



ESAB®



OPTIFLOW™ REGULATOR

ABOUT OPTIFLOW™

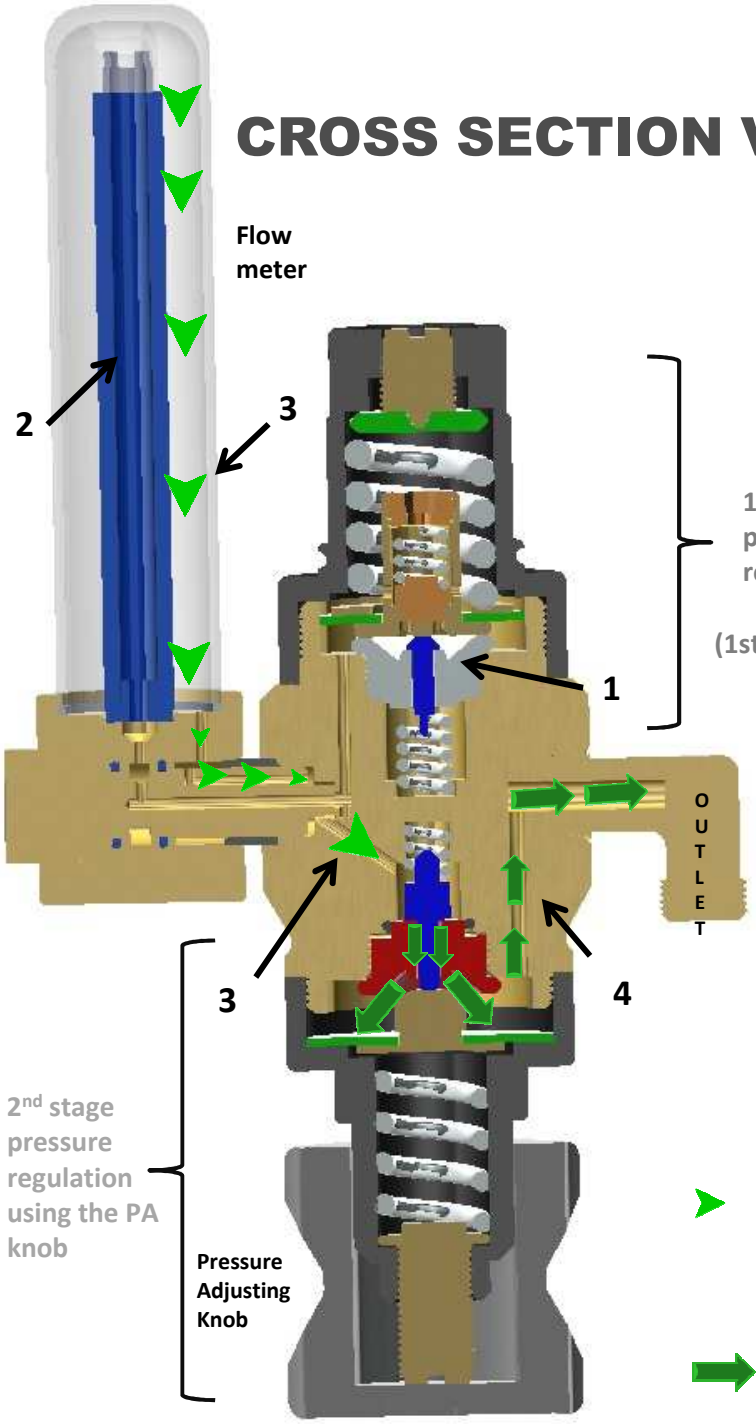
OPTIFLOW™, AN EXITING MIX OF ECONOMY & PERFORMANCE

Shielding gas plays an important role in Welding with an impact on the quality of the weld as well as the costs. While the input cost of Welding consumables is widely acknowledged, the cost of the shielding gas and opportunities to optimise this cost is not commonly well understood.

Using traditional regulators the pressure can build in the hose. Pressure in the hose will increase up to 4 – 8 bar!! Traditional regulator's reaction times are slow, resulting in wasted gas.

Selection & Optimisation of the Shielding gas can play an important role in Cost savings apart from its impact on our Environment. ESAB Optiflow™ Regulator is designed to optimise the use of Shielding gas and help in generating Savings.

CROSS SECTION VIEW



2 STAGE REGULATOR

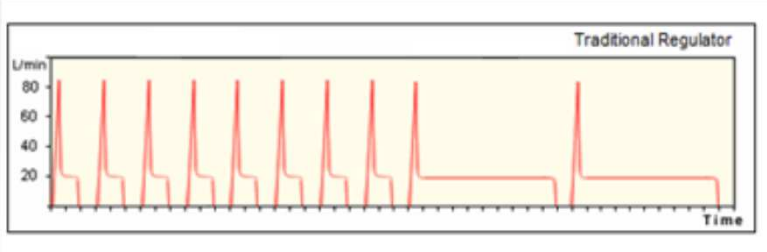
A two-stage regulator consists of two single-stage regulators in series and combined into one component. The first regulator (1st stage) reduces the high-pressure supply to an intermediate point between the inlet pressure and the desired outlet pressure. The 2nd stage reduces the intermediate pressure to the desired outlet pressure.

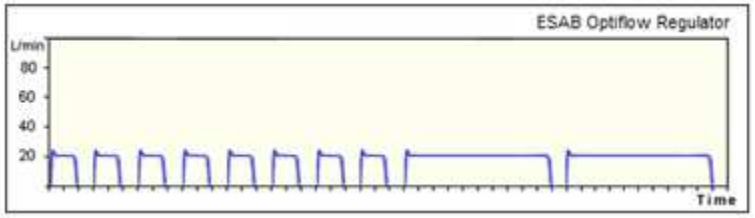
Flow pattern of the gas flowing through two stage OPTIFLOW regulator

1. **Gas flowing through the inlet connection (on the rear) goes through the first stage of the regulator. The first stage is preset with the help of a spring loaded diaphragm on the top.**
2. **Gas flows through flow meter inner tube, through the center and upwards. Flow rate measured, depends on the manual setting of the pressure adjusting knob.**
3. **Gas flowing out of the flow meter and through the second stage of the regulator. The second stage is controlled by the pressure adjusting knob.**
4. **Gas exiting the regulator through the outlet after the second stage of the gas regulation.**

BENEFITS

- A significant amount of gas is lost at the start of every welding run due to Pressure Surge.
- This loss aggregates to significant amounts with multiple starts as witnessed in a series of short welds.
- Unique Two Stage Design of ESAB Optiflow™ ensures minimal pressure surges, typically a quarter of a traditional regulator and thereby Gas Savings.
- Weld quality improves with a more uniform pressure and thereby gas flow rate.





SAVINGS

Shielding Gas is a significant consumable cost in the welding process and savings with Optiflow™ can be very significant.

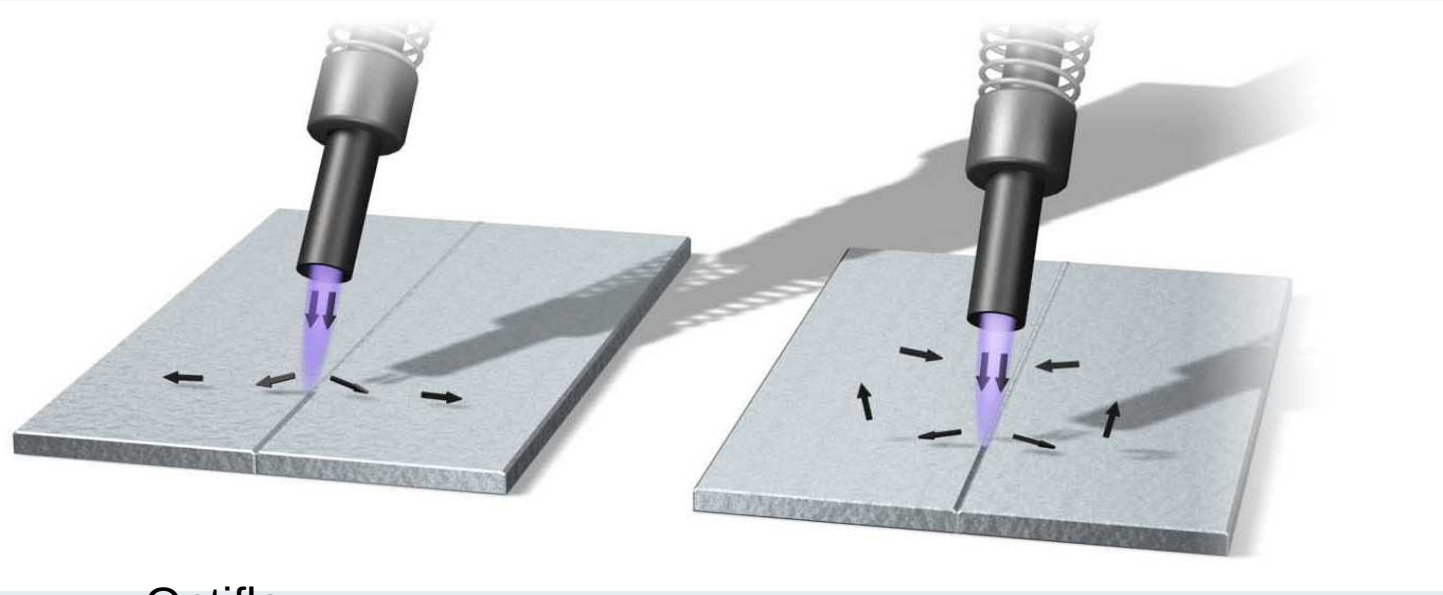
Nature of the welding in terms of starts and stops determines the extent of savings with best results experienced with multiple short weld cycles. However, valuable savings can still be achieved on longer seam runs

Nature of Welds	Savings
Short / Intermittent Welds	50%
Mostly Short Welds with some Seam Welds	40%
Equal Short & Seam Welds	30%
Mostly Seam Welds	20%

PERFOMANCE IMPROVEMENTS

Reduce turbulence.

- Reduce the risk of weld porosity
- Reduced spatter
- Reduced clean up



Optiflow

Overpressure traditional regulator

TECHNICAL SPECIFICATION

Optiflow™

Optiflow™ Lockable

Model	**Optiflow™ & Optiflow™ lockable**
Inlet	G 5/8” BSP Male
Outlet	G 3/8” BSP Male
Gas Services	Ar/Mixed Gas
Gas Pressure	30 LPM

CUSTOMER EXPERIENCES

Customer	Welding Type	Nature of Weld	Annual Gas Consumption Per Station (Cu. M)		Annual Savings Per Station
			Existing	Optiflow™	(INR)
Auto OEM	Manual – GMAW	Short Welds	2,100	1,008	Rs.65,000.00
Auto Ancillary	Robotic – GMAW	Seam Welds	144,000	86,500	Rs.30,600.00
Auto Ancillary	Manual – GMAW	Short Welds	380	60	Rs.19,100.00
Rail Wagon Parts	Manual - GTAW	Short Welds	1888	996	Rs.42,000.00

PROJECTED SAVINGS

Savings Per MT of MIG Welding Wire

Nature of Weld	Gas Savings	Gas Consumption (Cu. M)	Spend on Gas (INR)	Savings (INR)
Short / Intermittent Welds	50%	270	16,000	8,000
Mostly Short Welds with some Seam Welds	40%	300	18,000	7,200
Equal Short & Seam Welds	30%	330	20,000	6,000
Mostly Seam Welds	20%	340	20,500	4,100

Gas Savings with OPTIFLOW™ depends on the nature of Weld.
More the short welds, larger the savings.

PROJECTED SAVINGS / STATION

Nature of Weld	No of Stations	Monthly Wire Consumption (MT)	Monthly Gas Consumption (cu.m)	Annual Spend on Gas (INR)	Annual Savings / Station (INR)
Short / Intermittent Welds	1	0.5	135	Rs. 97,200.0	Rs. 48,600.0
Mostly Short Welds with some Seam Welds	2	1.0	300	Rs. 216,000.0	Rs. 43,200.0
Equal Short & Seam Welds	3	1.5	495	Rs. 356,400.0	Rs. 35,640.0
Mostly Seam Welds	4	2.0	680	Rs. 489,600.0	Rs. 24,480.0

Improved Weld Quality

Lower cylinder turn over

Environmental friendly

Inbuilt Flowmeter

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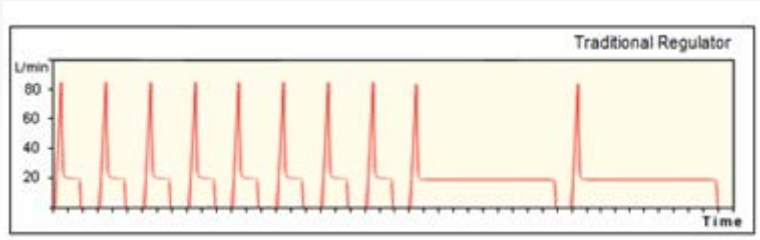

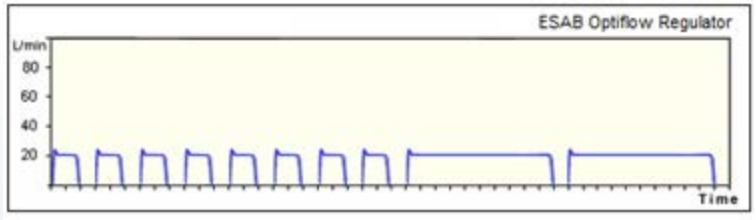

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			Existing	Optiflow™	(cu.m)	(INR)
Auto Ancilliary	**Robotic**	**Short Welds**	**168**	**48**	**120**	**7,300**
Auto Ancilliary	Manual	Short Welds	380	60	320	19,100
Rail Wagons	**Manual**	**Seam Welds**	**1,260**	**560**	**700**	**42,000**

PROJECTED SAVINGS

Savings / MT of MIG Welding Wire

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Improved Weld Quality

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PRECISIONMASTER

Gas Saver "Accumulator"

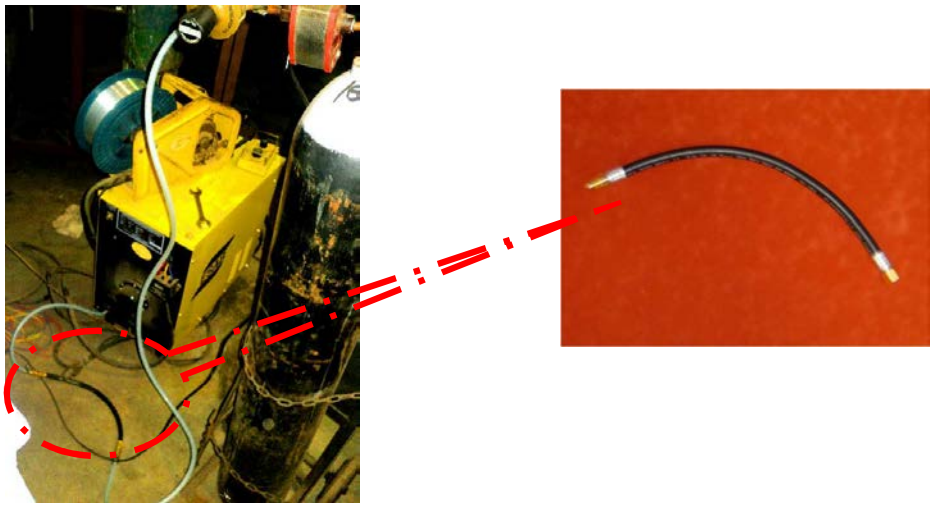
The ESAB PrecisionMaster Gas Saver is a patented device to help save significant money by reducing shielding gas waste and by improving weld start quality. Published articles report that an average GMAW user employs over 4 times the amount of shielding gas they should.

While welding, the pressure needed to flow typical shielding gas flow rates, though the power source and torch is about 0.2 Bar to 0.5 Bar. When welding stops, pressure increases in the shielding gas delivery hose from the gas source. The pressure builds to that of the regulator/flowmeter, 1.7 to 5.5 Bar for cylinder users or that of the pipeline, typically 3.5 Bar or higher. This higher pressure causes an excessive amount of gas to be stored in the hose and this extra gas is rapidly expelled, at very high flow rates, every time the torch switch is energized *. These high flow rates cause turbulence in the shielding gas stream pulling air with its moisture into the gas stream. This causes excess spatter and possibly internal weld porosity. It takes some time for that turbulence to stabilize into a smooth laminar flow once the proper flow rate is established.

The ESAB PrecisionMaster Gas Saver controls flow closer to the power source and utilizes an “Accumulator” to store a controlled amount of extra gas when welding stops. The “Accumulator” delivers this extra gas that is needed to purge the torch nozzle and weld start area of moisture laden air. The ESAB PrecisionMaster Gas Saver utilizes a surge flow control orifice at the feeder end, which controls the flow rate and avoids pulling air into the shielding gas stream.

While welding, this devise controls the flow rate utlising a special surge flow control orifice that limits the start-surge flow to a rate that avoids excess turbulence. The gas pressure is maintained above 1.7 Bar for normal flow rates to retain automatic flow compensation as restrictions caused by spatters, torch hose bends etc.. occur in production environment.

The below photo (*Pic a*) shows the PrecisionMaster Gas Saver, which screws into most power source gas inlets (*Pic b*).



* - See note on gas wastage at the end of the document

Although, it is best to use the PrecisionMaster Gas Saver with a pressure regulator, there are optional installations that may be used. The PrecisionMaster Gas Saver can be connected to a gas delivery hose that comes directly from the pipeline without the use of a regulator or flowmeter. The flow will then be controlled by the pressure set in the pipeline.

This device will generally save most MIG users from a minimum of 25% to over 50% of their shielding gas while improving weld start quality.

Technical Specifications

Model	ESAB PrecisionMaster Gas Saver
Part No.	0558007079
Inlet	CGA-032 Female inlet (hose Nut & Adapter in the kit)
Outlet	Male outlet (1/4" hose Nipple in the kit)
Gas Service	CO_2

Case Study

Customer	Rail wagon frame manufacturer
Nature of weld	Seam Welds
No. of Welds per wagon	48 nos.
Existing set-up	9 wagon sets per cylinder
With ESAB PrecisionMaster	15 wagon sets per cylinder
Savings	66%
Monetary savings	~ Rs. 66,500 per station per year

*** Note:**

Normal regulators used in a fabrication shop typically operates between 2 Bar to 8 Bar. A regulator/ flowgauge usually operates with a critical orifice and the regulator varies pressure from 2 Bar to over 8 bar. Which means, a regulator on the cylinder will reduce the pressure of shielding gas to 2 Bar or 8 Bar and then supply it to the welding torch through the gas delivery hose.

When using gas supply from a cylinder source, as the welding is stopped, the pressure in the gas delivery hose will be the regulator pressure, i.e. between 2 Bar & 8 Bar. *But, the pressure needed to flow 12 to 20 LPM of shielding gas through the hose to the welding torch, measured at the feeder, will usually be 0.2 Bar to 0.5 Bar.*

Therefore, when using a traditional regulator, excess gas will be stored in the gas delivery hose at a pressure much higher than needed. This leads to the gas hose expanding a little. A expanded hose holds more volume of gas

Below calculation explains the quantum of extra gas in the hose, when welding stops;
Gauge Pressure requirement = 4 psi or 0.272 Bar

If 25 psi or 1.7 bar regulator is used, then excess pressure in the hose when welding stops is calculated as below:
25 psi – 4 psi = 21 psi or (21/ 14.7) = 1.43 bar. This is the pressure of gas in the hose. Now, at this pressure, the extra gas in hose is calculated as = hose volume x 1.43 bar;
Assuming the hose ID is 8 mm & length between regulator & gas solenoid valve is 5 meters, then hose volume ($V= \pi r2 h$) = (pi x 0.4 cm x 0.4 cm x 500 cm) or 251.4 CC;
Hence extra gas stored in the hose, that would be wasted is
251.4 CC x 1.43 Bar = ***359.5 CC every time the welding starts.***

***** - See note on gas wastage at the end of the document

ESAB Optiflow ™ Regulator

An exciting mix of economy & performance

Quality that saves Money

Shielding gas per metre of weld costs as much as the wire. ESAB's Optiflow™ is a unique regulator that helps reduce the shielding gas consumption by upto 50%.

With traditional regulators, a large amount of gas is lost at the start of every welding run. Optiflow™ has an optimum start flow that is just a quarter of a traditional regulator.

The unique two-stage reduction valve has been developed for qualified shielding gas welding. The extremely pressure sensitive second stage greatly reduces the gas surge that normally occurs at start-up. This saves upto 50% gas with normal welding.

Weld Quality

The even start flow provides a higher quality weld since you avoid the turbulence that can disturb the welding process. The risk of pores in the welded joint is minimised.

Quality and the environment

Optiflow™ is also available in a lockable version for exact gas flow. Using Optiflow™, you can produce 50% more welded joints with the same amount of gas. This has economic effects for the environment as well, with a reduction in the need for Gas transport.

Test it yourself and see how much you save!

The amount of gas you save with Optiflow™ depends on how much you weld. The more short welds you have, the larger is your saving.

Technical Specifications

Model	**Optiflow™ & Optiflow™** lockable
Inlet	G 5/8" BSP
Outlet	G 3/8" BSP
Gas Services	Ar / Mixed gas
Gas Pressure	30 LPM

Ordering Information

Optiflow™	**0700 016 991**
Optiflow™ lockable	**0700 016 994**

- **Saves upto 50% Shielding Gas.**
- **Improved Weld Quality with Even Start-flow.**
- **Environmental benefits with lower gas consumption.**
- **Lockable version for Exact Gas-flow**

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