



Purging Case Study

Offshore Oil and Gas Pipeline Fabrication
Weld Tie-In on Pipe Spools with Wireless Remote



Purging of manual tie-in welds on 1 Km duplex and Inconel clad pipe spools

The Problem

The client was using an internal purge dam with an external purge O2 monitor and the welding specification stated:

- the internal back purge had to be maintained for the root, as well as the hot pass
- the level had to be less than 50ppm

Problem 1

Testing the O2 content through the open root gap so they were unable to monitor and verify the O2 levels as stated in the welding specification when closing the root pass and whilst welding the hot pass.

Problem 2

Time taken to purge the joint as they were supplying the purge gas from the open end of the pipe over 1 Km; even with an initial flow rate of 40 LPM the preliminary purge took considerable time.

Solution

TVC designed and supplied a **self-contained, wireless remotely operated purge system**, the first of its type ever used in the field, comprising of:

Purge Dam

Remotely controlled, battery-powered internal stainless steel purge dam with silicon high temperature inflatable bladders.

Oxygen Sensor

High resolution zirconia Oxygen sensor.

Flow Control

3-stage automatic purge gas flow control.

Gas Reservoir

Onboard Argon purge gas reservoir.

Purge Dam: how the system operates

TECHNICAL INFORMATION			
Nominal Cylinder	1.256 Kg	2.8 Lit	PR Number: 385374
Contents:			RT Number: 385382
Dip Tube Quantity:	0		SDS Number: 300000001219
Valve info:	HB03230		Valve outlet: B53
Nominal Pressure:	13.9 bar-g@ 15 °C		14.174 kg/cm ²
RT Short Text:	RT_H2O_X50A__	HB03230_B5__	200B
SPECIAL PRODUCT INFORMATION			
Open/close valve slowly. Close when not in use. Wear Safety Eye Protection.			
Check Safety Data Sheet before use.			

1

A stainless steel draw wire is deployed through the 1 Km spool.

The two spool pipes are lined up and the purge dam and gas reservoir are placed inside the open pipe directly at the tie-in weld location and attached to the stainless steel draw wire.

The two pipes are aligned using an external clamp for manual 5G welding operations. A Wi-Fi repeater module is placed at the open end of the 1 Km spool.



Purge Dam: how the system operates

2

When pipes are ready to weld, the Welding Inspector or operator uses the hand-held remote control to start the purging process.

A wireless signal is sent from the external welding position and is transmitted along the pipe to the internal purge dam via the Wi-Fi repeater.

The total transmission length of the signal is 2 Km.

Purge Dam: how the system operates

TECHNICAL INFORMATION			
Nominal Cylinder Contents:	1.256 Kg 2.8 Ltr	PR Number:	385374
Dip Tube Quantity:	0	RT Number:	385382
Valve info:	HB03Z30	SDS Number:	300000001210
Nominal Pressure:	13.9 bar-g@ 15 °C	Valve outlet:	BS3
RT Short Text:	RT_H2O_X50A_HB03Z30_BS_200B		
SPECIAL PRODUCT INFORMATION			
Open/close valve slowly. Close when not in use. Wear Safety			
Check Safety Data Sheet before use			

3

The purge gas from the gas reservoir is used to inflate the silicon bladders.

Using pressure sensors fitted to each bladder, the system can sense when the bladders are fully inflated.

The system continually monitors the bladder pressure and automatically tops them up if the pressure starts to drop, ensuring that a seal is constantly maintained.

Once fully inflated, a bypass valve is opened, and the purge gas flow will flow at the high flow level.

The flow level can be pre-set from 5 to 50 LPM, purging the internal area between the two bladders.

Flow Limit Control

The system has two pre-programmed limits to control the gas flow.

The screenshot displays a control interface with a central display area and navigation buttons. The display area is titled "ALARM LEVELS" and shows two rows of data:

Limit Type	Value (ppm)	Percentage Value
Oxygen High	00200	0.0200 %
Oxygen Low	00050	0.0050 %

Navigation buttons include "Up 10 ppm", "Down 10 ppm", and a "BACK" button.

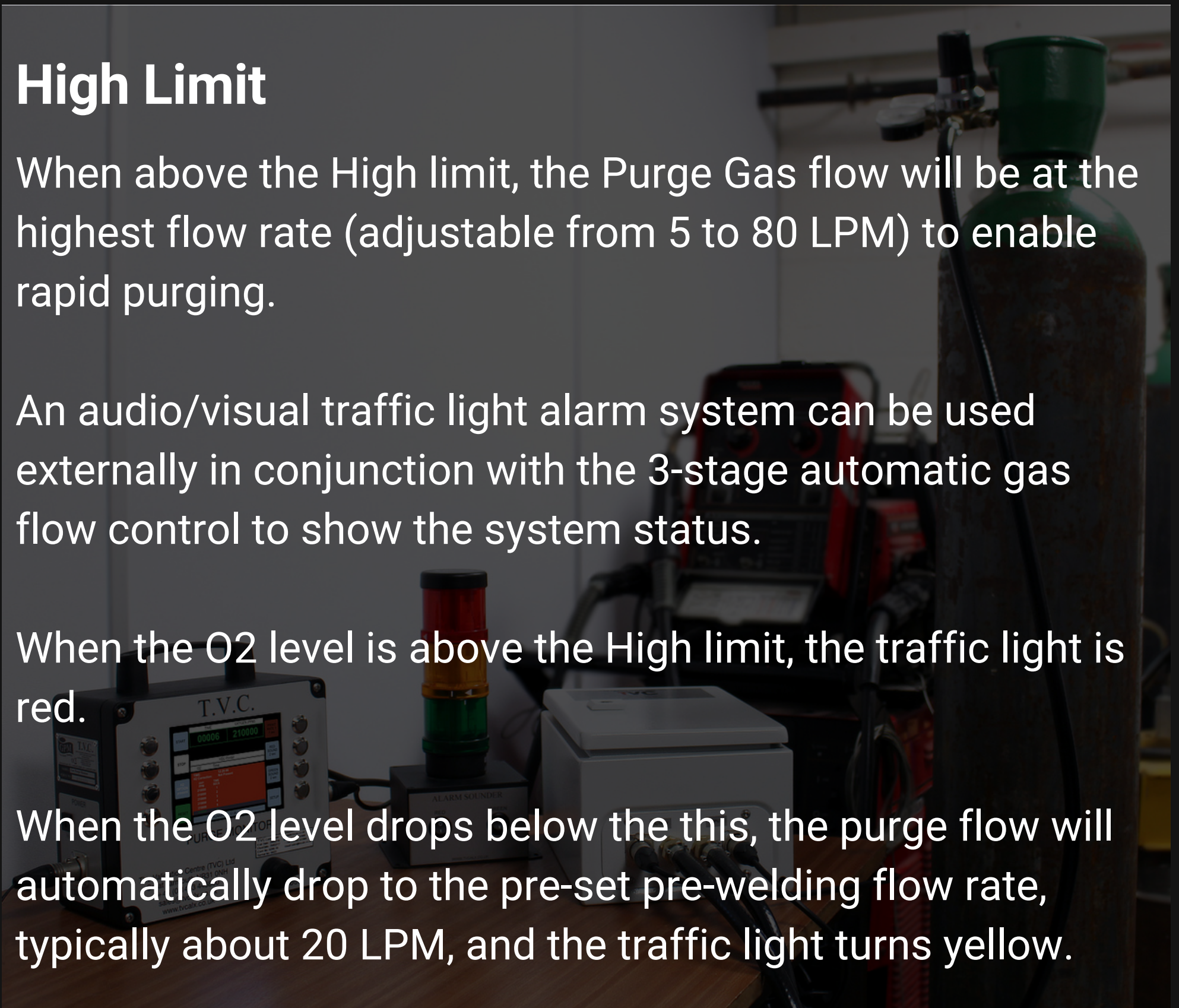
High Limit

When above the High limit, the Purge Gas flow will be at the highest flow rate (adjustable from 5 to 80 LPM) to enable rapid purging.

An audio/visual traffic light alarm system can be used externally in conjunction with the 3-stage automatic gas flow control to show the system status.

When the O₂ level is above the High limit, the traffic light is red.

When the O₂ level drops below this, the purge flow will automatically drop to the pre-set pre-welding flow rate, typically about 20 LPM, and the traffic light turns yellow.



Flow Limit Control

The system has two pre-programmed limits to control the gas flow.

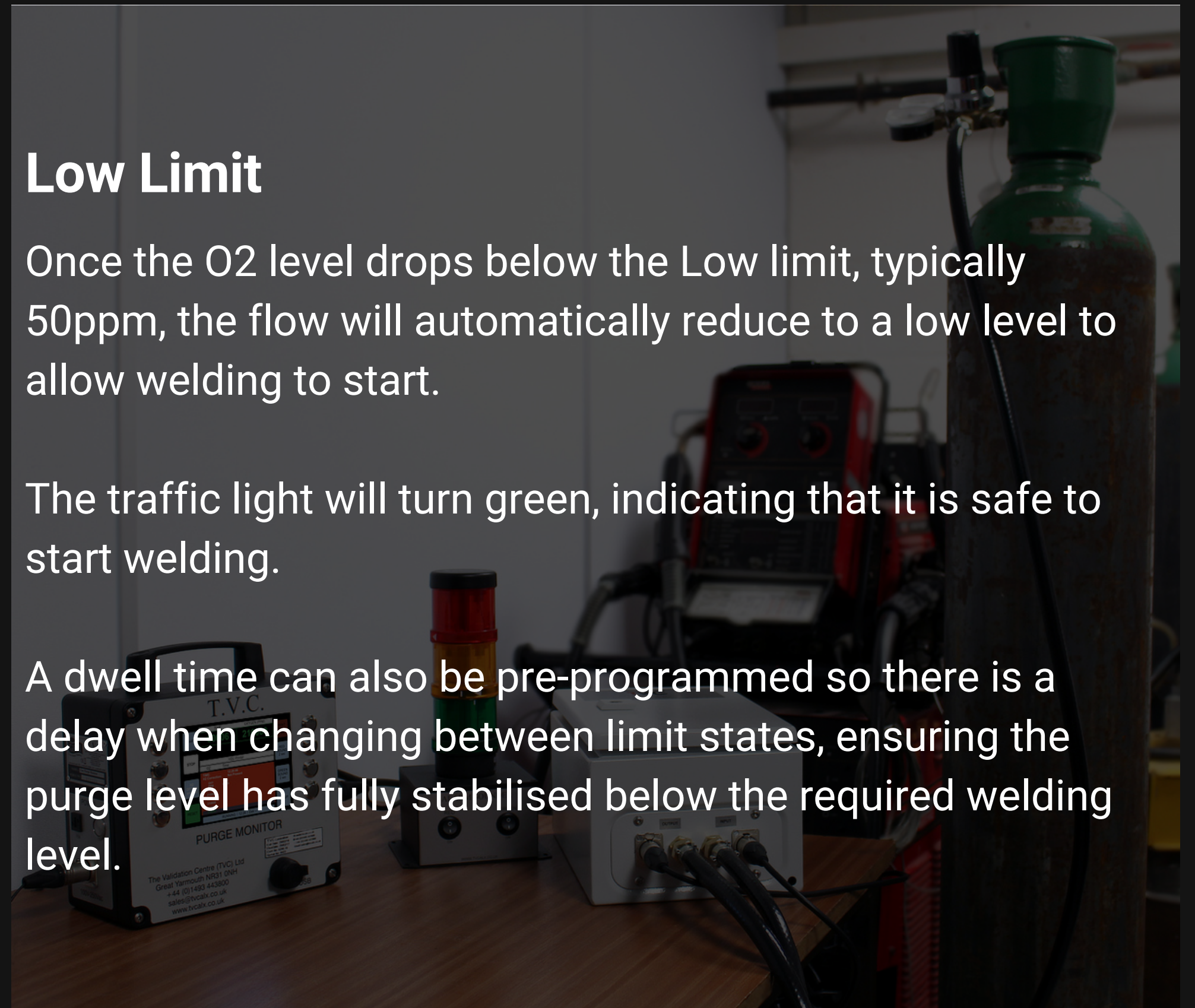
The screenshot displays a control interface for flow limit control. It features a central display area with a black background and green text. The display is titled "ALARM LEVELS" and shows two main sections: "O2 High (ppm)" with a value of "00200" and "Percentage Value: 0.0200 %", and "O2 Low (ppm)" with a value of "00050" and "Percentage Value: 0.0050 %". To the left of the display are three buttons: "Oxygen High" (teal), "Oxygen Low" (white), and a grey button. To the right are two buttons: "Up 10 ppm" and "Down 10 ppm" (both grey), and a green "BACK" button at the bottom right.

Low Limit

Once the O₂ level drops below the Low limit, typically 50ppm, the flow will automatically reduce to a low level to allow welding to start.

The traffic light will turn green, indicating that it is safe to start welding.

A dwell time can also be pre-programmed so there is a delay when changing between limit states, ensuring the purge level has fully stabilised below the required welding level.



Flow Limit Control

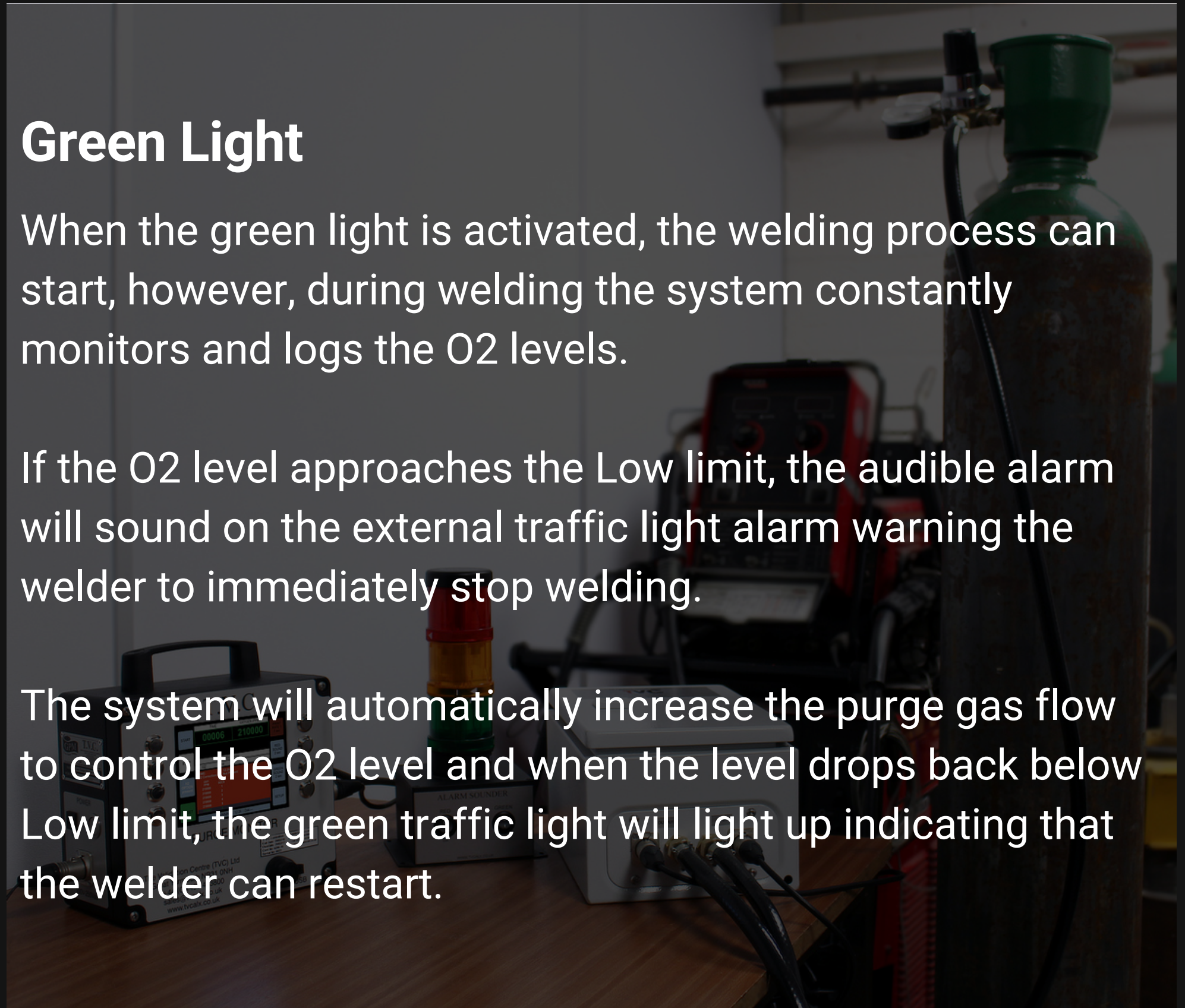


Green Light

When the green light is activated, the welding process can start, however, during welding the system constantly monitors and logs the O2 levels.

If the O2 level approaches the Low limit, the audible alarm will sound on the external traffic light alarm warning the welder to immediately stop welding.

The system will automatically increase the purge gas flow to control the O2 level and when the level drops back below Low limit, the green traffic light will light up indicating that the welder can restart.



Root Pass Purge Flow Reduction

When the root pass is nearing completion, the purge flow needs to be reduced to allow the close out of the root weld.

Built-in solution

When the remote-control unit button is pressed, the internal purge gas flow is reduced to a pre-set extra low flow, suitable for the close out of the root weld to take place. The purge flow and O₂ monitoring can be left to continue for the completion of the hot pass and any other subsequent fill passes.

Once purging is no longer required, the purge flow can be stopped remotely, and the bladders deflated. With the bladders deflated, the purge dam will rest on small stainless steel wheels and the purge dam and gas reservoir can be removed from the pipe using a winch system attached to the stainless steel draw wire.

START	TIME (s)	OXYGEN (PPM)	PRINT RATE 1 1 sec
	00095	000026	
STOP	VDU Printer		RED SOUND 5 sec
	O2	Time	
H2 OPTION Not Present	000039	86	GREEN SOUND 5 sec
	000037	87	
	000036	88	
	000034	89	
	000032	90	
	000031	91	
	000030	92	
	000030	93	
	000028	94	
	000026	95	
RESET	RUNNING 11:01 Dsk:93%		SETUP

Onboard Data logging

Full operation, including O2 levels and flow rates, can be recorded from the start of the purging process through to completion.

Contact us

For more information on the purging solutions we can offer, contact us:

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