



2.5" SATA III SLC SSD

HERMES-HR Series

Product Specification

INDUSTRIAL

APRO RUGGED METAL 2.5" SATA III SLC SSD

SUPPORTS DDRIII SDRAM CACHE

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Revision History

Revision	Description	Date
1.0	Initial release	2014/3/11
1.1	Adding Tantalum Capacitors' Description	2014/06/12

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1. Introduction

APRO industrial rugged metal 2.5" SATA III SLC SSD – HERMES-HR series provides high capacity flash memory Solid State Drive (SSD) that electrically complies with Serial ATA 3.0 (SATA) standard. APRO Rugged Metal 2.5" SATA III SLC SSD – HERMES-HR Series support SATA Gen-III (6.0 GB/s) with high performance. The main used flash memories are SLC-NAND type flash memory chips. The available disk capacities are 8GB, 16GB, 32GB, 64GB, 128GB and 256GB.

The operating temperature grade is optional for Standard grade 0°C ~ 70°C and wide temp grade supports -40°C ~ +85°C. The data transfer performance by sequential read is up to 510 MB/sec, and sequential write is up to 340 MB/sec.

APRO Rugged Metal 2.5" SATA III SLC SSD built-in DDRIII 2Gbits SDRAM products provide a high level interface to the host computer. This interface allows a host computer to issue commands to the Rugged Metal 2.5" SATA III SLC SSD to read or write blocks of memory. Each sector is protected by a powerful 40 bits per 1024 bytes error correction (ECC). APRO Rugged Metal 2.5" SATA III SLC SSD HERMES-HR Series intelligent controller manages interface protocols, data storage and retrieval as well as ECC, defect handling and diagnostics, power management and clock control.

Figure 1 shows a block diagram of the used high tech Rugged Metal 2.5" SATA III SLC SSD controller.

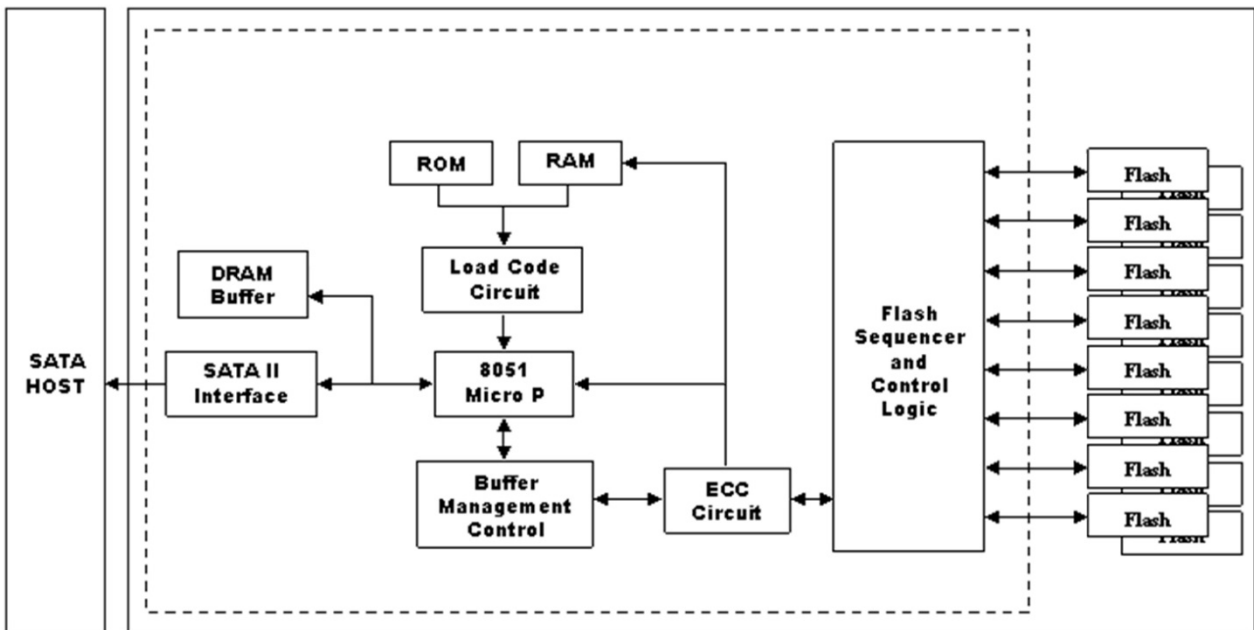


Figure 1: APRO Rugged Metal 2.5" SATA III SLC SSD HERMES-HR Series controller block diagram

1.1. Scope

This document describes features, specifications and installation guide of APRO's Rugged Metal 2.5" SATA III SLC SSDs HERMES-HR Series. In the appendix, there provides order information, warranty policy, RMA/DOA procedure for the most convenient reference.

1.2. System Features

- SLC-NAND type flash technology.
- Standard 2.5" SATA Flash Disk form-factor (9.5mm height).
- SATA 7-pin (data) + 15-pin (power connector) SATA Interface.
- Extremely Rugged Metal casing to endure harsh environments.
- Power interrupt data protection technology by Tantalum Capacitors.
- SATA 1.0a, SATA 2.6 and SATA 3.0 specification compliance.
- SMART (Self-Monitoring, Analysis and Reporting Technology) function supported.
- Supports Window-7 TRIM Command.
- Non-volatile memory and no moving parts.
- SLC Flash SSD standard grade capacity from 8GB up to 256GB.
- Supports 2GBits DDRIII SDRAM Cache
- Sequential read performance up to 510 MB/sec.
- Sequential write performance up to 340 MB/sec.
- Automatic 40 bits per 1024 bytes error correction (ECC) and retry capabilities.
- +5 V $\pm 5\%$ operation.
- Shock: 0.5ms, 1500 G, 3 axes.
- Vibration: 7 Hz to 2K Hz, 20G, 3 axes.
- Very high performance, very low power consumption.
- Low weight, Noiseless.

1.3. Flash Management Technology - Static Wear Leveling

In order to gain the best management for flash memory, APRO 2.5" SATA III SLC SSD HERMES-HR Series supports Static Wear-leveling technology to manage the Flash system. The life of flash memory is limited; the management is to increase the life of the flash product.

A static wear-leveling algorithm evenly distributes data over an entire Flash cell array and searches for the least used physical blocks. The identified low cycled sectors are used to write the data to those locations. If blocks are empty, the write occurs normally. If blocks contain static data, it moves that data to a more heavily used location before it moves the newly written data. The static wear leveling maximizes effective endurance Flash array compared to no wear leveling or dynamic wear leveling.

1.4. DRAM Buffer

SSDs designed with a DDRIII SDRAM buffer which is support high transfer rate as a data buffer for the SSD; SSD with SDRAM buffer is able to deliver excellent random data transfer speed.

1.5. Power Interrupt Data Protection Technology

In the event of an unstable power supply, SSD loses power before it can finish programming process from host to flash, this may cause data being written to the incorrect block and further leads to data corruption.

Power Interrupt Data Protection Technology is applied with several tantalum capacitors to provide power buffering after host power interruption. The Data Protection Technology provides enough time for the SSD controller can write all DRAM buffer data to flash, all data will be protected and without data loss.

The ability of Power Interrupt Data Protection Technology is able to write 1.28MB of data within 60ms.

This ensures all data in the DRAM buffer can be successfully written into flash.

Traditionally, super capacitors were applied in most SSD products, the advantages of tantalum capacitors over super capacitors are:

➤ **Tantalum capacitors are electrolyte free.**

It is able to maintain its designed capacitance for several years when used within design limits.

➤ **Wide operating temperature range.**

Tantalum capacitors can operate from temperature range of -55C to +125C, which is very suitable for industrial and military usage.

➤ **Tantalum capacitors have an ultimate high volumetric efficiency (CV/cc).**

For example, a 50-microfarad tantalum capacitor can be equal and to properly replace a 500-microfarad aluminum capacitor.

2. Product Specifications

For all the following specifications, values are defined at ambient temperature and nominal supply voltage unless otherwise stated.

2.1. System Environmental Specifications

Table 1: Environmental Specification

APRO Rugged Metal 2.5" SATA III SLC SSD		Standard Grade	Industrial Grade
HERMES-HR Series		SR2SRxxxG-JHCTC	WR2SRxxxG-JHITI
Temperature	Operating:	0°C ~ +70°C	-40°C ~ +85°C
	Non-operating:	-20°C ~ +80°C	-50°C ~ +95°C
Humidity	Operating & Non-operating:	10% ~ 95% non-condensing	
Vibration	Operating & Non-operating:	7 Hz to 2K Hz, 20G, 3 axes	
Shock	Operating & Non-operating:	0.5ms, 1500 G, 3 axes	

2.2. System Power Requirements

Table 2: Power Requirement

APRO Rugged Metal 2.5" SATA III SLC SSD		Standard Grade
HERMES-HR Series		SR2SRxxxG-JHCTC
DC Input Voltage (VCC) 100mV max. ripple(p-p)		5V±5%
+5V Current (Maximum average value)	Reading Mode :	410 (max.)
	Writing Mode :	600 (max.)
	Idle Mode :	140 (max.)

2.3. System Performance

Table 3: System Performances

Data Transfer Mode supporting		Serial ATA Gen-III (6.0Gb/s = 768MB/s)					
Average Access Time		0.2 ms (estimated)					
Maximum Performance	Capacity	8GB	16GB	32GB	64GB	128GB	256GB
	Sequential Read (MB/s)	400	400	500	500	500	510
	Sequential Write(MB/s)	110	130	250	340	340	340
The number of Flash IC		4pcs	8pcs	8pcs	8pcs	8pcs	8pcs

Note:

(1). All values quoted are typically at 25°C and nominal supply voltage.

(2). Testing base on CrystalDiskMark 3.01 with file size 1000MB

2.4. System Reliability

Table 4: System Reliability

Wear-leveling Algorithms	Static Wear-leveling
Bad Blocks Management	Supportive
ECC Technology	40 bits per 1024 bytes
Endurance	Un-limited Read Cycles Endurance Management enables five years minimal useful life
Data Retention	10 years

2.5. Physical Specifications

Refer to Table 5 and see Figure 3 for Rugged Metal 2.5" SATA III SLC SSD HERMES-HR Series physical specifications and dimensions.

Table 5: Physical Specifications of APRO Rugged Metal 2.5" SATA III SLC SSD-HERMES-HR Series

Length:	99.70 mm / 4.0 in
Width:	69.90 mm / 2.75 in
Thickness:	9.50 mm / 0.37 in
Weight:	115.00 g / 4.06 oz

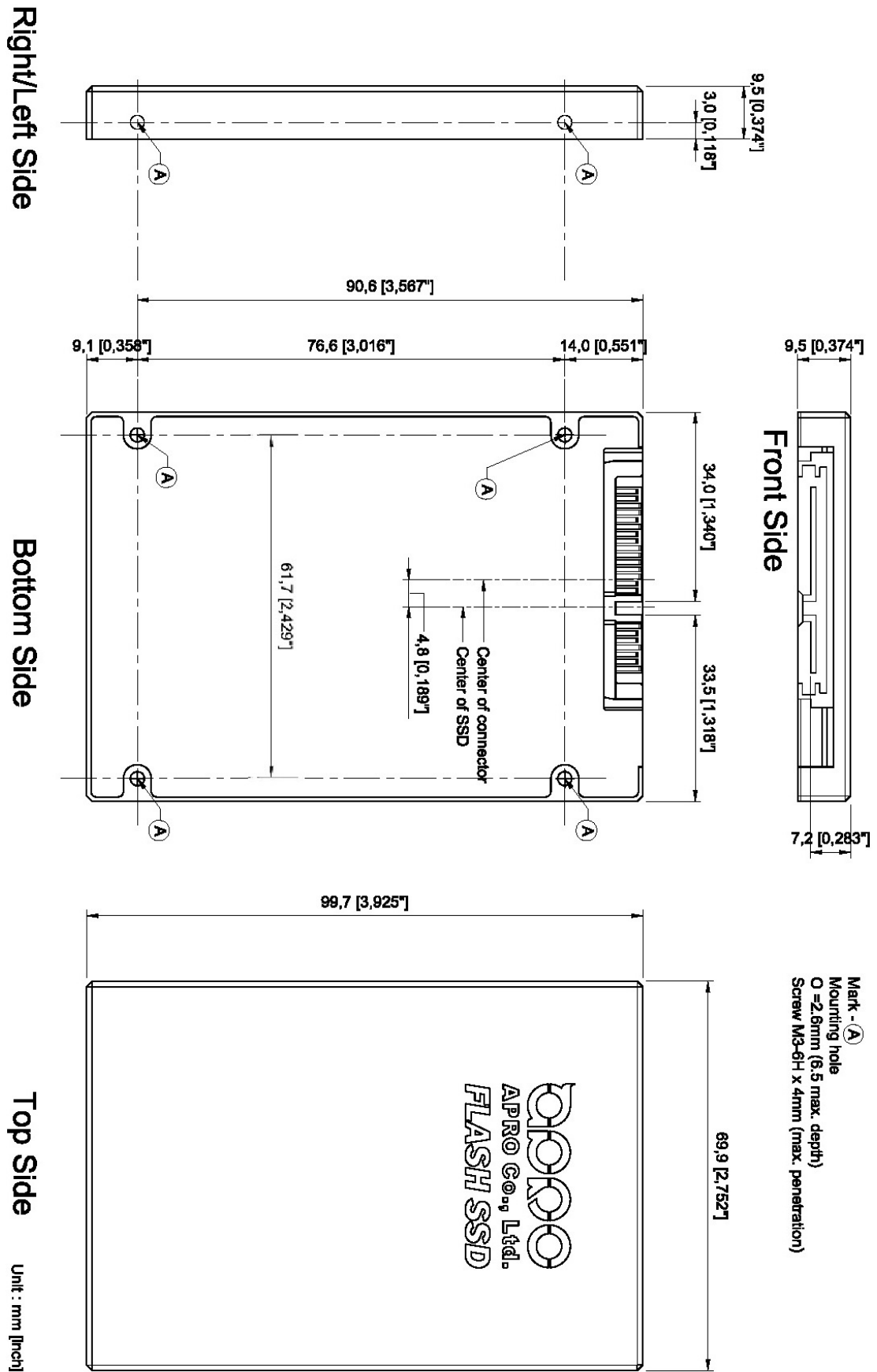


Figure 2: APRO Rugged Metal 2.5" SATA III SLC SSD Dimension

2.5.1. Conformal coating

Conformal coating is a protective, dielectric coating designed to conform to the surface of an assembled printed circuit board. Commonly used conformal coatings include silicone, acrylic, urethane and epoxy. APRO applies only silicone on APRO storage products upon requested especially by customers. The type of silicone coating features good thermal shock resistance due to flexibility. It is also easy to apply and repair.

Conformal coating offers protection of circuitry from moisture, fungus, dust and corrosion caused by extreme environments. It also prevents damage from those Flash storages handling during construction, installation and use, and reduces mechanical stress on components and protects from thermal shock. The greatest advantage of conformal coating is to allow greater component density due to increased dielectric strength between conductors.

APRO uses MIL-I-46058C silicon conformal coating

3. Interface Description

3.1. APRO Rugged Metal 2.5" SATA III SLC SSD interface

APRO Rugged Metal 2.5" SATA III SLC SSD is equipped with standard 7 pins + 15 pins Serial ATA connector.

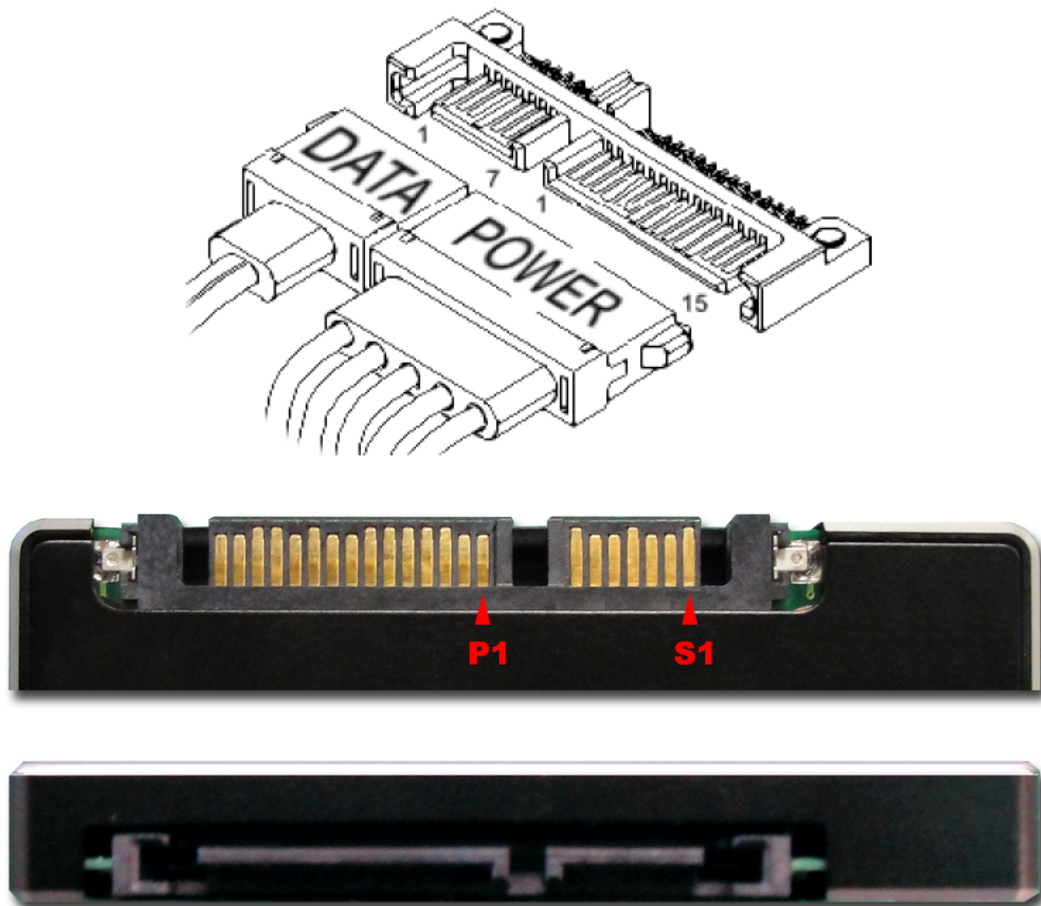


Figure 3 :The connectors of 2.5" SATA III SLC SSD

3.2. Pin Assignments

There are total of 7 pins in the signal segment and 15 pins in the power segment. The pin assignments are listed in below table 7.

Table 7 - Pin Assignments

Name	Type	Description
S1	GND	NA
S2	A+	Differential Signal Pair A
S3	A-	
S4	GND	NA
S5	B-	Differential Signal Pair B
S6	B+	
S7	GND	NA

Key and Spacing separate signal and power segments		
P1	NC	NA
P2	NC	NA
P3	NC	NA
P4	GND	NA
P5	GND	NA
P6	GND	NA
P7	V5	5V Power, Pre-Charge
P8	V5	5V Power
P9	V5	5V Power
P10	GND	NA
P11	DAS/DSS	Device Activity Signal / Disable Staggered Spin up
P12	GND	NA
P13	NC	NA
P14	NC	NA
P15	NC	NA


Notes:

1. All pins are in a signal row with a 1.27 mm (0.050" pitch).
2. The commands on the mating sequence in forward table apply to the case of backplane blind mate connector only. In this case, the mating sequences are:
 - (1) The pre-charge power pins and other ground pins.
 - (2) The signal pins and the rest of the power pins.

Appendix A: Ordering Information

1. Part Number List

◆ APRO Rugged Metal 2.5" SATA III SLC SSD – HERMES-HR Series

Product Picture	Grade	Standard grade (0°C ~ 70°C)	Industrial Grade (-40°C ~ +85°C)
	8GB	SR2SR008G-JHCTC(/C)	WR2SR008G-JHITI(/C)
	16GB	SR2SR016G-JHCTC(/C)	WR2SR016G-JHITI(/C)
	32GB	SR2SR032G-JHCTC(/C)	WR2SR032G-JHITI(/C)
	64GB	SR2SR064G-JHCTC(/C)	WR2SR064G-JHITI(/C)
	128GB	SR2SR128G-JHCTC(/C)	WR2SR128G-JHITI(/C)
	256GB	SR2SR256G-JHCTC(/C)	WR2SR256G-JHITI(/C)

2. Part Number Decoder:

X1 X2 X3 X4 X5 X6 X7 X8 X9 – X11 X12 X13 X14 X15 – C

X1 : Grade

S: Standard Grade – operating temp. 0° C ~ 70 ° C

W: Wide Temp Grade- operating temp. -40° C ~ +85 ° C

X2 : The material of case

R : 2.5" Rugged Metal Casing

X3 X4 X5 : Product category

2SR : 2.5" SATA SSD w/SDRAM cache

X6 X7 X8 X9 : Capacity

008G: 8GB **064G:** 64GB

016G: 16GB **128G:** 128GB

032G: 32GB **256G:** 256GB

X11 : Controller

J : JMicron (HERMES-HR Series)

X12 : Controller version

A, B, C.....

X13 : Controller Grade

C : Commercial grade

I : Industrial grade

X14 : Flash IC

T : Toshiba SLC-NAND Flash IC

X15 : Flash IC grade / Type

C : Commercial grade

I : Industrial grade

C : Reserved for specific requirement

C : Conformal-coating

Appendix B: Limited Warranty

APRO warrants your Rugged Metal 2.5" SATA III SLC SSD against defects in material and workmanship for the life of the drive. The warranty is void in the case of misuse, accident, alteration, improper installation, misapplication or the result of unauthorized service or repair. The implied warranties of merchantability and fitness for a particular purpose, and all other warranties, expressed or implied, except as set forth in this warranty, shall not apply to the products delivered. In no event shall APRO be liable for any lost profits, lost savings or other incidental or consequential damages arising out of the use of, or inability to use, this product.

BEFORE RETURNING PRODUCT, A RETURN MATERIAL AUTHORIZATION (RMA) MUST BE OBTAINED FROM APRO.

Product shall be returned to APRO with shipping prepaid. If the product fails to conform based on customers' purchasing orders, APRO will reimburse customers for the transportation charges incurred.

WARRANTY PERIOD:

- SR2SRxxxG-JHCTC(/C) 3 years



- WR2SRxxxG-JHITI(/C) 5 years



The warranty period is able to extend. Please contact APRO and/or Your APRO distributors for more information.