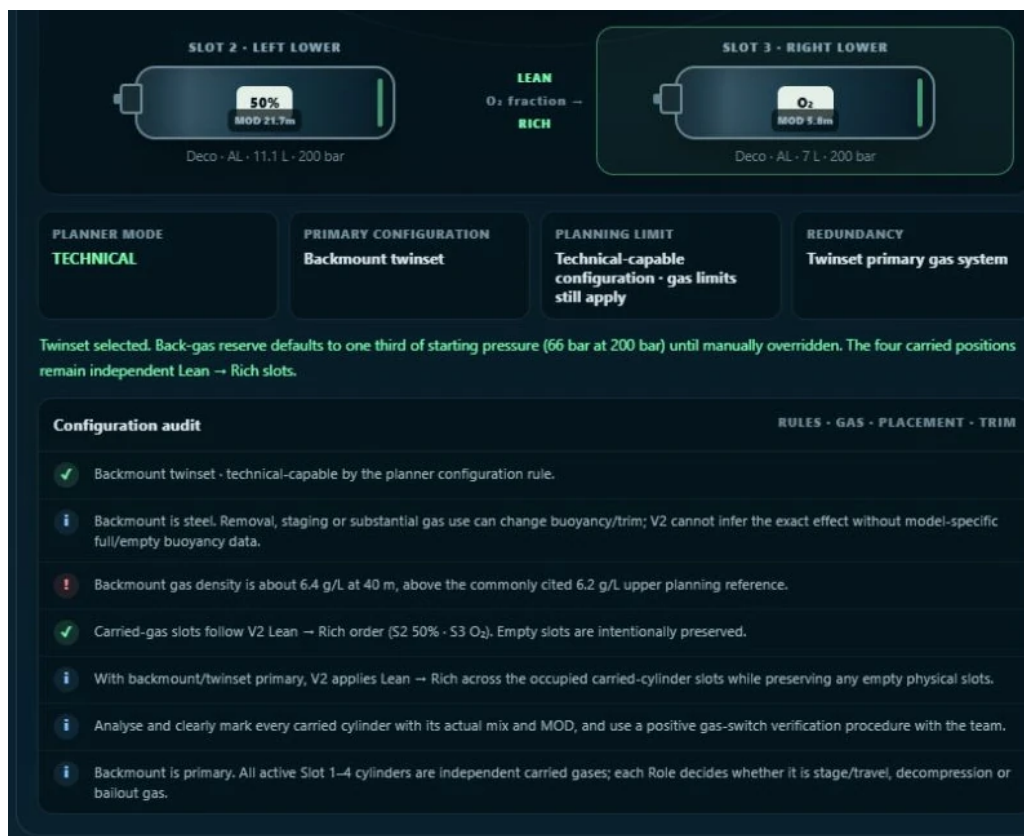
Advanced loadout reveals helium, material, volume, roles, lower slots, manifest and engine table. Advanced controls can open automatically when the configuration or gases need them. “Technical options active” means these controls remain required.

SUMMARY

Set equipment to describe what will actually be carried. Never change a configuration solely to make a rejected profile calculate.

Select, edit, then carry

A highlighted cylinder is only the cylinder being edited.



Historical RC2 screenshot (19 October 2026). Figure 2. Active lower cylinders, technical-mode summary and configuration audit. The air-at-40 m density warning is deliberate in the teaching case.

STEP	ACTION / CHECK
1	Click the backmount image or a side/lower slot. Read SELECTED CYLINDER and its position.
2	For an offboard cylinder, enable Carry this cylinder. Confirm IN USE rather than OFF / Not carried .
3	Set the role, mixture, model/volume, material, starting pressure and reserve. For Deco, review the switch ceiling.
4	Read the mode banner and Configuration audit, then inspect the gas list in each profile row.

COMMON TRAP

Clicking a slot selects it but does not necessarily enable it. The empty slots can display default Air, EAN50 or O2 even when none of that gas is carried.

Every cylinder field, explained

The cylinder editor describes a physical resource, not just a blend name.

FIELD	HOW TO USE IT
Carry this cylinder	Includes or excludes an offboard slot. Primary-system rules preserve at least one bottom source.
Role	Primary bottom, Stage / travel, Decompression or Independent bottom bailout; availability depends on position and primary system.

FIELD	HOW TO USE IT
Stored blend / blend buttons	Apply Air, EAN32, EAN36, EAN50, EAN80, O2, Tx18/45 or Tx21/35 to the selected cylinder. Simple recreational view hides/restricts advanced blends.
O2 % / He %	Percentages, not fractions: 18 and 45 for Tx18/45. Nitrogen is the remainder. Editing may adjust the other fraction to keep the total within 100%; recheck both.
Cylinder	Select the real model/size from the library or Custom. A model selection populates volume and material.
Water volume · L	Internal water capacity, not surface gas litres. For a twinset this is per-cylinder size.
Material	Aluminium, Steel or Other / unknown. Used for configuration/trim information, not a full buoyancy simulation.
Start · bar	Actual starting pressure used by the capacity calculation.
Reserve · bar	Simple pressure reserve withheld from normal-plan usable gas. Separate from the minimum-gas estimate.
Planned switch ceiling · m	For Deco: blank means automatic at MOD. A manual value can delay a switch to shallower water; it cannot permit a deeper-than-MOD switch.

Readouts update with the environment

The editor shows gas, applicable MOD, pO₂ and density at the deepest entered level, and capacity. A deco cylinder showing a high pO₂ at maximum depth is not an instruction to breathe it there: its use must remain within its switch and oxygen limits.

Backmount cylinders and editable reserves

In a twinset, enter the water volume of one cylinder. A 12 L + 12 L selection produces 24 L total; do not enter 24 L per cylinder.

Action	QA6 behaviour
Fresh backmount setup	200 bar start / 66 bar reserve.
Edit starting pressure	Reserve becomes floor(start / 3): 200 -> 66, 210 -> 70, 232 -> 77 bar.
Edit reserve manually	Your value remains until that cylinder's starting pressure is changed again. Gas, volume or profile edits do not reapply thirds.
Switch Single / Twinset	The current backmount reserve is retained. A new starting-pressure edit reapplies the one-third default.
Retrieve an existing saved profile	Its saved reserve is retained. Edit the corresponding starting-pressure field to apply the new default.

The printed cylinder table reports each twinset cylinder separately using equal pressure drop. A 2 × 12 L system at 200 bar contains 4,800 surface litres in the ideal-gas model.

A software default, not a universal rule

One-third initialization is editable. It is separate from the emergency minimum-gas estimate and is not a complete route, thirds or emergency-gas procedure.

Sidemount: independent fills and reserves

Entering Sidemount creates a left primary at 200 / 66 bar. Adding the right primary through Pair or Carry this cylinder initializes that primary's reserve from its own starting pressure. Both primary cylinders, including a single-primary setup, use the editable one-third default.

Control	QA6 behaviour
Left/right starting pressure	Changing one primary sets only its own reserve to floor(start / 3). Left 232 / 77 and right 180 / 60 are independent.
Manual reserve	Retained until that same cylinder's start pressure is edited again.
Link primary mix	Links composition only. It does not link volume, starting pressure or reserve.
Same mix in both primaries	The engine pools gas capacity, then allocates consumed litres by water volume. Each bottle has equal pressure drop; its own fill and reserve remain in the physical-cylinder report.
Different mixes	Separate working gases; profile assignment and eligibility determine use.
Stage/deco	No automatic one-third reset when their starting pressure changes. These reserves remain independently editable.

Fresh standard stage/deco slots default to 50 bar. The additional-manifest cylinder initializer and some historical/demo slots retain 40 bar; inspect the displayed reserve rather than assuming all carried resources share one default.

A pooled gas surplus does not hide an individual-cylinder reserve deficit under the stated allocation. Promoting an active carried stage to a sidemount primary applies the primary default.

No breathing rotation is simulated

Equal pressure drop is an accounting assumption. It does not model manual sidemount alternation, inaccessible gas, a failed regulator, valve isolation or emergency sharing.

Placement, roles and automatic sorting

V2 preserves cylinder data when it changes a carried position.

ROLE	ENGINE BEHAVIOR
Primary bottom	Primary working source. Backmount is always Bottom. Sidemount bottom sources occupy the outer left/right positions.
Stage / travel	Available for explicit profile use. It is not automatically selected merely because it is carried.
Decompression	Eligible for automatic ascent switching when within its switch ceiling and oxygen limits. The engine favors a richer usable oxygen mix.
Independent bottom bailout	Reserved as a contingency resource rather than routine profile/deco consumption. A carried-slot bailout can contribute to technical-mode classification.

Lean to rich: occupied slots only

For backmount/twinset, ordering is S1 left upper -> S2 left lower -> S3 right lower -> S4 right upper, from lower to higher oxygen fraction. Empty positions stay empty. When sorting occurs, the complete cylinder object moves, including its pressure, reserve, size and role.

Dual-sidemount exception

The independent primary left/right pair stays fixed and can have the same gas. Lean-to-rich sorting applies to the additional carried stage/deco/bailout cylinders, not across that primary pair.

Bailout scope matters

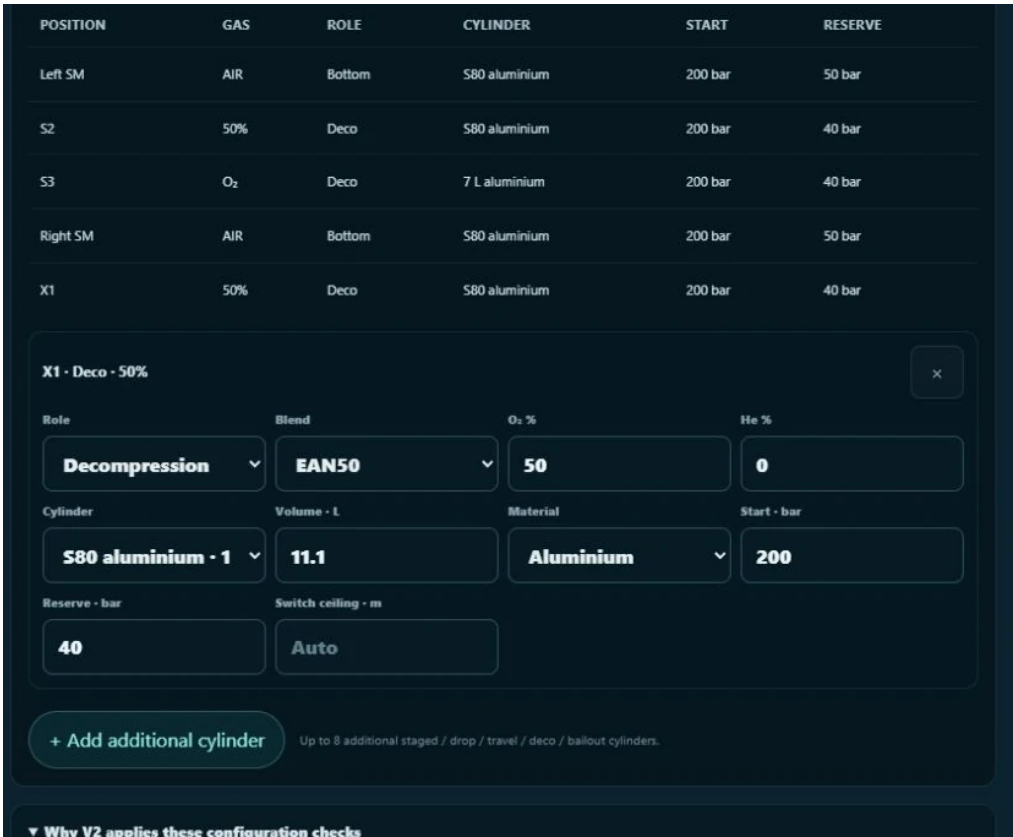
In this build, the technical-mode bailout check uses the four carried slots. An extra manifest cylinder marked Bailout is not included in that mode-unlocking check. The +depth/+time feature is not a lost-gas simulation.

SUMMARY

After a mix change, re-read the slot labels and profile gases. Physical cylinder markings and a positive team gas-switch procedure remain essential; a diagram cannot identify a regulator in the water.

The manifest and engine gas table

Go beyond the four visual carry slots without hiding resources.



Historical RC2 screenshot (19 October 2026). Figure 4. An added X1 manifest resource with its own role, mixture, cylinder, volume, material, pressures and switch ceiling.

STEP	ACTION / CHECK
1	Expand Cylinder manifest. Review the overview of the primary system and occupied carried slots.
2	Select + Add additional cylinder. Up to eight extras are supported, identified as X1, X2 and so on.

STEP	ACTION / CHECK
3	Edit Role (Stage / travel, Decompression or Bailout), Blend, O2, He, Cylinder, Volume, Material, Start, Reserve and Switch ceiling.
4	Use Remove additional cylinder to remove an unwanted extra. Recheck labels, selected profile gases and results after changing the list.

Engine gas table

Expand this table to inspect the gas resources, volume and pressures generated from the loadout. Same-mix sidemount primaries can appear as one combined resource; carried and extra resources remain individually identified. Although the table cells look editable, this build regenerates gas inputs from the loadout when calculating. Make durable changes in the cylinder editor or manifest, then recheck this table.

SCOPE LIMIT

“Staged” in the manifest does not provide a full pickup/drop-route simulator. Do not assume the planner verifies where a cylinder is physically reachable or whether duplicate mixtures will be used in your intended sequence.

06 / MOD & mix helper

MOD, pO2 and the quick helper

The quick helper and the main engine use different environmental assumptions.

QUANTITY	INTERPRETATION
pO2	Oxygen fraction × ambient pressure. It rises with depth. The editor and result use the configured environment.
MOD	Maximum operating depth at the selected oxygen limit. Deco-role cylinders use the deco limit; other roles use the working limit.
Quick helper	A simple 1 ATA at the surface / 10 m per ATA Nitrox relationship. Move MOD, pO2 or EAN O2%; the related values update.
Use this EAN in selected cylinder	Applies the helper oxygen percentage to the selected cylinder as a Nitrox mix. Verify the selected cylinder before applying.
EAD	Equivalent air depth based on nitrogen pressure. It is not an oxygen, density or overall safety limit.
END	Equivalent narcotic depth. This planner treats oxygen as narcotic; helium reduces the calculated narcotic fraction.

Simple sea-level teaching formulas

$pO_2 = FO_2 \times (1 + \text{depth} / 10)$. $MOD = 10 \times (pO_2 \text{ limit} / FO_2 - 1)$. $EAD = (\text{depth} + 10) \times (1 - FO_2) / 0.79 - 10$. These are helper formulas, not the exact environmental calculation used by the main planner.

Why a switch can appear at 5.8 m

At 1,013 mbar, salt-water density 1.030 kg/L and a 1.60 bar oxygen limit, the main engine permits oxygen at about 5.8 m. It rounds switch depths toward shallower water. EAN50 can show MOD 21.7 m in a rounded readout but switch at 21.6 m in the schedule.

SUMMARY

Use the main engine's actual switch depth and warnings when reviewing its output. Never round a switch deeper just to match a familiar 6 m or 21 m convention.

07 / Model & settings

Conservatism and travel

The same GF pair does not guarantee the same runtime in two planners.

04 · MODEL

Advanced settings

CONSERVATISM

GF Low · %

GF High · %

Last stop

50

85

6 m

RMV · LITRES/MIN

Work / bottom

Ascent / travel

Deco stops

18

15

15

Separate rates make the gas report more transparent:
working gas, ascent travel and stationary decompression
can be modelled independently.

TRAVEL RATES · M/MIN

Descent

Ascent to first stop

Between stops

Last stop → surface

18

9

3

3

NO-STOP ASCENT

☒ Add a precautionary safety stop to no-stop plans

Safety-stop depth · m

Safety-stop time · min

5

3

Enabled by default to reflect the BusaBoy habit of a 3-
minute precautionary stop around 5 m on no-stop dives.
Required decompression schedules use their calculated
stops instead.

Historical RC2 screenshot (19 October 2026). Figure 5. Expanded Advanced settings: GF, RMV, travel rates and the optional no-stop safety stop.

SETTING	DEFAULT / EFFECT
GF Low / GF High	50 / 85%. Low influences deeper ascent constraints; High controls the final surface constraint. Require $0 < \text{Low} \leq \text{High} \leq 100$.
Last stop	6 m, selectable 3-7 m. A usable richer gas may cause the engine to adjust the effective final stop shallower; review its notice.
Descent	18 m/min. Whole-minute travel rounding applies.
Ascent to first stop	9 m/min. Used for the initial ascent travel.
Between stops	3 m/min. Individual legs are rounded separately.
Last stop -> surface	3 m/min. Match this with the comparison tool's final-ascent setting.

The model is Bühlmann ZHL-16C with gradient factors and separate nitrogen/helium tissue loading. These are mathematical compartments, not measured body tissues. Changing GF is not a simple universally ranked “safer” slider.

RMV, stops and oxygen limits

Separate phase settings explain why two gas reports can differ.

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SETTING	DEFAULT	WHAT IT CHANGES
Work / bottom RMV	18 L/min	Surface-volume rate for working/profile use.
Ascent / travel RMV	15 L/min	Ascent travel gas calculation.
Deco stops RMV	15 L/min	Stationary decompression gas calculation.
Precautionary safety stop	Enabled	Adds a safety stop to no-stop plans.
Safety depth / time	5 m / 3 min	Included in runtime and gas. Required-deco plans use their calculated stops instead.
Switch time	1 min	Adds modeled switch time and corresponding gas/tissue effects.
Working pO2	1.40 bar	Working/profile and travel oxygen checks.
Deco pO2	1.60 bar	Automatic ascent/decompression gas eligibility and MOD.

Surface litres are not bar per minute

RMV here is litres per minute referenced to the surface. It does not change with cylinder size. A consumption rate expressed as bar/min depends on water volume and must not be entered as if it were RMV.

Read the event-level gas assignment

Profile and ascent phases can use different RMV settings, and gas changes have their own timed events. The detailed schedule is the right place to reconcile a gas-use difference with another tool.

DEFAULTS ARE REPRODUCTION INPUTS

All values on this page describe the observed software defaults. They are not recommendations for a diver, team, emergency or oxygen-exposure policy.

Water, altitude and local pressure

Pressure assumptions affect MOD, gas use and decompression.

CONTROL	DEFAULT / OPERATION
Water	Salt water selects 1.030 kg/L; fresh water selects 1.000 kg/L.
Density · kg/L	Can be edited for a known site. This is water density, not breathing-gas density.
Altitude · m	Default 0 m. The engine estimates surface pressure from sea-level pressure and altitude.
Sea-level pressure · mbar	Default 1013. Supply sea-level-adjusted pressure, not an already altitude-reduced station pressure.
METAR button	Requests a location and nearby aviation/weather pressure. Read the reported source and distance; verify relevance and freshness.

Using pressure retrieval

Select the METAR button only if you want location-based lookup. The implementation first attempts nearby aviation observations and has weather/location fallbacks. If retrieval fails, the existing pressure remains unchanged. The manual did not trigger location permission or test the external weather services.

Avoid double altitude correction

The sea-level pressure field and altitude are used together. Entering local station pressure and then adding altitude can apply altitude effects twice. Use an appropriate sea-level-adjusted value and confirm the actual conditions independently.

Reproducing a case

Use salt water, density 1.030 kg/L, altitude 0 m and 1013 mbar for all numerical cases in this guide. Do not fetch weather while reproducing them; it would change the inputs.

SUMMARY

The helper assumes a simple standard sea-level relationship. The actual plan uses configured density and pressure; a discrepancy between them is not automatically a bug.

Minimum-gas assumptions

A transparent estimate with a defined endpoint.

INPUT	DEFAULT	ROLE
Team size	2	Multiplies emergency RMV per diver.
Emergency RMV / diver	15 L/min	Emergency surface-volume rate for each modeled diver.
Problem time at depth	1 min	Team breathing at maximum depth before ascent.
Emergency ascent	10 m/min	Travel-time assumption for the minimum-gas estimate.
Gas handover / switch	1 min	Additional gas at the independent handover depth, when one exists.
Reference fill	200 bar	Only converts litres to cylinder-equivalent water volume in comparison reports.

No-stop endpoint

The estimate generally runs from maximum depth to the surface if there is no independent gas handover. It is separate from the normal-plan calculation, simple cylinder reserve and optional safety-stop gas.

Decompression endpoint

The estimate runs toward the first independent ascent/deco gas handover, including planned bottom-gas decompression holds before that handover. It does not prove the downstream independent gas will cover every emergency.

When no estimate is supplied

A decompression plan without an independent gas handover returns an unavailable estimate rather than an invented reserve. A schedule can still be displayed; the missing emergency estimate is a separate unresolved issue.

SUMMARY

Never substitute the software's default emergency RMV, endpoint or team assumptions for the actual emergency procedure. The estimate is not a universal agency rock-bottom rule.

08 / Repetitive dives

Residual loading and surface intervals

Saved profiles and previous tissue history are different mechanisms.

STEP	ACTION / CHECK
1	Calculate the first teaching profile and inspect its result.
2	Choose Store current result as previous dive. Confirm the previous-plan badge. This stores final inert-gas tissues in the browser session.
3	Build the next profile. Enable Start this plan from the previous calculated dive and enter the surface interval before it.
4	Calculate, review and store that result before proceeding to the next dive. The UI describes a chain of up to six calculations.
5	Use Clear history for a deliberate fresh-history exercise. Recheck the checkbox, surface interval and any retrieved profile state.

What carries forward

The model carries nitrogen/helium tissue state. During the surface interval it models surface off-gassing before the next profile. It does not reset tissues just because the next profile is shallow.

What does not carry forward

CNS and OTU in the results are for the current calculation only. V2 does not accumulate prior repetitive oxygen exposure. The displayed percentages must not be interpreted as a whole-day exposure total.

Session and saved-profile nuance

Session history is not a permanent logbook. A saved input can also contain an initial tissue snapshot, so a retrieved profile deserves explicit history review. Saving a profile is not equivalent to storing the current result as the previous dive.

REPRODUCTION RULE

The six measured cases in this guide start with fresh tissues and no previous-dive loading. Do not compare their numbers to a repetitive calculation.

QA6 history behaviour

The chain limit is enforced at six dives. Storing the same calculated result again does not add another dive to the chain. Clear history resets the session chain. Saved profiles preserve an entered surface interval even when no residual history is active; always review the retrieved history state.

09 / How calculation works

1. Build gas resources. Read the real loadout, roles and cylinder values, including sidemount aggregation and manifest extras.
2. Validate. Check fields, configuration, mixture suitability, oxygen limits, travel transitions and profile constraints.
3. Initialize tissues. Use surface-equilibrated compartments or the selected prior tissues after the entered surface interval.
4. Simulate the profile. Update sixteen nitrogen/helium compartments through timed travel, holds and switches; account for gas and exposure.
5. Generate and check the ascent. Calculate a no-stop or GF decompression route and eligible gas changes; check trajectory constraints.
6. Report and compare. Build runtime, pressure, capacity, exposure, emergency estimates, the + plan and visual playback.

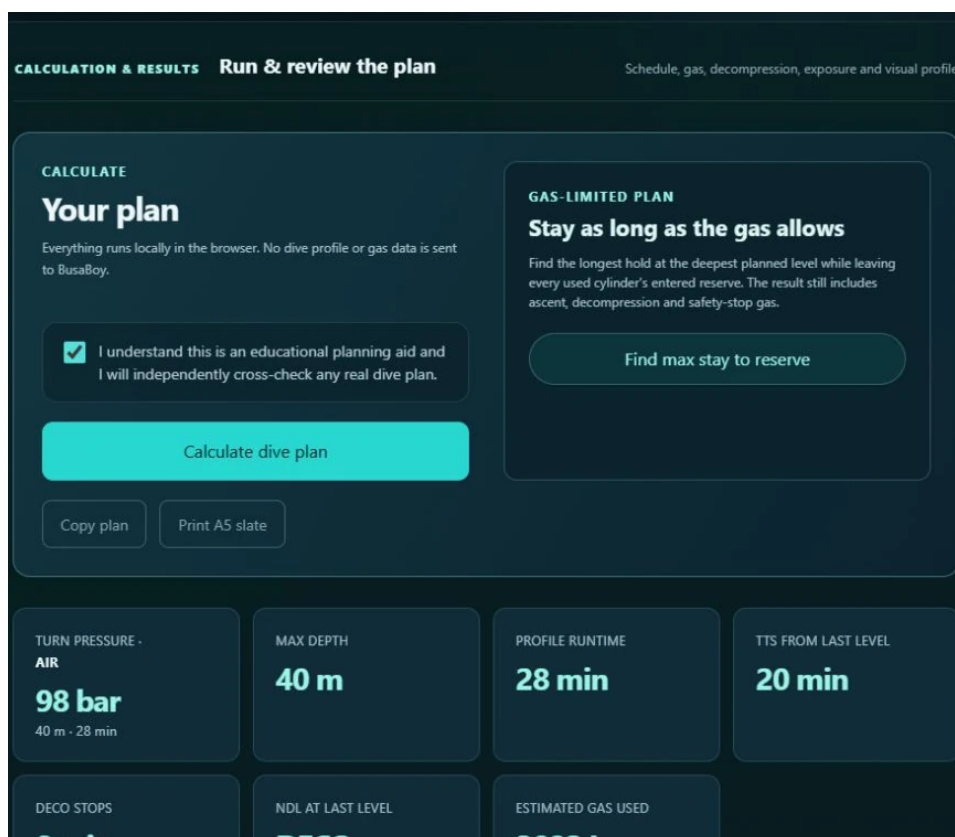
A returned answer can still contain a failed check.

Read warnings and contingency separately. Numerical output is not independent physiological or operational validation.

10 / Read the results

Read the summary without shortcuts

The top cards answer different questions.



Historical RC2 screenshot (19 October 2026). Figure 6. Calculation controls and top result cards for the 40 m / 25 min air teaching case.

CARD	MEANING
Turn pressure	Predicted pressure when departing the final entered level. A shortfall banner means the scheduled remainder plus reserve is not covered.
Max depth / Profile runtime	Deepest depth and elapsed time at the end of the entered profile, before the generated final ascent.
TTS from last level	Time to surface from the last entered level, including scheduled travel, switches and stops.
Deco stops	Required stationary deco time, or the optional safety-stop indication for a no-stop plan.
NDL at last level	Estimated remaining no-decompression time there, or DECO. It is not remaining gas time.
Estimated gas used	Total surface litres across used resources. Read the per-gas breakdown too.

ARITHMETIC CHECK

Profile runtime + TTS = total runtime. In the illustrated case: $28 + 20 = 48$ minutes.

Compact runtime and detailed events

Segment time is a duration; Run is cumulative elapsed time.

Compact runtime plan				
ACTION	DEPTH	SEGMENT	RUN	GAS
1 Descend	40 m	3 min	3 min	Air
— Level	40 m	25 min	28 min	Air
T Ascend	21.6 m	3 min	31 min	Air
↔ Switch	<u>21.6 m</u>	<u>1 min</u>	<u>32 min</u>	<u>S2 EAN50</u>
T Ascend	15 m	1 min	33 min	S2 EAN50
T Ascend	12 m	1 min	34 min	S2 EAN50
T Ascend	9 m	1 min	35 min	S2 EAN50
— Deco	9 m	1 min	36 min	S2 EAN50
T Ascend	6 m	1 min	37 min	S2 EAN50
T Ascend	5.8 m	1 min	38 min	S2 EAN50
↔ Switch	<u>5.8 m</u>	<u>1 min</u>	<u>39 min</u>	<u>S3 O₂</u>
— Deco	5.8 m	7 min	46 min	S3 O ₂
T Ascend	0 m	2 min	48 min	S3 O ₂

Historical RC2 screenshot (19 October 2026). Figure 7. Compact runtime for the 40 m / 25 min air case. The transcription in Case 4 preserves the full schedule.

Read left to right

Action identifies descent, level, ascent, switch, deco or safety stop. Depth is the segment endpoint or hold depth. Segment is time spent in that row. Run is the runtime at its end. Gas is the resource used.

Show detailed event schedule

Expand it when investigating rounding, individual holds, gas consumption or a difference between planners. The compact table groups compatible events for readability; the detailed table exposes the underlying event sequence.

GAS-SWITCH MARKERS

Underlined switch rows are provided for NOTOX notation. A mark on a table does not replace a trained positive identification and switching procedure.

Exposure, density and equivalent depths

These checks answer different questions; none replaces the others.

READOUT	WHAT TO LOOK FOR
CNS / OTU	Current-calculation oxygen exposure estimates. Prior repetitive exposure is not accumulated. A rounded 0% is not proof of no exposure.

READOUT	WHAT TO LOOK FOR
Bottom pO ₂ / pN ₂ / pHe	Gas partial pressures at the deepest working point. Helium is shown when applicable.
EAD	Air depth with comparable nitrogen pressure. Useful for understanding composition, not an ascent instruction.
END	Equivalent narcotic depth under the planner's assumption that oxygen is narcotic.
Gas density at 0 °C	Planner estimate compared against its 5.2 g/L preferred and 6.2 g/L upper references. A warning can occur even with acceptable pO ₂ and sufficient gas.
GF and environment	Confirm that the displayed GF, altitude and water density match the intended case.

The 40 m air case demonstrates the distinction

The result has positive gas margins and bottom pO₂ around 1.06 bar, but density around 6.4 g/L triggers a danger warning. Passing one check does not cancel another.

The 50 m trimix case is not a simple depth comparison

Tx18/45 at 50 m displays about 4.8 g/L density and END about 23 m under the model's narcotic assumption. This does not establish equivalent training requirements, equivalent decompression or equivalent overall risk to a shallow air dive.

SUMMARY

Read the status text as well as rounded numbers. A value displayed as 5.2 g/L may be slightly above 5.2 internally and therefore trigger a warning.

Warnings and configuration audits

Distinguish a rejected input from a calculated result that still needs revision.

SIGNAL	RESPONSE
Configuration audit	Review source architecture, pressure/reserve validity, mixture suitability, placement, material and density messages before calculation.
Calculation error	Read the exact text. Fix the named input or configuration. No new valid result should be inferred from an old screenshot.
CHECK THIS PLAN	A danger-level issue such as gas shortage or high density. A schedule may still be displayed; it is not ready merely because it exists.
REVIEW	An adjustment or assumption needs attention, such as a final-stop change or a preferred-density warning.
No configured-limit warnings	Only says the configured checks did not flag the result. It does not establish safety, completeness or validation.

Some audit messages block; others inform

Zero start pressure, reserve not below start, or a manual deco switch deeper than MOD can block. A steel-cylinder trim note is informational. Density can be a danger finding even when it does not prevent the engine from returning a schedule.

The contingency label is broader than it sounds

“CONTINGENCY NOT GAS-FEASIBLE” can be triggered by a danger warning as well as a negative capacity margin. In the 40 m air example, the contingency has positive litre margins but fails the density check. Read the accompanying details.

SUMMARY

A warning-free main result, a usable contingency, appropriate equipment and an independent cross-check are separate review tasks.

11 / Gas management

Turn pressure is not the reserve

Do not wait until the reserve pressure before starting an ascent.

REPORT COLUMN	INTERPRETATION
At turn / start	Predicted pressure at departure from the final level; for other resources, pressure available when carried or first used.
Needed from turn	Scheduled gas use after leaving the final level plus that cylinder's entered pressure reserve.
Margin	Predicted pressure minus the needed-from-turn target. Negative means the main schedule cannot preserve that reserve.

Case 1: a positive departure margin

At 18 m / 25 min, the 12 L Air cylinder predicts 91 bar at departure. The displayed required-from-turn target is 64 bar, with a +27 bar margin. That is not a universal turn rule; it belongs to this exact profile, ascent and reserve.

Case 2: no-stop but insufficient gas

At 20 m / 30 min, departure pressure is about 57 bar while about 65 bar is needed. The initial banner reports roughly 8 bar short. Independently rounded cells can show a -7 bar margin; one-bar display differences do not remove the shortfall.

Final level is not always deepest

In a multilevel profile, the turn report refers to the last entered level. Minimum gas instead uses the deepest working point. These are different locations in a plan and should not be interchanged.

SUMMARY

Turn pressure includes the scheduled return/ascent demand and reserve. A simple reserve entry alone does not establish the pressure at which to leave depth or turn along an overhead route.

Gas use, capacity and gas mass

Keep surface litres, cylinder water litres and pressure separate.

MEASURE	CALCULATION / MEANING
Entered available	Water volume × start pressure, in surface litres.
Simple reserve	Water volume × reserve pressure.
Margin after reserve	Available - reserve - estimated used. Every used resource must be inspected.
Profile + ascent	Consumption split around the end of the entered profile; then combined for total use.
Cylinder-equivalent volume	Surface litres ÷ reference fill pressure. It is a comparison volume, not an additional cylinder or a working-pressure rating.

MEASURE	CALCULATION / MEANING
Gas mass consumed	Approximate mass removed by breathing gas, using composition-dependent standard density. It is not the cylinder's complete buoyancy change or a weighting prescription.

Example: 18 m teaching case

The 12 L cylinder at 200 bar contains 2,400 L in this model. The 50 bar reserve is 600 L. Observed use is 1,480 L, leaving about 320 L above reserve. Estimated end pressure is therefore about 77 bar.

Why the sums may differ by one litre

Each displayed cell can be rounded independently. For example, 1,309 L profile + 172 L ascent appears beside a rounded total of 1,480 L. Use the underlying calculation for reconciliation; do not treat the display as exact laboratory measurement.

CAPACITY MODEL LIMIT

The simple volume × pressure calculation is idealized. Real gas behavior, temperature, gauge error, actual fills and unusable gas can affect available capacity.

Physical cylinder estimates

The result now lists each physical cylinder, including each twinset or sidemount bottle: used surface litres, start pressure, estimated end pressure, reserve and remaining margin. End pressure = start pressure - allocated litres / water volume. Same-mix pooled resources allocate litres in proportion to water volume, producing equal pressure drop. Negative end pressure indicates a gas deficit, not a physically achievable gauge reading.

The pressure-history chart and slate end-pressure table use this same accounting. Real compressibility, temperature, gauge error and cylinder-switching technique are not modelled.

Find max stay to reserve

This searches for a whole-minute hold at the last deepest level while retaining entered reserves. It is an optimizer for software constraints, not an instruction to use the maximum duration.

1. Set the complete loadout, profile, model settings and each cylinder's reserve.
2. Choose Find max stay to reserve. In recreational mode the search is additionally capped by the no-decompression limit.
3. Read the maximum-stay message and limiting gas. The deepest hold changes; in leave-runtime mode later leave times shift accordingly.
4. Review the regenerated schedule, individual-cylinder margins, oxygen/density warnings and contingency.

The search ceiling is a 600-minute hold. If even a zero hold cannot cover the modeled route and ascent, no feasible stay is reported. A returned maximum may still have warnings and does not reserve extra contingency or account for unmodelled failures.

12 / The deeper / longer plan

Too deep + too long

The + plan recalculates the modified profile and ascent.

STEP	ACTION / CHECK
1	Enter Too deep · m and Too long · min. The observed defaults are +3 m and +3 min.
2	Calculate the main plan. The planner applies the additions to a deepest planned level and recalculates.
3	Inspect contingency TTS, total runtime, deco time, per-resource gas use and margins.
4	Read status and warnings. A recreational contingency entering deco is withheld as unavailable rather than offered as an executable recreational plan.

Time-mode behavior

In Time at level, the extra time adds to that level's hold. In Leave-level runtime, the extra time shifts that and following leave runtimes. Added travel from the deeper level still affects the interpretation; do not assume identical hold increments across both modes.

Repeated deepest levels

The source modifies the first deepest level for contingency, while maximum-stay search targets the last equally deepest level. With repeated equal maximum depths, explicitly inspect which row changed.

What the + plan does not simulate

It is not automatic lost-gas, regulator failure, lost teammate, missed-stop, delayed rescue or staged-cylinder-access planning. Those scenarios need separate deliberate modeling and independent procedures.

CASE LESSON

The 18 m main case has +320 L after reserve, while its +3 m/+3 min case has about -30 L. Main-plan feasibility does not establish contingency feasibility.

13 / Graph & tissue playback

The graph: depth, GF99, NDL and TTS

A shared timeline, with two different units on the right axis.



Historical RC2 screenshot (19 October 2026). Figure 8. The built-in EAN32 demo graph, inspected at runtime 15 min. The left axis is depth; the right axis serves both percentages and minutes.

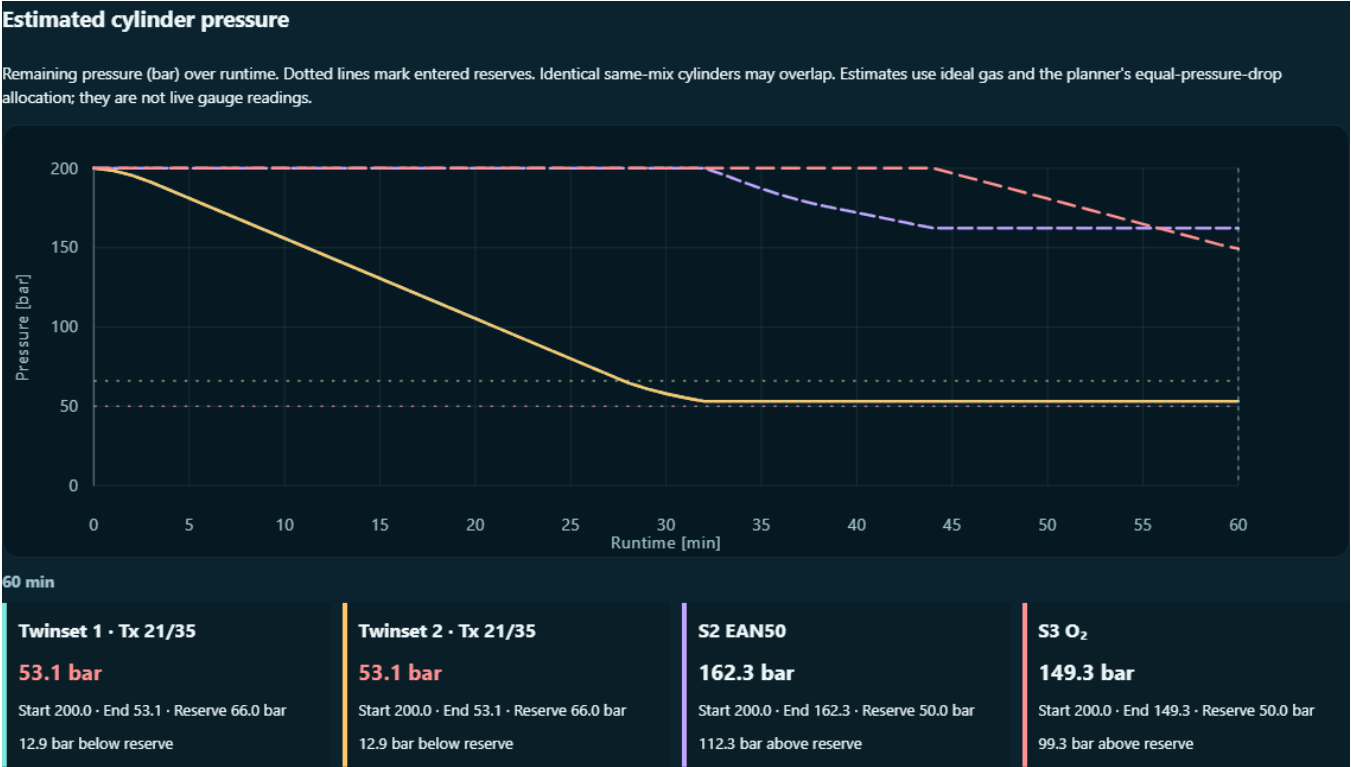
TRACE / MARKER	READ IT AS
Depth	Left axis, metres. Shows the entered profile and generated ascent.
GF99	Current leading compartment gradient relative to its original Bühlmann M-value, in percent. It is not the selected GF High setting.
NDL / TTS	Minutes on the numeric right axis. NDL display is capped at 99+; once decompression begins the red trace remains TTS.
Gas switches / deco stops	Timeline markers identify switches and stops; verify them against the runtime table.

Move the pointer over the graph, or focus it and use arrow keys, to inspect runtime, depth, gas, GF99 and phase. During the planned ascent, TTS is the remaining scheduled time including switches and stops. A value of 50 on the right axis means 50% for GF99 but 50 minutes for NDL/TTS.

Estimated cylinder pressure graph

A second graph shows remaining bar over runtime for every physical cylinder. Its smaller labels, thin traces, grid and rounded time divisions match the main profile. Dotted lines mark reserves. Identical traces can overlap; each cylinder retains a separate readout card with start, end and reserve values.

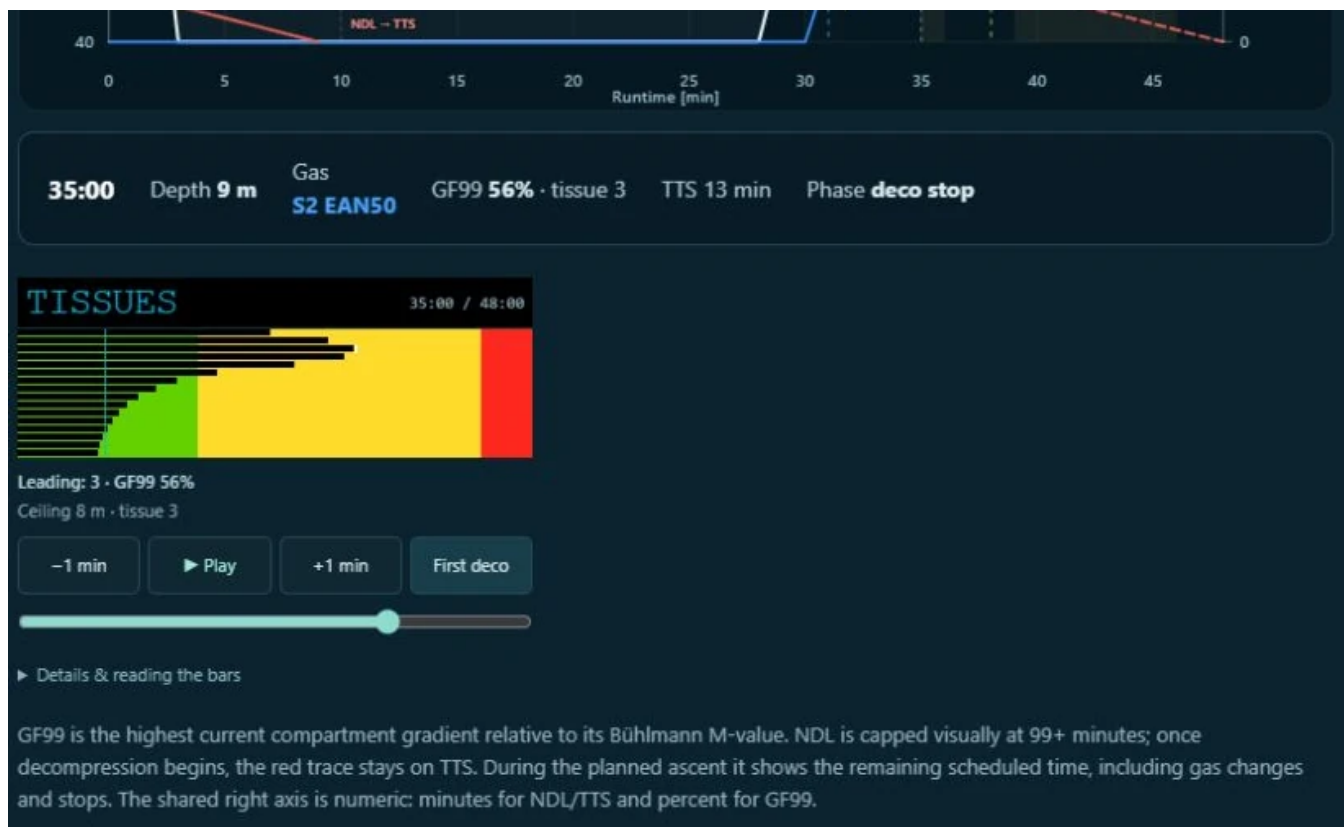
Use the main graph, timeline slider or play controls to move the shared cursor. Gas unused during a segment stays flat. Below-reserve values carry a textual warning; negative pressure is labelled GAS DEFICIT. The plotted curve integrates gas use against changing ambient pressure during travel. These are modeled estimates, not live gauge readings.



QA5 visual styling retained in QA6; synthetic test data deliberately includes a reserve shortfall.

Tissue playback and the detail panel

Inspect the modeled compartments at a particular runtime.



Historical RC2 screenshot (19 October 2026). Figure 9. Tissue panel at runtime 35 min in the 40 m air case: compartment 3 leads GF99 at about 56%.

CONTROL	FUNCTION
Back / Forward one minute	Step through the calculated timeline.
Play / Pause	Animate the calculated plan. Playback is not a live dive-computer feed.
Runtime slider	Jump to a point in the plan.
First deco	Jumps to the first actual decompression hold. It may differ from the headline “First stop” depth.
Details & reading the bars	Opens speed (1, 5 or 10 min/sec), compartment selection and detailed pressure/rate explanations.
Follow the GF99 leader	Keeps the selected detail focused on the leading compartment; turn it off to inspect a chosen compartment.

Sixteen rows run fastest to slowest. Black bars represent dissolved nitrogen + helium pressure, cyan marks inspired inert pressure, and the white tip identifies the GF99 leader. Green/yellow/red are pressure zones, not permission to ascend. Each row uses its own changing scale; compare its values, not just bar length.

TWO DIFFERENT LEADERS

The compartment controlling the GF ceiling can differ from the GF99 leader. “Change since start” uses the actual initial loading, including repetitive history.

14 / Six worked cases

The reproducible case baseline

Use these settings before comparing any of the measured cases.

GROUP	COMMON INPUTS
History / time mode	Fresh tissues; no previous result. Time at level.
GF / stops	50/85; last stop 6 m; no-stop safety enabled, 5 m for 3 min.
RMV	Work 18, ascent 15, deco 15 L/min.
Travel	Descent 18, ascent to first stop 9, between stops 3, final ascent 3 m/min.
Oxygen / switch	Working 1.40 bar; deco 1.60 bar; switch 1 min.
Environment	Salt, 1.030 kg/L; altitude 0 m; sea-level pressure 1013 mbar.
Contingency	+3 m / +3 min.
Minimum gas	2 divers × 15 L/min; problem 1 min; emergency ascent 10 m/min; handover 1 min.
Reference fill	200 bar for comparison volumes.

Two additional cylinders for technical cases

Case 4, Case 5 and Case 6 use S2 EAN50 in an S80 11.1 L aluminium cylinder, 200 bar / 40 bar reserve, and S3 O2 in a 7 L aluminium cylinder, 200 bar / 40 bar reserve. Both are carried with Decompression role and automatic switch ceilings.

The primary twinset reserve is deliberately overridden

Those three cases use 2 × 12 L steel, 200 bar, 50 bar manually entered reserve. Selecting Twinset alone initially gives 66 bar at 200 bar, which will not reproduce these cases.

TEACHING USE ONLY

These are measured outputs from this beta build, including deliberately problematic cases. They are not operational dive recommendations or independently validated decompression schedules.

Historical worked cases

The following six cases and time-mode comparison retain their RC2 inputs and observed outputs. Explicit reserves such as 50 or 40 bar remain part of those historical inputs; they are not current defaults. Re-enter every setting and compare a new calculation before drawing conclusions about QA6. No case is a real-dive recommendation.

18 m: main plan passes, contingency does not

+

Single backmount • Air • 12 L steel • 200 bar start / 50 bar reserve

ACTION	DEPTH	SEGMENT	RUN
Descend	18 m	1 min	1
Hold	18 m	25 min	26
Ascend	5 m	2 min	28
Safety stop	5 m	3 min	31
Ascend	Surface	2 min	33

OBSERVED RESULT	VALUE
Profile runtime / TTS / total	26 / 7 / 33 min
NDL at last level	21 min
Gas used / margin after reserve	1,480 L / +320 L
Departure / needed from turn	91 bar / 64 bar
Minimum-gas estimate	189 L
CNS / OTU	0% displayed / 6
+3 m / +3 min contingency	37 min total; 1,830 L used; about -30 L after reserve.

What to learn

The main result reports no configured-limit warnings, but the contingency is not gas-feasible. The additional depth and time consume more than the initial gas margin. A successful main calculation is not the end of the review.

A useful classroom question

Why is the simple 600 L reserve not the same as the 189 L minimum-gas estimate? Answer: they arise from different inputs and definitions; one is a fixed pressure reserve and the other a modeled team emergency demand.

SUMMARY

Reproduce the main and contingency results separately. Keep the contingency deficit visible in any teaching discussion.

20 m: the default is not a ready plan

+

Single backmount • Air • 12 L steel • 200 / 50 bar • 30 min hold

OBSERVED RESULT	VALUE
Profile / TTS / total	32 / 7 / 39 min
NDL at last level	5 min
Gas used	1,885 L

OBSERVED RESULT	VALUE
Available above simple reserve	1,800 L
Margin after reserve	Approximately -85 L
Departure / required departure	About 57 / 65 bar
Minimum-gas estimate	212 L
Contingency	Unavailable: the configured deeper/longer case enters decompression in a recreational configuration.

Interpretation

The main plan is no-stop under the model but cannot preserve the entered reserve. This is a direct example of NDL and gas duration being independent constraints. The startup profile is a set of initial fields, not a pre-approved dive.

How to revise the exercise

Use a shorter profile, or model the actual available equipment and pressures if they differ. Recalculate and recheck all outputs. Do not lower the reserve simply to turn a red margin positive.

Rounded deficit wording

The main capacity table displays roughly -85 L while the warning may say short by about 86 L. The warning uses a conservative rounding convention. Both describe the same failed reserve check.

SUMMARY

A schedule, an NDL value and an “insufficient gas” warning can all be present at once. Read every report panel.

The built-in Um El Faroud demo

+

Single EAN32 • 30 m / 20 min • 15 L steel • 200 / 50 bar

STEP	ACTION / CHECK
1	Open Your V2 dive plans and select Retrieve beside the fixed Um El Faroud - Malta demo.
2	Confirm Single, EAN32, 15 L, 200 bar and 50 bar reserve. The demo restores its own settings.
3	Acknowledge and calculate. It loads as an editable starting point; the fixed demo itself is not overwritten.

OBSERVED RESULT	VALUE
Profile / TTS / total	22 / 8 / 30 min
Safety stop / NDL	3 min at 5 m / 3 min NDL at last level
Gas used / reserve margin	1,778 L / +472 L

OBSERVED RESULT	VALUE
Bottom pO ₂ / EAD	1.29 bar / about 24.4 m
CNS / OTU	12% / 33
Density	About 5.2 g/L; preferred-reference warning.
Contingency	Unavailable because it enters decompression in the recreational configuration.

Why the demo still requires review

A built-in example can calculate while containing warnings and an unavailable contingency. The named site does not establish access, conditions, suitability or a route; the result is a profile calculation.

SUMMARY

Retrieve demonstrates loading a complete V2 setup. Save a modified copy as a personal profile and independently review it rather than treating the demo's name as an endorsement.

40 m air: gas margin is not enough

+

Twinset Air • 40 m / 25 min • S2 EAN50 + S3 O₂ • Baseline settings

OBSERVED RESULT	VALUE
Profile / TTS / total	28 / 20 / 48 min
Reported first stop / stationary deco	15 m / 8 min
Air / EAN50 / O ₂ use	2,623 / 237 / 231 L (individually rounded)
Total gas used	3,092 L
Margins after reserve	Air +977 L; EAN50 +1,539 L; O ₂ +889 L.
CNS / OTU	34% / 58
Minimum gas	475 L to the independent EAN50 handover.
Density	6.4 g/L on air at 40 m: above the upper reference.

Two critical observations

The final stop is adjusted from 6 m to 5.8 m to keep the oxygen switch within the configured pO₂ limit. More importantly, the air density warning means this example is not ready despite positive gas margins.

Contingency reading

At 43 m / 28 min the result totals 58 minutes, TTS 27 and deco 14. All three capacity margins remain positive, but air density rises to about 6.8 g/L. The “NOT GAS-FEASIBLE” status here includes a danger warning, not just a shortage of litres.

SUMMARY

This case is deliberately unsuitable as an operational template. It demonstrates why oxygen, density, decompression and gas capacity must be reviewed independently.

The complete compact schedule

+

Transcribed from the live case. All times are minutes; Run is cumulative.

ACTION	DEPTH	SEG.	RUN	GAS
Descend	40 m	3	3	Air
Level	40 m	25	28	Air
Ascend	21.6 m	3	31	Air
Switch	21.6 m	1	32	S2 EAN50
Ascend	15 m	1	33	S2 EAN50
Ascend	12 m	1	34	S2 EAN50
Ascend	9 m	1	35	S2 EAN50
Deco	9 m	1	36	S2 EAN50
Ascend	6 m	1	37	S2 EAN50
Ascend	5.8 m	1	38	S2 EAN50
Switch	5.8 m	1	39	S3 O2
Deco	5.8 m	7	46	S3 O2
Ascend	0 m	2	48	S3 O2

Why “First stop 15 m” is not the first hold

The summary reports 15 m, but the first stationary deco event is at 9 m. The chart’s First deco control jumps to runtime 35 at 9 m. Use the actual event schedule when explaining where time is spent.

The small movement with a full-minute cost

The 6.0 -> 5.8 m leg consumes one rounded minute. It is followed by one minute for the oxygen switch. Removing these during comparison would change runtime and gas use.

NOT AN EXECUTION SLATE

This table documents the beta output for a case with a density danger warning. It is included for software literacy, not as an independently approved decompression schedule.

50 m trimix: read the whole result

+

Twinset Tx18/45 • 50 m / 20 min • Same EAN50 and O2 resources

OBSERVED RESULT	VALUE
Profile / TTS / total	23 / 29 / 52 min
First stop / stationary deco	21 m / 14 min
Tx18/45 / EAN50 / O2 use	2,652 / 384 / 327 L
Total gas used	3,363 L
Reserve margins	Tx +948 L; EAN50 +1,392 L; O2 +793 L.
Bottom pO2 / pHe	1.09 / 2.73 bar
EAD / END / density	18.1 m / 23 m / 4.8 g/L
CNS / OTU / minimum gas	45% / 67 / 672 L

Reproduce the setup

Select Twinset, then its backmount cylinder and Tx18/45. Confirm O2 18%, He 45%, per-cylinder 12 L, 200 bar and manually entered 50 bar reserve. Keep the two carried deco resources and baseline settings unchanged.

Contingency

The +3 m / +3 min plan totals 63 minutes with TTS 37 and 21 minutes of deco. The result says the contingency needs review. The final-stop adjustment still needs attention; positive gas margins do not constitute independent validation.

COMPARISON LIMIT

This is not a controlled air-versus-trimix experiment: Case 4 has a different depth and hold. Its purpose is to demonstrate the trimix fields and output checks, not quantify the isolated benefit of helium.

Maximum stay changes the ascent too

+

Same 50 m Tx18/45 loadout as Case 5; select Find max stay to reserve.

MEASURE	20 MIN HOLD	MAX-STAY RESULT
Deepest hold	20 min	28 min
Profile runtime	23 min	31 min
TTS	29 min	40 min
Total runtime	52 min	71 min
Stationary deco	14 min	25 min
Total gas use	3,363 L	4,523 L
Limiting resource	Not an optimization	Tx18/45

Observed behavior

The optimizer updates the profile's deepest time field to 28 minutes and reports that all used resources retain their entered reserves. The main profile, decompression and gas reports are recalculated around that new input.

What the comparison teaches

Eight additional minutes at depth add nineteen minutes to total runtime in this calculation. The additional eleven minutes outside the hold come from the changed ascent/decompression schedule. Maximum stay is not "add eight minutes and keep the old ascent."

Preserve the original

If you want a before/after comparison, save the original Case 5 profile first, then save the optimized result as a new profile. Do not accidentally update the original when the interface indicates Update saved profile.

SUMMARY

Treat the optimizer as a sensitivity-analysis tool. Review its contingency and exposure separately, and do not infer that a gas-limited maximum is an appropriate planned duration.

Sidemount and configuration exercises

These are arithmetic and interface exercises, not measured decompression schedules.

Exercise A: linked mix, unequal pressure

Choose Sidemount -> Pair. Keep both S80 cylinders at 11.1 L on Air. Enter 200 bar left and 180 bar right, with 50 bar reserve each. The combined engine row should represent 22.2 L at a volume-weighted 190 bar and 50 bar reserve: 4,218 L total, 1,110 L reserved and 3,108 L above reserve.

Exercise B: change one mixture

With Link left/right primary sidemount mix enabled, change a primary mixture. Observe that the other mixture changes while its starting pressure and reserve remain independent. Then disable linking and compare the separate engine resources. Recheck whether both gases support maximum depth.

Exercise C: a selected but absent cylinder

Select an empty carried slot. Its editor and default blend become visible. Before enabling Carry this cylinder, check that it still says OFF / Not carried. Enable it and inspect the manifest and profile gas list.

Exercise D: empty-slot preservation

Enable two non-primary carried slots with different oxygen fractions. Reverse their relative richness through an edit. V2 can move complete cylinder objects between occupied slots; empty slots should remain empty. Check pressure and reserve travel with the object.

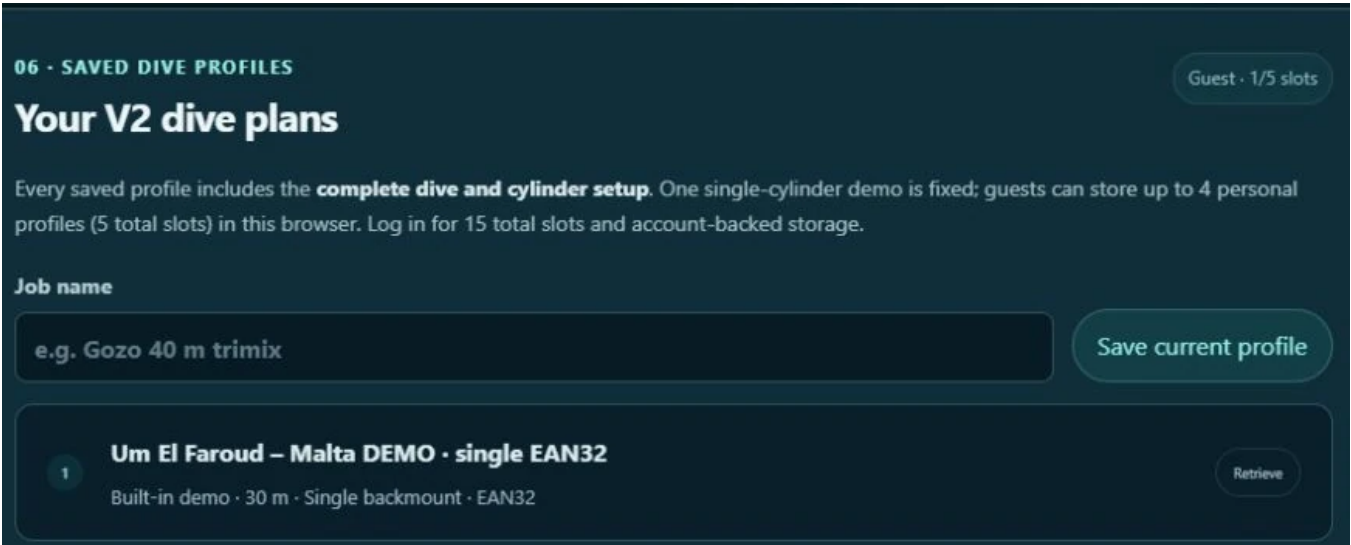
INSTRUCTOR DISCUSSION

Which values are physical per-cylinder facts, which are aggregated engine values, and which are software classifications? An aggregated pair cannot prove individual-cylinder emergency sufficiency.

15 / Save, copy & print

Save, retrieve, update and restore

Saved profiles contain the complete dive and cylinder setup.



Historical RC2 screenshot (19 October 2026). Figure 10. Guest saved-profile area with its fixed demo and Job name field.

ACTION	EXPECTED BEHAVIOR
Save current profile	Calculates first, then stores the input and summary if calculation succeeds. Use a meaningful Job name.
Retrieve	Restores the saved setup. Inspect equipment, gases, settings and history, then calculate before relying on a result.
Update saved profile	Appears for an active personal profile; replaces that profile with the current setup.
Save as new profile	Keeps the earlier saved version and creates a separate personal entry.
Delete / Undo	Personal profiles can be deleted; the interface offers an undo restoration while that deleted item is retained and a slot is available. The fixed demo is protected.

Capacity and location

Guests have 5 total slots: 1 fixed demo + 4 personal profiles in this browser. Signed-in users have 15 total: 1 demo + 14 personal account profiles. Browser-local data can be lost when site data is cleared or may be unavailable in restricted/private sessions. Calculations run locally, but account saves transmit the complete setup to the account service; the page's local-calculation statement should not be read as a promise that cloud saves stay only on-device.

VERIFICATION STATUS

The account-backed workflows are documented from public source and UI. This manual did not sign in, save to an account, delete an account profile or test synchronization across devices.

Copy and print the A5 slate

1. Calculate and review the current plan. Edits invalidate the prior result.

2. Copy plan exports settings, schedule, gas information and physical-cylinder estimates. Paste the clipboard into a temporary document to confirm success.
3. Choose Slate layout: A5 portrait (default) or A5 landscape, then Print A5 slate.
4. The separate preview checks the schedule and page fit. Select Print / save vector PDF. Use A5, the chosen orientation, 100% scale and no browser headers/footers.
5. Inspect the exported file. A printer's non-printable margins may differ from the preview; no physical printer is validated by this manual.

What is printed

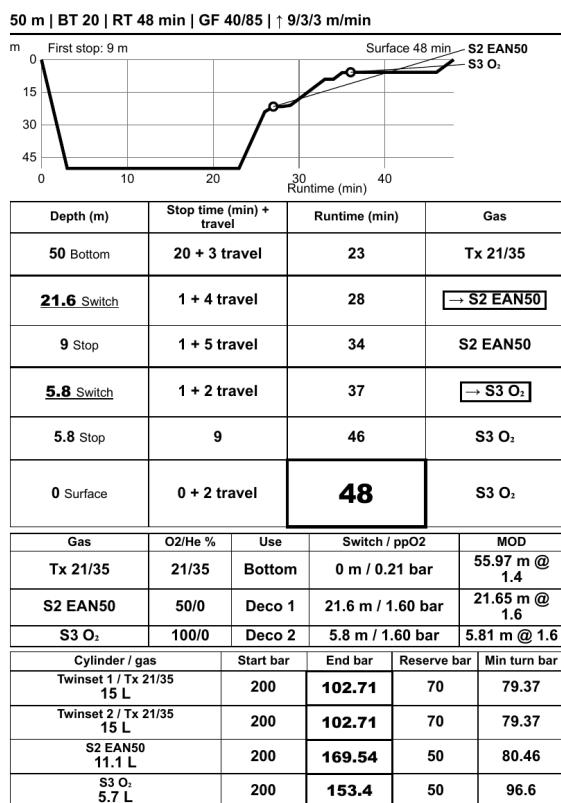
One page inside 4 mm margins: depth/bottom time/runtime/GF/ascent-rate header; vector profile; stop table; gas specification table; and a physical-cylinder table with Start, End, Reserve and Min turn pressure. End pressure is emphasized separately for each cylinder.

BT is time held at maximum depth; RT is total runtime. The three ascent rates are first-stop / between-stops / surface. Table travel durations are explicit additions to holds or switches, so cumulative runtimes can be checked. Min turn is scheduled ascent use plus the entered reserve, not the separate emergency estimate.

Strict page-fit behaviour

Portrait accommodates longer stop lists better. Oversized tables or graph labels are blocked rather than shrunk below readable sizes, clipped or silently split. Runtime continuity, gas-list consistency and switch MOD/ppO2 are checked against the calculated plan. More than four switch labels are refused by this compact layout. A longer landscape case may fit in portrait.

The slate intentionally contains no logo, disclaimer or full warning/contingency narrative. Keep the website review and separate copied record with it. A successful print is not a validation of the plan. No automatic contingency backside is generated; this planner is open circuit, so no CCR setpoint is invented.



Current portrait layout, synthetic QA illustration. Not a real-dive instruction.

16 / Independent cross-check

Reconcile another planner or computer

Match inputs first; investigate differences instead of forcing agreement.

MATCH	CHECK
Model	Bühlmann ZHL-16C and the same GF Low/High; identify any proprietary or different model behavior.
Profile	Same depth sequence, hold/runtime interpretation, descent time and any multilevel gas changes.
Gas	Actual fractions, available ascent gases, switch depths, switch timing and role.
Ascent	First-ascent rate, between-stop rate, final-ascent rate, stop spacing, last stop and safety-stop behavior.
Environment	Salt/fresh density, altitude and surface-pressure assumptions.
History	Same previous tissue state and surface interval; do not compare fresh and repetitive plans.
Gas accounting	RMV phase rates, cylinder capacity, reserves, team emergency demand and endpoint.
Rounding	This planner rounds each travel leg upward to whole minutes and switches toward shallower tenths of a metre.

For a Perdix or another dive computer

The original guide included a Perdix 2 reference. This edition avoids assuming unchanged firmware menus. Consult the current manufacturer manual for that exact model and firmware, then record the comparable settings above. Sharing a GF pair does not guarantee identical schedules.

When the numbers differ

Find the first differing event: travel, switch, hold or stop. Compare that event's gas and duration, then examine tissue/history and pressure assumptions. Do not alter real gas fractions or reserve requirements simply to make displays agree.

SUMMARY

This guide verifies what the beta displays. Independent validation of a real dive remains a separate task.

17 / Troubleshooting

Inputs and configuration

Read the error literally, then inspect the setting it names.

SYMPTOM	LIKELY CAUSE / NEXT STEP
Advanced controls missing	Select Advanced loadout or inspect whether the simple recreational view is active.
A rich/trimix preset is disabled	Simple recreational UI restricts advanced blends. Reveal the relevant controls and ensure the real loadout and intended dive are appropriate.
Selected cylinder not used	Selection is separate from Carry this cylinder. Check IN USE and the manifest.
Cannot set requested depth	Recreational mode limits depth to 40 m or working MOD. Gas architecture and suitability determine mode.
Recreational profile exceeds NDL	Reduce the planned exposure within the real configuration. Do not add fictitious redundancy to bypass rejection.
Invalid values / no calculation	Check all displayed ranges, even fields inside collapsed sections. Check safety acknowledgement.
Leave runtime too early	Allow preceding levels, switch time and rounded travel; correct the time mode or runtime.
Switch deeper than MOD	Reduce the manual switch ceiling or use the automatic value. Verify mixture and oxygen limit.
Gas falls below 0.16 bar	A hypoxic gas is being used at an unsuitable shallow point. Review explicit travel levels and return gas.
Last primary cannot be removed	V2 maintains at least one primary bottom-gas cylinder. Choose the intended primary configuration first.

RECHECK AFTER EVERY FIX

Changing equipment can change the available gas list, role interpretation and reserve defaults. Recalculate and inspect the entire result.

Reserve does not change as expected

Confirm RC3 · QA6 is loaded after a hard refresh. For a sidemount primary, change its own starting-pressure field and leave the field to commit the edit. Selecting a cylinder alone does not change its reserve. Stage/deco pressure edits intentionally keep their reserve. Saved reserves are retained until a starting-pressure edit. Manual overrides last until the next starting-pressure edit of that cylinder.

Invalid gas totals, negative reserves and invalid cylinder volumes are not silently corrected by the equipment editor; fix the displayed values before calculating.

Results, storage and apparent contradictions

Different reports can be correct while answering different questions.

SYMPTOM	INTERPRETATION / RESPONSE
Positive main gas margin; contingency fails	The deeper/longer case has its own gas and warning checks. Review its table independently.
NOT GAS-FEASIBLE but positive litres	The contingency status also incorporates danger warnings such as density. Read the text below it.
Density says 5.2 but warns above 5.2	Display rounding hides a slightly higher underlying value.
MOD 21.7 but switch 21.6	Readout rounds normally; switch depth rounds toward shallower water.
First stop differs from First deco	Headline stop depth and first stationary hold are different in some outputs. Read the event schedule.
Minimum gas unavailable	A decompression case has no independent handover. The engine does not fabricate that emergency endpoint.
A sidemount pair appears as one row	Same-mix capacity is pooled, but Physical cylinder estimates and the slate show each cylinder separately using equal pressure drop.
A blend/capacity change erased results	Inputs invalidated the earlier result. Calculate again.
Guest saves disappeared	Confirm browser/profile/site data and storage availability. Account and guest storage are distinct.
Save fails	A valid calculation, free slot and functioning storage/backend are required. Read the save-area message.
CNS unexpectedly low after repeat dives	Only current-calculation CNS/OTU are shown. Prior exposure is not accumulated.
METAR fails	Existing pressure is left unchanged. Enter a verified appropriate value manually.

REPORTING A REPRODUCIBLE ISSUE

Record build/date, exact inputs, history state, observed output, expected behavior and a screenshot. A saved profile plus copied result makes a report easier to reproduce.

Print preview is blocked

Read the error outside the slate. Try portrait if landscape is too crowded. The export does not reduce its minimum text size, omit stops or invent an absent schedule. Resolve input/schedule inconsistencies rather than bypassing the check.

18 / Input reference

Numerical input ranges

These are UI limits in the inspected build, not recommended operating ranges.

FIELD	RANGE	STEP	DEFAULT
Contingency depth (m)	0 to 20	1	3
Contingency time (min)	0 to 20	1	3
GF Low (%)	1 to 100	1	50
GF High (%)	1 to 100	1	85
Work RMV (L/min)	5 to 60	1	18
Ascent RMV (L/min)	5 to 60	1	15
Deco RMV (L/min)	5 to 60	1	15
Descent (m/min)	1 to 30	1	18
Ascent (m/min)	1 to 20	1	9
Between stops (m/min)	1 to 20	1	3
Final ascent (m/min)	1 to 10	1	3
Safety depth (m)	3 to 6	1	5
Safety time (min)	1 to 10	1	3
Switch time (min)	0 to 5	0.5	1

UI LIMITS, NOT DIVE LIMITS

Depth/time and model boundaries are software entry constraints. Equipment, gas suitability and later checks impose additional restrictions.

Input ranges: environment and equipment

Continue the field dictionary. Values describe the inspected UI.

FIELD	RANGE	STEP	DEFAULT
Working pO2 (bar)	0.8 to 1.6	0.05	1.40
Deco pO2 (bar)	1.0 to 1.6	0.05	1.60
Water density (kg/L)	0.95 to 1.10	0.001	1.030
Altitude (m)	-500 to 5000	10	0
Sea-level pressure (mbar)	870 to 1050	1	1013
Team size	1 to 6	1	2
Emergency RMV (L/min)	5 to 60	1	15

FIELD	RANGE	STEP	DEFAULT
Problem time (min)	0 to 10	0.5	1
Emergency ascent (m/min)	1 to 20	1	10
Handover (min)	0 to 5	0.5	1
Reference fill (bar)	100 to 350	10	200
Surface interval (min)	0 to 1440	1	60

CYLINDER / PROFILE	EDITOR OR ENGINE RANGE
O2 / He	1-100% / 0-99%; total must not exceed 100%.
Water volume	1-30 L per cylinder. Twinset capacity is doubled.
Start / reserve	0-350 / 0-300 bar in the editor; active start must be positive and reserve below start.
Switch ceiling	0-100 m; blank = automatic. Gas MOD still applies.
Profile depth / time	0-150 m / 0-600 min engine bounds; recreational depth limits are lower.
Last decompression stop	3, 4, 5, 6 or 7 m.

VERIFY THE RESULTING VALUE

Some invalid or blank entries are rejected, clamped or replaced by defaults. Re-read the value displayed after an edit.

Units and useful arithmetic

Make the unit visible whenever you compare a number.

UNIT / RELATION	USE
m / min / m per min	Depth / time / vertical travel rate.
bar / mbar	Pressure; 1 bar = 1,000 mbar.
L water volume	Cylinder's internal capacity.
Surface L	Gas quantity referenced to surface conditions in the planner's simplified accounting.
L/min	RMV as surface-volume flow.
kg/L / g/L	Water density / breathing-gas density. Do not confuse them.
1 ATA	Approximately 1.01325 bar; the helper uses a simplified 1 ATA / 10 m relationship.
1 m / 1 ft	1 m $\approx$ 3.28084 ft; 1 ft = 0.3048 m.
1 bar / 1 psi	1 bar $\approx$ 14.5038 psi; 1 psi $\approx$ 0.06895 bar.
1 ft ³	Approximately 28.3168 L. This conversion does not turn a cylinder's nominal gas rating into its water volume.

Capacity and pressure

Available = water volume × start pressure. Reserved = water volume × reserve pressure. Estimated pressure consumed = surface litres used / water volume. For a twinset, use total water volume in these equations.

Consumption at a constant level

Gas use $\approx$ RMV × ambient pressure × time. At a simple illustrative 3 bar ambient, 18 L/min for 10 min uses about 540 surface litres. The planner uses its actual environment and event structure, so this is a sense-check, not a replacement calculation.

ROUNDING

Keep full precision while checking arithmetic and round only the final display. Independently rounded rows need not sum to the exact displayed total.

19 / Acronyms & terminology

Acronyms and terms: gases and planning

A compact dictionary of the labels used throughout the guide.

TERM	EXPANSION / MEANING
Air	Nominal 21% oxygen, 0% helium in the planner; remainder nitrogen.
EAN / EANx	Enriched Air Nitrox; x is oxygen percentage, such as EAN32.
Tx / Trimix	Oxygen, helium and nitrogen mix. Tx18/45 = 18% O ₂ , 45% He, 37% N ₂ .
O ₂ / N ₂ / He	Oxygen / nitrogen / helium.
FO ₂	Fraction of oxygen; 32% = 0.32.
pO ₂ / ppO ₂	Partial pressure of oxygen.
pN ₂ / pHe	Partial pressure of nitrogen / helium.
MOD	Maximum Operating Depth for a gas at the selected pO ₂ limit.
MBD	Minimum Breathable Depth under a chosen lower pO ₂ threshold.
EAD	Equivalent Air Depth based on nitrogen pressure.
END	Equivalent Narcotic Depth; depends on the narcotic-gas assumption.
RMV	Respiratory Minute Volume, here surface litres per minute.
SAC	Surface Air Consumption; usage varies. If expressed in bar/min, cylinder volume is needed before comparing with RMV.
NDL	No-Decompression Limit: remaining modeled time before required stops.
TTS	Time To Surface, including the modeled ascent and stops.
OC	Open Circuit: exhaled gas is discharged rather than rebreathed.

Gas percentages must describe the analysed cylinder contents. A preset name is a convenience, not evidence of what a real cylinder contains.

Acronyms and terms: model and equipment

Know which labels describe a model, a resource or an exposure estimate.

TERM	EXPANSION / MEANING
ZHL-16C	Bühlmann dissolved-gas model with 16 mathematical compartments and C coefficients.
GF	Gradient Factor: a fraction of the model's allowed supersaturation.
GF Low / High	Controls deeper and final surface gradient constraints.
GF99	Planner label for the highest current compartment gradient relative to its original M-value.

TERM	EXPANSION / MEANING
M-value	Model limit on tissue inert-gas pressure relative to ambient pressure.
CNS	Central Nervous System oxygen-exposure estimate, displayed as a percentage.
OTU	Oxygen Tolerance Unit, a modeled pulmonary oxygen-exposure measure.
SI	Surface Interval between dives.
SM	Sidemount. Left/right primary cylinders are physically independent.
S40 / S80	Common cylinder model class labels. This planner uses 5.7 L / 11.1 L water volume respectively.
S1-S4 / X1-X8	Four carried-slot labels / up to eight additional manifest resources.
BCD	Buoyancy Control Device. Material notes do not model the complete buoyancy system.
METAR / QNH	Aviation weather report / sea-level-adjusted pressure used for altimeter setting.
RC / Beta	Release Candidate / test-stage software; labels do not establish validation.
NOTOX	Gas-switch verification mnemonic referenced by the planner. Use the exact procedure taught by your training organization rather than assuming a universal expansion.

MATHEMATICAL, NOT MEASURED

Tissue compartments, oxygen exposure and gas-use estimates are model outputs. The planner is not measuring a diver's physiology, actual breathing or remaining cylinder pressure.

20 / Instructor resources

A practical instructor session

A 60-minute structure using the verified cases and interface exercises.

TIME	EXERCISE / DISCUSSION
0-10 min	Identify primary configuration, selected versus carried cylinder, actual mix and cylinder units.
10-20 min	Reproduce Case 1. Ask why the main plan passes while its contingency fails.
20-30 min	Compare Case 2. Separate NDL, simple reserve, turn pressure and minimum gas.
30-40 min	Inspect Case 4 and its runtime. Explain why positive gas margins do not remove density warnings, and why O2 switches at 5.8 m.
40-50 min	Run the sidemount linked-mix exercise. Identify per-cylinder facts versus aggregate gas rows.
50-60 min	Use chart playback, copy the result and complete an independent-comparison worksheet.

Answer key

Case 1: contingency consumes the main plan's spare capacity. Case 2: no-stop time is a decompression constraint, not a gas guarantee. Case 4: density warning remains; switch rounding is toward shallower depth in the configured salt-water environment. Sidemount: linked composition does not imply linked pressure or equal emergency sufficiency.

Further discussion

Why does First deco jump to 9 m when Case 4 says First stop 15 m? Why can a 5.2 g/L display still produce a warning? Why should a repetitive calculation's CNS percentage not be read as a day total?

END PRODUCT

Each learner should be able to explain every input and warning in their example, not merely reproduce a total runtime.

A reproducible planning record

Print or duplicate this page for a software comparison exercise.

RECORD	YOUR ENTRY
Date / site or teaching scenario	_____
Planner build / comparison tool & version	_____
Primary configuration / carried resources	_____

RECORD	YOUR ENTRY
Analysed gas, size, start, reserve for each	_____
Profile rows / time mode	_____
GF / last stop / safety stop	_____
RMV / travel rates / switch time	_____
Water / density / pressure / altitude	_____
Previous tissues / surface interval	_____
Main runtime / TTS / deco / exposures	_____
Per-gas margin / turn / minimum gas	_____
Contingency result and warnings	_____
Independent comparison / discrepancies	_____
Reviewer / unresolved items	_____

REVIEW OUTCOME

Record unresolved differences explicitly. A completed worksheet is evidence of review, not a certification that a plan is safe.

21 / Final review

The final review card

A one-page summary to return to after the detailed chapters.

CHECK	WHAT MUST BE EXPLICIT
Equipment	Actual primary system; every carried cylinder active; role, mixture, volume, material, pressure and reserve correct.
Profile	Correct time mode and chronological rows; suitable gas throughout every travel leg and hold.
Model	GF, rates, stops, oxygen limits and environment deliberately set.
History	Fresh or repetitive state intentionally selected; interval correct; prior CNS/OTU handled separately.
Schedule	Runtime, gas changes, stop depths and final ascent understood; detailed events reviewed where needed.
Gas	Every used resource has adequate margin; turn pressure and minimum gas interpreted separately; no unmodeled accessibility assumption.
Warnings	All configuration, density, oxygen, capacity and model-adjustment messages understood and resolved appropriately.
Contingency	The + plan is available and reviewed; additional failure scenarios handled separately.
Cross-check	Same input assumptions reconciled with established tools and the intended dive computer.
Export	Saved version, copied text or printout matches the reviewed result and identifies the build/date.

THE ESSENTIAL DISTINCTION

Calculated means the software produced an answer. Reviewed means you understood its assumptions and warnings. Independently verified is an additional step before using a real plan.

22 / Limits & release record

Release record and verification scope

Edition 2.1 / 21 October 2026 / RC3 · QA6. The reference is the QA6 replacement package prepared for the site owner. This document does not independently confirm which package is deployed on the public server.

Release	Relevant change
QA1	Physical-cylinder reporting, stricter editor validation, recreational max-stay, history and stale-state fixes.
QA2	Editable one-third reserve for backmount starting-pressure changes.
QA3	Single-page vector A5 slate with runtime/switch and fit checks.
QA4	Portrait/landscape selection, per-cylinder end pressures and pressure-history graph.
QA5	Pressure graph styling and mobile sizing aligned with the profile.
QA6	Independent one-third defaults and manual overrides for sidemount primaries.

Recorded local checks include 21 QA4 browser checks, eight QA5 focused checks and eleven QA6 reserve checks. These counts belong to different release suites and should not be added as distinct coverage. The sample PDFs were one-page vector exports. Authentication, account sync, location services, physical printing and real-world physiology remain outside that verification.

The retained RC2 cases and screenshots are historical observations from the 19 October 2026 manual. They are not represented as re-run against QA6. See the archived RC2 guide for the original context.