

**Kirby Morgan Dive Systems, Inc. (KMDSI)
Helmets and BandMasks® Using SuperFlow® 350 (P/N 505-027 &
505-069) Demand Breathing Regulators and Supplied with a
Low Pressure Compressor Supply**

Mike Ward 08-03-07

There have been requests by users to clarify the pressure requirements for the Kirby Morgan® helmets and BandMasks® that employ the SuperFlow® 350 regulators. A new chart has been developed for users using Low Pressure Compressors . The chart clearly breaks down the maximum depths based on the anticipated respiratory minute volume work rate (RMV) and the compressor output. This new chart will be replacing the old chart in all KMDSI manuals that employ the SuperFlow® 350 regulators to accommodate the full range of pressures normally encountered with low-pressure compressors.

When using Low Pressure compressors the user should always take into consideration the difference between the settings of the cycling valve. For example, if the compressor is set with a 30 psig differential between cycling high and low, the lower pressure should be used. The low set pressure is where the cycling valve kicks in and allows the compressor to pump up the volume tank to the high set pressure. The pressure/depth table below shows respiratory minute volume work rates (RMV) from 40 thru 75 RMV for each compressor discharge pressure from 90 psig (6.2 bar) to 220 psig (15.18 bar in 10 psig (.69 bar) increments required, and the maximum depth that can be dived in feet seawater FSW and meters seawater (MSW). This table is intended only for KMDSI Helmets and BandMasks® that employ the Superflow® 350 demand regulators, and only when being used with LP compressors. The depth's called out in the tables are based on the use of a 3/8" (9.5mm) I.D. umbilical, 600 foot long length (183 meters).

Note: When using a high-pressure control console, use the pressures listed in the high-pressure table in each of the helmet and BandMask® manuals or the pressures listed in the KMDSI supervisor checklist A2. The pressures listed for high-pressure consoles are optimal pressures for the depth ranges and are based on 62.5 and 75 RMV work rates.

The US Navy Diving Manual defines the RMV work rates as follows

- 10-18 RMV Light Work
- 20-38 RMV Moderate Work
- 38-45 RMV Moderately Heavy
- 45-60 RMV Heavy
- >60 Severe

Users should insure that the compressor can meet both the supply pressure and output volume required for the deepest anticipated depth and ventilation rate. Below is the formula used for computing the Minimum Volume of air required for ventilation at depth. Note: This is the bare minimum, as a safety margin always add a minimum of 10%-20%.

$\{(Depth + 33) \div 33\} \times RMV \} \times .10 \text{ or } .20 \%$ safety margin.

Low Pressure Compressor Best Practice:

- When using a LP compressor always base the output pressure on the lowest pressure during compressor cycling.
- Complete a flow test of the compressor and all umbilicals at least once a year.
- Always take the standby diver into consideration when planning air usage.
- Always allow for at least 10-20% greater volume than what is needed for the maximum ventilation anticipated.
- Never use less than 40 RMV for planning purposes.
- Always dive with a man worn emergency gas supply system (EGS)
- When using HP supply systems (Control Consoles) use the recommended pressures for depth as listed in the chart for High Pressure Supply Systems. For best overall performance avoid using pressures excessively higher than what is required for depth especially if diving shallow. Formula to use when using HP control consoles $\{(D \times .445) + \text{pressure from the chart for the depth anticipated}\}$.
- If using umbilicals longer than 600 feet, or with an internal diameter less than 3/8" (9.5mm), or other configurations not mentioned, E-mail or call KMDSI or Dive Lab Inc, for further guidance and information.

**New Operations
Manual Low
Pressure
Compressor Table**

**Supply Pressure Requirements for Kirby Morgan®
Helmets &
Band Masks® equipped with SuperFlow® 350
Regulators, when used with LP compressors**

SUPPLY PRESSURE SURFACE GAGE READING	RMV	DEPTH FSW / MSW
90 PSIG / 6.21 BAR	40	76 / 23
	50	63 / 19
	62.5	44 / 13
	75	33 / 10
100 PSIG / 6.9 BAR	40	86 / 26
	50	72 / 22
	62.5	55 / 17
	75	42 / 13
110 PSIG / 7.59 BAR	40	100 / 31
	50	83 / 25
	62.5	67 / 20
	75	50 / 15
120 PSIG / 8.28 BAR	40	112 / 34
	50	91 / 28
	62.5	71 / 22
	75	57 / 17
130 PSIG / 8.97 BAR	40	122 / 37
	50	100 / 31
	62.5	82 / 25
	75	60 / 19
140 PSIG / 9.66 BAR	40	137 / 42
	50	108 / 33
	62.5	84 / 26
	75	65 / 20
150 PSIG / 10.35	40	145 / 44

BAR		
	50	120 / 37
	62.5	95 / 29
	75	69 / 21
160 PSIG / 11.04 BAR	40	157 / 48
	50	124 / 38
	62.5	100 / 31
	75	76 / 23
170 PSIG / 11.73 BAR	40	167 / 51
	50	135 / 41
	62.5	107 / 33
	75	86 / 26
180 PSIG / 12.42 BAR	40	181 / 55
	50	148 / 45
	62.5	115 / 35
	75	93 / 28
190 PSIG / 13.11 BAR	40	190 / 58
	50	154 / 47
	62.5	122 / 37
	75	100 / 31
200 PSIG / 13.8 BAR	40	192 / 59
	50	166 / 51
	62.5	132 / 40
	75	102 / 31
210 PSIG / 14.49 BAR	40	212 / 65
	50	175 / 53
	62.5	137 / 42
	75	108 / 33
220 PSIG / 15.18 BAR	40	220 / 67
	50	182 / 56
	62.5	147 / 45
	75	111 / 34

The above values were derived from actual breathing simulator tests using the ANSTI wet simulator with 600' long umbilical 3/8" I.D (9.5mm) at

Dive Lab Inc. The respiratory work rates and test procedures used are based on are internationally recognized test practices and procedures.

Note: Most sustained work rates by Professional Divers average between 20 to 40 RMV. When calculating supply requirements, KMDSI recommends using no less than 40 RMV.

For more information, check the Dive Lab website, divelab.com, Click on Technical Section.