System Run Time Guide
3M™ Versaflo™ Powered Air Purifying Respirator TR-600

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Rev: 1 *Replaces all previously published guides on this topic until superseded.*

Before using the TR-600 PAPR, all users must read and understand the product *User Instructions*. Consult the TR-600 PAPR *User Instructions* for general system operation. Consult the TR-600 Charger and Battery Pack *User Instructions* for additional information.

This System Run Times Guide is intended to provide a general understanding of the factors affecting system run times, as well as run times of example system setups. The term 'System Run Times' is meant to convey the approximate time a complete 3M™ Versaflo™ Powered Air Purifying Respirator (PAPR) system using the TR-600 motor/blower will operate on a single battery charge before the system automatically shuts down due to insufficient power.

The 3M™ Versaflo™ PAPR TR-600 is a flow controlled system, meaning it is designed to deliver a consistent volume of airflow throughout its listed operating conditions. It automatically compensates for changes in battery charge status, level of filter loading, and changes in ambient temperature and pressure. Since these factors affect how hard the PAPR has to work and thus how much battery power is needed, the system run times can vary significantly. Other key factors that can affect system run times include: selected airflow setting, the pressure drop of the components making up the entire PAPR system, and even extreme weather conditions (due to changes in barometric pressure).

The pressure drop of a system is dependent on multiple factors, including the selected headgear, selected breathing tube, selected filter/cartridge, and pre-filter and spark arrestor use. A system with a higher pressure drop requires the motor/blower work harder and causes the battery to discharge faster.

System Run Times Under <u>Ideal</u> Conditions
System run times displayed in Figure 1 are calculated on a new fully charged battery and clean/unloaded filter in a clean environment, with a loose-fitting headgear. Battery aging and filter loading will decrease run times.

TR-600 Approximate Run Time (hours)			
		Standard flow / Medium flow / High flow	
Filter/Cartridge		**TR-630 Standard Battery**	**TR-632 High Capacity Battery**
TR-6710N	HE	12.5 / 11 / 9.5	19 / 16 / 13.5
TR-6820N	HE, HF, Nuisance Level OV/AG	12.5 / 11 / 9.5	19 / 16 / 13.5
TR-6510N	HE/OV	10 / 8.5 / 7	15 / 12.5 / 10.5
TR-6320N	HE/AG	10 / 8.5 / 7	15 / 12.5 / 10.5
TR-6530N	HE/OV/AG/HF	10 / 8.5 / 7	15 / 12.5 / 10.5
TR-6350N	HE/Formaldehyde	10 / 8.5 / 7	15 / 12.5 / 10.5
TR-6360N	HE/Ammonia/Methylamine	10 / 8.5 / 7	15 / 12.5 / 10.5
TR-6600	Prefilter	When clean, decreases run times by approx. 3-7%	
TR-626	Spark Arrestor	When clean, decreases run times by approx. 3-7%	

Figure 1 - Approximate system run times under ideal conditions with new equipment.

Run Times for Example Systems
TR-600-ECK (Easy Clean Kit): Run time: 9.5 – 12.5 hours
The pieces in the TR-600-ECK (Easy Clean Kit) that may influence run times include a TR-6710N HE filter, TR-6600 prefilter, BT-30 breathing tube, S-433L hood, and TR-630 standard capacity battery. The run time for the TR-600-ECK using the supplied TR-630 standard capacity battery is between 9.5 hours and 12.5 hours, depending on the selected airflow setting. If the TR-630 was replaced with the TR-632 high capacity battery, the run time would be between 13.5 hours and 19 hours, depending on selected airflow setting.

TR-600-HIK (Heavy Industry Kit): Run time: 10.5 – 15 hours
The pieces in the TR-600-HIK (Heavy Industry Kit) that may influence run times include a TR-6530N HE/OV/AG/HF cartridge, TR-644 spark arrestor, BT-30 breathing tube, M-307 respiratory hardhat, and TR-632 high capacity battery. The run time for the TR-600-HIK using the supplied TR-632 high capacity battery is between 10.5 hours and 15 hours, depending on the selected airflow setting. If the TR-632 was replaced with the TR-630 standard capacity battery, the run time would be between 7 hours and 10 hours.

System Run Times as Affected by Filter Loading
The 3M™ Versaflo™ PAPR TR-600 automatically compensates for the level of filter loading to help ensure the selected airflow setting is delivered. A new clean (unloaded) filter has a lower pressure drop than a loaded filter, meaning it is easier to draw air through a new filter than a loaded one. This also means that the PAPR system has to continuously work harder and use more battery power to maintain a consistent airflow as the filter loads, which decreases the run time. There is an inverse relationship between run time and filter loading, as shown in Figure 2.

When used in accordance with the *User* Instructions, the PAPR system works by filtering out air contaminants in the work environments and delivering filtered air to the wearer. The characteristics and airborne concentration of each type of contaminant influence how quickly a filter will load. Because of this, it is difficult to calculate how quickly a filter will load in any given environment.

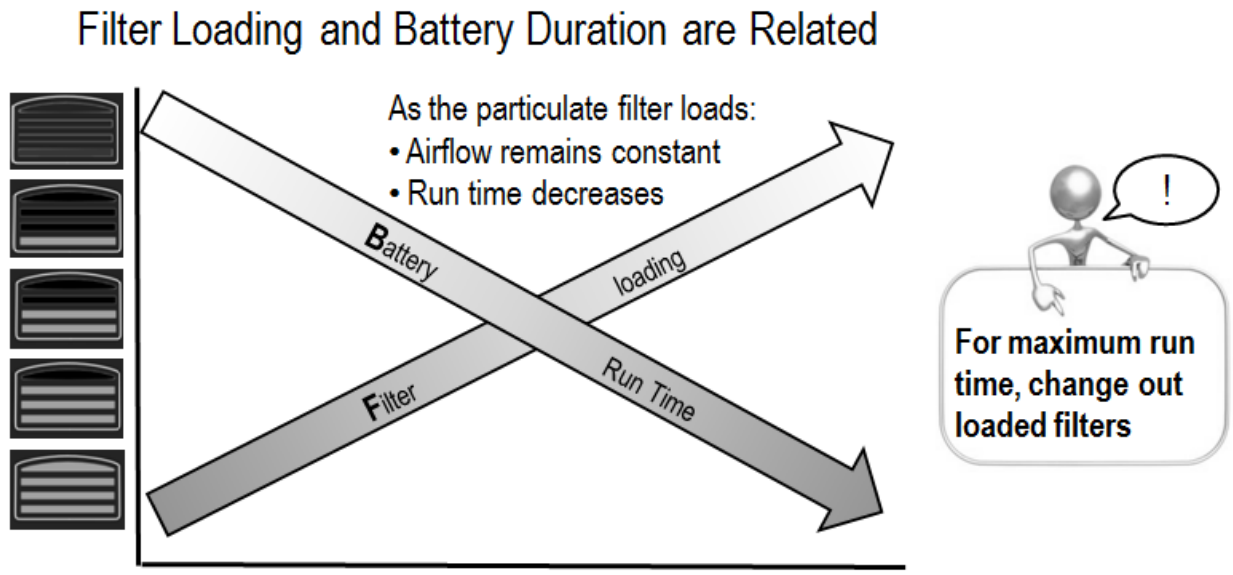

Figure 2 – Run time relationship between filter loading and battery duration. Chart is illustrative only, and not drawn to scale.

System Run Times as Affected by Battery Age
The available maximum capacity of a rechargeable battery decreases as the battery ages. 3M™ Versaflo™ battery packs provide approximately 250 full capacity charge/discharge cycles while maintaining 80% of the original charge capacity over the course of the first year of service when used under recommended conditions. As the battery ages its available capacity decreases, which reduces the system's run time per charge. For more information on battery aging and charge/discharge cycle counting, see 3M Technical Data Bulletin #223 – Battery Maintenance for 3M™ Versaflo™ PAPR.

System Run Time as Affected by Battery Storage

The system run times shown in Figure 1 are based on a new and fully charged battery. The remaining run time decreases as the battery charge status decreases. Battery charge status decreases during use and during storage. During storage (anytime not is use or being charged) batteries will naturally lose a percentage of their charge (remaining capacity), known as self-discharge. The 3M™ Versaflo™ battery packs have a self-discharge rate between approximately 2.5% and 4% per month depending on the size of the battery pack. Batteries stored at higher temperatures have a higher self-discharge rate than batteries stored at lower temperatures. Optimal storage temperature is 59 °F (15 °C).