



## Hydraulic Fluid Power System Management

Comprehensive hydraulic system monitoring and control

WITH ADVANCED SOLUTIONS AND DECADES OF RELEVANT EXPERIENCE, MTS STANDS UNIQUELY QUALIFIED TO INTEGRATE AND OPTIMIZE YOUR HYDRAULIC DISTRIBUTION COMPONENTS. OUR STATE-OF-THE-ART **FLUID POWER SYSTEM MANAGEMENT SOLUTIONS** ALLOW EVEN THE LARGEST, MOST COMPLEX TEST LABORATORIES TO EASILY MONITOR AND CONTROL THEIR OVERALL HYDRAULIC SYSTEM STATE. WE CAN HELP YOU COMBINE ALL VITAL FUNCTIONALITY AND SYSTEM STATUS INFORMATION INTO A SINGLE, SEAMLESS AND HIGHLY INTUITIVE USER EXPERIENCE.



## Manage Your Hydraulic Power From a Single Source

Hydraulic Power Units (HPUs) in most test labs are typically managed as single units rather than as a whole. The lack of communication between HPUs makes it impossible to assign specific flow levels to each test station based on need, which then requires the hydraulic distribution system to maintain far more always-on flow than is necessary to meet both average and peak demand. This overuse of hydraulic resources increases electricity consumption and results in the premature component wear that may lead to unscheduled downtime.

Test labs also experience lost productivity when operators have to leave their stations and walk to another part of the facility to request more power or troubleshoot an HPU-related issue. A similar dip in productivity occurs when an E-stop is activated. In such an event, test engineers must travel throughout a facility to investigate where and why hydraulic power was shut down.

MTS Fluid Power System Management Solutions offer a standardized suite of hardware and software for connecting the control room with hydraulic fluid activity at each test station across your facility, providing you with visibility to the state of your entire hydraulic distribution system. You can easily monitor and control your HPUs as a single system, helping you improve productivity, reduce energy costs and prolong equipment life.

### Productivity

With this innovative and visually intuitive system in place, test engineers don't have to leave their stations and visit a pump room or other remote area of the test lab to manage their hydraulic power needs. At the same time, lab and facilities managers have access to information they need to intelligently and efficiently allocate hydraulic power. Early warning detection and fault identification also help to protect uptime.

### Efficiency

Since you have visibility to your facility's overall hydraulic fluid demand, you can control the supply and balance the load to distribute hydraulic fluid only where it is needed, instead of reactively and inefficiently maintaining full pressure to all stations. This ability to anticipate future demand and selectively regulate hydraulic flow helps to minimize electricity and water consumption, reducing operating expenses.

### Longevity

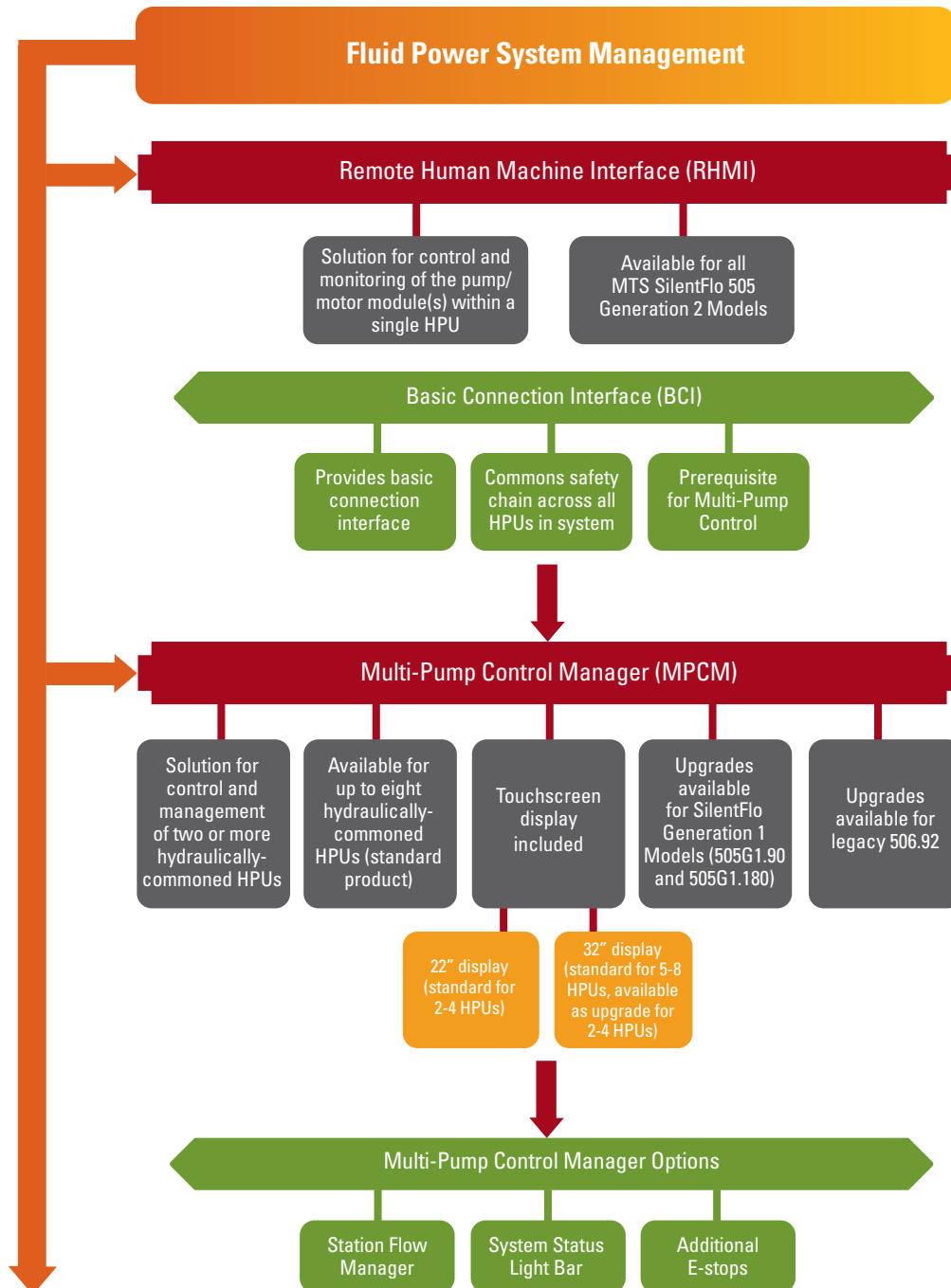
MTS Fluid Power System Management Solutions are compatible across legacy, current and future MTS SilentFlo™ HPUs, helping to ensure the longest functional life from your technology investments. Distributing hydraulic pressure only when necessary also reduces wear on hydraulic distribution components, helping to further prolong functional life and reduce total cost of ownership.

### Scalability

These solutions are designed to be easily upgradeable, so you can purchase what you need today and expand capabilities as your testing requirements grow. A Basic Connection Interface can be purchased separately and later upgraded to add multi-pump control capabilities. Similarly, a Remote HMI can be field-upgraded to operate as a Station Flow Manager.

## Versatility to Grow with Your Test Program

With MTS Fluid Power System Management Solutions, you can control and monitor the pump/motor module(s) within a single HPU, or operate up to eight hydraulically-commoned HPUs as a single system. To manage more than one HPU at a time, you can start with a Basic Connection Interface (BCI), and from there incorporate multi-pump control capabilities for consolidated system status and operation. Additional options are also available for further enhancing the productivity and efficiency of your hydraulic distribution system.



## MTS Hydraulic Fluid Power System Management Configuration

**(A) Remote Human-Machine Interface (RHMI):** Emulates the display panel of an individual HPU and makes it readable and fully functional from the test station or any other location in the lab.

**(B) Basic Connection Interface:** Typically located in the pump room, and is the starting point for any configuration. Provides E-stop integration, cooling control and valve control.

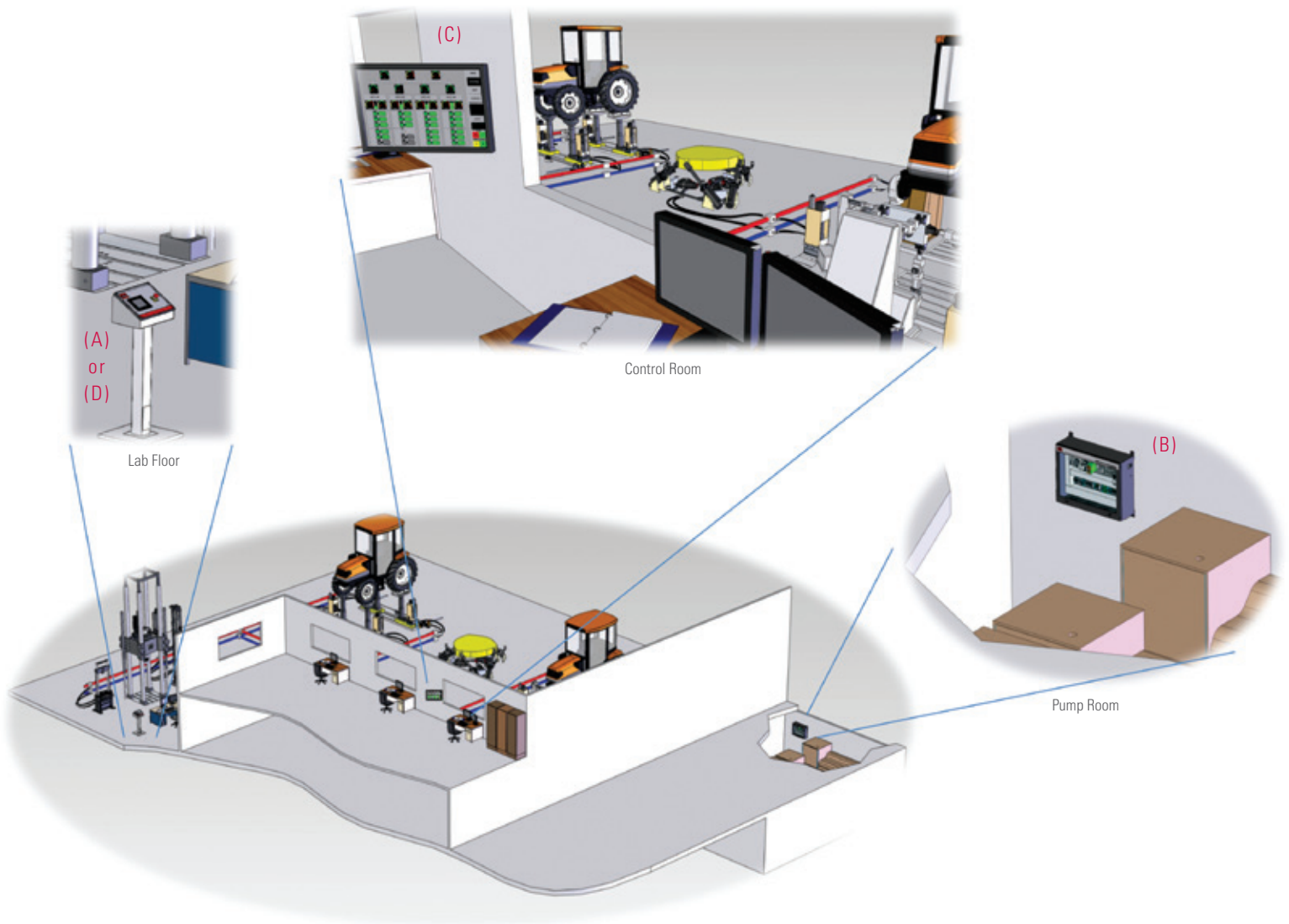
**(C) Multi-Pump Control Manager:** Typically located in the control room. Builds on BCI functionality to enable remote system

control and monitoring with a user-friendly touchscreen LCD control panel. Facilitates operation in equipment-saving load balancing or energy-saving Run-on-Demand mode.

**(D) Station Flow Manager:** Allows operators at test stations to electronically request flow requirements for their station.

**(E) Light Bar:** Mounted in a visible location to provide lab personnel with at-a-glance notification of hydraulic system status.

**(F) Additional E-stops:** Provide more locations for stopping the distribution system.







## Hydraulic Fluid Power System Management

### Remote HMI

#### MONITOR AND CONTROL AN HPU FROM A REMOTE LOCATION

The Remote Human-Machine Interface (RHMI) allows you to transfer control panel operation of a single HPU to another location of your choice, with identical screens, functionality and full E-stop capability. Instead of leaving a test station and walking to the pump room to monitor or change HPU settings, test engineers can now perform such tasks from a far more convenient location, improving their productivity. Because the RHMI uses the same structure as the Station Flow Manager, it can be easily field-upgraded to become a Station Flow Manager when you decide to incorporate multi-pump control.



The RHMI is available in wall-mount, tabletop or pedestal configurations for utmost placement flexibility.

### Basic Connection Interface

#### THE BASE TECHNOLOGY ENABLER

The Basic Connection Interface (BCI) is a simple box of electronics, typically mounted on the wall in the pump room or elsewhere in close proximity to the HPUs. It serves as the starting point for any MTS Fluid Power System Management configuration. The BCI connects SIL-2 safety relays and E-stop functionality and offers basic cooling and dump valve control.





# Multi-Pump Control Manager

## Easy command of the entire system state

The Multi-Pump Control Manager (MPCM) allows you to control any HPU in your system as if you were standing in front of it, from a centrally-located touchscreen monitor. In addition to remote operation and status display of individual pump modules, the MCPM lets you make start/stop, pressure and reset decisions as a system. Other functionality includes system-level error alarms and faults including E-stop fault indication, which identifies the specific user-identified E-stop location that was tripped.

All of this functionality is literally at your fingertips in the control room with a visually intuitive LCD touchscreen display panel. If you can run a single HPU, then you're ready to operate the MPCM. Touchscreens are available in two sizes: a 22" touchscreen LCD is designed for labs with up to four HPUs, and a 32" touchscreen LCD lets you control and monitor up to eight HPUs.

HPU PLATFORM		SYSTEM TRANSDUCERS			SYSTEM ROD SETUP		MAIN
1	505.180	PRESSURE SENSOR PRESENT	TEMP SENSOR PRESENT	FLOW SENSOR PRESENT	MIN MAX FLOW	FLOW BUFFER	SYSTEM
2	505.180	SYSTEM UNITS			30	20	UNIT
3	505.180	PRESSURE IN PSI	TEMP IN °F	FLOW IN GPM	ON DELAY (SEC)	OFF DELAY (MIN)	STATUS
4	505.180	SYSTEM DESIGN PRESSURE			1	10	SETUP
		3000 PSI/21 MPa					STATION
							SERVICE

**Setup View** provides simple, intuitive initial system configuration.

STATION FLOW MANAGER								MAIN
STATION	NAME	STATUS	FLOW (GPM)	STATION	NAME	STATUS	FLOW (GPM)	SYSTEM
1	CR-1	ON	25	5	CR-1	OFF	0	UNIT
	CR-2	OFF	0		CR-2	OFF	0	
	CR-3	OFF	0		CR-3	OFF	0	
	CR-4	OFF	0		CR-4	OFF	0	
2	CR-1	OFF	0	6	CR-1	ON	15	STATUS
	CR-2	OFF	0		CR-2	OFF	0	
	CR-3	OFF	0		CR-3	OFF	0	
	CR-4	ON	52		CR-4	OFF	0	
3	CR-1	OFF	0	7	CR-1	OFF	0	SETUP
	CR-2	OFF	0		CR-2	OFF	0	
	CR-3	OFF	0		CR-3	OFF	0	
	CR-4	OFF	0		CR-4	OFF	0	
4	CR-1	OFF	0	8	CR-1	OFF	0	STATION
	CR-2	OFF	0		CR-2	OFF	0	
	CR-3	OFF	0		CR-3	OFF	0	
	CR-4	OFF	0		CR-4	OFF	0	

**Station View** allows operators to assign flow demand thresholds for use in Auto mode.

HPU 1				HPU 2				SYSTEM		MAIN
E-STOP OK	MODULE STATUS	HOURS	E-STOP OK	MODULE STATUS	HOURS	FAULT	ALARM			SYSTEM
WATERLOGS OK	#1 HIGH PRESSURE	0.4	WATERLOGS OK	#1 HIGH PRESSURE	0.1	E-STOP RELEASED	FLAME SENSORS OK			UNIT
OIL LEVEL OK	#2 HIGH PRESSURE	0.4	OIL LEVEL OK	#2 HIGH PRESSURE	0.1	FLAME EXTINGUISH	FLAME SENSORS OK			STATUS
OIL TEMP OK	#3 HIGH PRESSURE	0.2	OIL TEMP OK	#3 HIGH PRESSURE	0.2	E-STOP RELEASED	MPH-11 COMB OK			SYSTEM RESET
RETURN FILTER OK	#4 HIGH PRESSURE	0.2	RETURN FILTER OK	#5 DISABLED	0.0	MPH-11 COMB OK	MPH-12 COMB OK			
	#5 HIGH PRESSURE	0.2		#5 DISABLED	0.0	MPH-12 COMB OK	MPH-13 COMB OK			
	#6 DISABLED	0.2		#6 DISABLED	0.0	MPH-13 COMB OK	MPH-14 COMB OK			
HPU 3				HPU 4						
E-STOP OK	MODULE STATUS	HOURS	E-STOP OK	MODULE STATUS	HOURS	WTL LUB	OPH-6 COMB OK			
WATERLOGS OK	#1 HIGH PRESSURE	0.1	WATERLOGS OK	#1 HIGH PRESSURE	0.1	OPH-6 COMB OK	OPH-7 COMB OK			
OIL LEVEL OK	#2 HIGH PRESSURE	0.1	OIL LEVEL OK	#2 HIGH PRESSURE	0.1	OPH-7 COMB OK	OPH-8 COMB OK			
OIL TEMP OK	#3 HIGH PRESSURE	0.1	OIL TEMP OK	#3 HIGH PRESSURE	0.1	OPH-8 COMB OK	OPH-9 COMB OK			
RETURN FILTER OK	#4 HIGH PRESSURE	0.1	RETURN FILTER OK	#4 HIGH PRESSURE	0.1	OPH-9 COMB OK	OPH-10 COMB OK			
	#5 HIGH PRESSURE	0.1		#5 HIGH PRESSURE	0.1	OPH-10 COMB OK	OPH-11 COMB OK			
	#6 HIGH PRESSURE	0.1		#6 HIGH PRESSURE	0.1	OPH-11 COMB OK	OPH-12 COMB OK			

**Status View** replicates status information from each HPU and displays vital system-level status information.

HPU #1				HPU #2				HPU #3				HPU #4				MAIN
																SYSTEM
																UNIT
																STATUS
																AUTO
																STOP
																0 I
																PRESSURE
																I II

**System View** displays all vital control and monitoring information in an easy-to-understand graphical manner.

HPU 1				HPU 2				MAIN
MODULE #1 ENABLED	STOP	UNIT HOURS	0.6	MODULE #1 ENABLED	STOP	UNIT HOURS	0.2	SYSTEM
MODULE #2 ENABLED	HIGH PRESSURE	OIL PRESS	3060 PSI	MODULE #2 ENABLED	HIGH PRESSURE	OIL PRESS	PSI	UNIT
MODULE #3 ENABLED	REMOTE ENET	OIL TEMP	83 °F	MODULE #3 ENABLED	REMOTE ENET	OIL TEMP	118 °F	STATUS
MODULE #4 ENABLED	AUTO	OIL LEVEL	1/4	MODULE #4 ENABLED	AUTO	OIL LEVEL	1/2	
MODULE #5 ENABLED		OIL FLOW	6.9 GPM	MODULE #5 ENABLED		OIL FLOW	5.9 GPM	
HPU 3				HPU 4				
MODULE #1 ENABLED	STOP	UNIT HOURS	0.1	MODULE #1 ENABLED	STOP	UNIT HOURS	0.1	
MODULE #2 ENABLED	HIGH PRESSURE	OIL PRESS	2960 PSI	MODULE #2 ENABLED	HIGH PRESSURE	OIL PRESS	PSI	
MODULE #3 ENABLED	REMOTE ENET	OIL TEMP	109 °F	MODULE #3 ENABLED	REMOTE ENET	OIL TEMP	116 °F	
MODULE #4 ENABLED	AUTO	OIL LEVEL	1/2	MODULE #4 ENABLED	AUTO	OIL LEVEL	3/4	
MODULE #5 ENABLED		OIL FLOW	47.2 GPM	MODULE #5 ENABLED		OIL FLOW	110.4 GPM	

**Unit View** replicates each HPU's HMI for running the system in Manual mode.

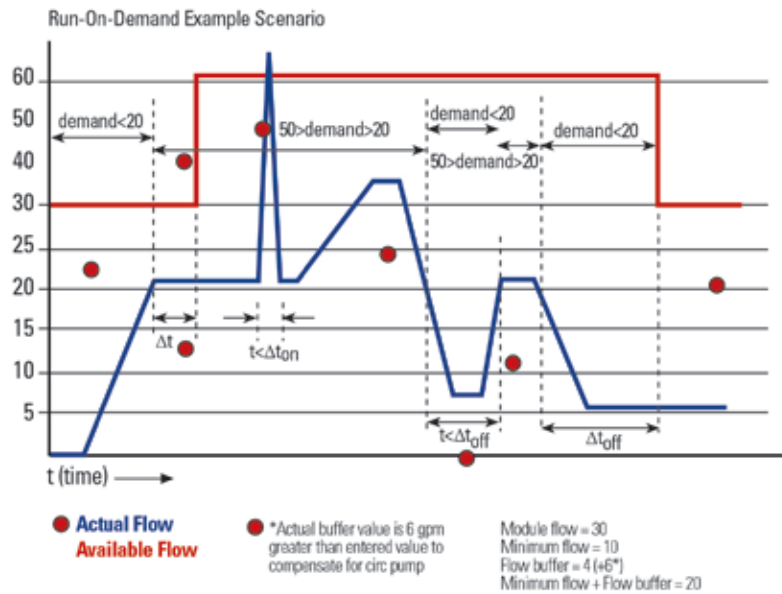


The MPCM facilitates hydraulic fluid distribution control in any of three modes:

- » Manual
- » Auto
- » Run-on-Demand

Auto mode provides automatic system load balancing, which equally distributes pump hours across all available pump modules rather than those that happen to come first in the chain. This helps to improve overall HPU life.

Run-On-Demand mode (see example) offers tremendous energy-saving potential for your test lab. In this mode, the operator inputs information for module minimum, flow buffer, and next “on/off” times for each test station. The MPCM then uses this data to automatically start only the number of modules required to meet demand at any given time. When more demand is needed, additional modules are activated to meet it. Modules automatically shut off as demand subsides.



1. On touchscreen LCD in the control room, the operator sets pump module flow to 30 gpm, minimum flow to 10 gpm and flow buffer to 4 gpm, based on anticipated demand.
2. One module activates in the pump room to make 30 gpm available.
3. Demand rises to 20 gpm for a designated period of time, exceeding minimum and flow buffer thresholds. A second module automatically starts to increase available flow.
4. Demand spikes to 60 gpm for a brief period before returning to 20 gpm. No new module is activated, because the spike was too brief in duration.
5. Flow drops back below 20 gpm for a designated period of time, and the second pump module automatically shuts down.

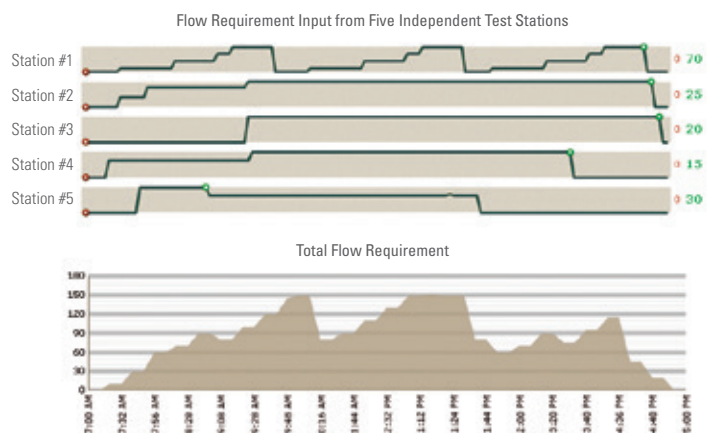
### Manage system flow demands

With the Multi-Pump Control Manager's Station View screen, you can input, view or change individual station flow requirements from a single location. Station operators will no longer need to determine how many or which pump modules to turn on or off, reducing the chance of flow calculation errors that could ruin tests or consume

excessive power. The MPCM combines all requested flow requirements to manage the system demands and hydraulic power distribution in an energy-efficient manner. For example, if an unattended test has an interlock, the MPCM can automatically shutdown HPU demand to save energy and costs.

With optional Station Flow Managers placed at the test stations, the station operator can input flow requirement requests that can then be combined and managed from the Multi-Pump Control Manager.

STATION FLOW MANAGER									
STATION	NAME	STATUS	FLOW (gpm)	STATION	NAME	STATUS	FLOW (gpm)	MAIN	
1	STATION #1 4-POSTER	ON	10	5	STATION #5 BUMPER TESTSTAND	ON	30	SYSTEM	
		ON	30			ON	20	UNIT	
		ON	50			ON	0	STATUS	
		ON	70			ON	0	SETUP	
2	STATION #2 MAST LAB A	ON	10			ON	0	STATION	
		ON	20			ON	0		
		ON	25			ON	0		
		ON	0			ON	0		
3	STATION #3 LANDMARK LAB	ON	20			ON	0		
		ON	0			ON	0		
		ON	0			ON	70		
		ON	0			ON	0		
4	STATION #4 DAMPER LAB	ON	10			ON	70		
		ON	15			ON	0		
		ON	0			ON	0		
		ON	0			ON	0		



## Multi-Pump Control Manager Options

### Options

#### POWERFUL COMPONENTS TO FURTHER STREAMLINE YOUR HYDRAULIC DISTRIBUTION

The MTS Fluid Power System Management Solution includes several optional components for optimizing staff productivity and hydraulic distribution system efficiency. You can choose to integrate only the options you need today, with flexibility to easily add new capabilities in the future as your needs dictate.

#### Station Flow Manager

##### OPEN TWO-WAY COMMUNICATION BETWEEN CONTROL ROOM AND LAB FLOOR

The Station Flow Manager allows test engineers at individual test stations to send an estimate to the control room of how much power they will need for the day, based on work in their queue. Individual flow values can be designated for up to four channels in manual operation at each test station.

Equipped with this depth of information, lab managers can supply the proper amount of power to the proper locations at the proper time, and can proactively plan for increased demand. They can also capitalize on advanced MPCM functions such as Auto Load Balancing and Auto Run-on-Demand. Up to eight Station Flow Managers can be integrated into each hydraulic fluid distribution loop, for a total of 32 individual flow channels.

#### System Status Light Bar

##### AT-A-GLANCE NOTIFICATION OF HYDRAULIC SYSTEM STATUS

The same questions arise whenever hydraulic pressure slows down or stops. Is it an issue at the test station? Is it a problem with an HPU in the pump room? Or, is it a system-wide issue? In the past, test engineers have had to abandon their workstations in their search for answers. By installing one or more System Status Light Bars in visible locations on the test floor, your staff can get instant answers to vital system status questions at a glance.

The MTS System Status Light Bar uses the familiar colors of the stoplight to impart vital information as clearly and directly as possible:



- » **Solid green** – System high pressure
- » **Flashing green** – System low pressure
- » **Yellow with slow buzzing sound** – System alarm
- » **Red with fast buzzing sound** – System fault

The buzzer can be muted, and up to three System Status Light Bars can be daisy-chained together to provide multiple locations with system status information simultaneously.

#### Additional E-stops

##### MORE OPPORTUNITIES TO CONTROL SYSTEM OPERATION

Adding E-stops at key locations around the lab allows more operators to stop the system in case of emergency. With the Multi-Pump Control Manager's E-stop fault indicator, the tripped E-stop location is easily found, so the issue can be resolved more quickly, and downtime is minimized.



## The Complete Hydromechanical Solutions Offering

MTS is your single resource for the proven technology, unmatched expertise and responsive support it takes to ensure reliable, efficient hydraulic fluid distribution across your test facility.

### SilentFlo HPU's

Test professionals around the world choose SilentFlo hydraulic power units (HPU's) for their superior performance, low-noise operation and energy-efficiency. Operating at or below sound levels commonly found in labs and factories, SilentFlo HPU's deliver exceptionally clean and quiet hydraulic power. A variable-volume pump design also helps to optimize energy-efficiency.

### HSMs

MTS Hydraulic Service Manifolds (HSMs) provide independent pressure regulation for the precise control, isolation and distribution of hydraulic fluid to test stations. By installing MTS HSMs into the hydraulic lines between the HPU and servovalve, you can turn each hydraulic circuit on or off and independently set low-pressure levels. This allows convenient, efficient test setup, operation and maintenance of individual test systems without disturbing other systems.

### ISMs

Easy to set up and maintain, MTS Isolation Service Manifolds (ISMs) provide a simple means of regulating flow and facilitating safe operation throughout your hydraulic distribution system. The ISM is placed between the HPU and HSM to prevent system over-pressurization, provide full system pressure discharge, and allow for full hydraulic power isolation downstream of the device. This consistent and purposeful control allows you to meet the most recent European Norm (EN) machinery safety standards, including EN 13121, EN 13849-1, and EN ISO 4413.

### Actuators

MTS offers a comprehensive family of fatigue-rated actuators to meet your testing objectives. MTS actuators deliver exceptional fidelity over the full range of motion. Proprietary materials and processes minimize friction for excellent reliability, wear-resistance and energy-efficiency. You can expect highly reliable performance over a long functional life, helping to maximize your uptime and minimize total cost of ownership.

### Servovalves

Precision-engineered MTS Servovalves deliver the high-flow, quick-response and low-distortion performance required to give you absolute control over your hydraulic actuation. This helps you uphold the highest possible levels of test data fidelity. MTS servovalves deliver exceptional resolution and low hysteresis for exacting flow control, and are available in a wide range of flow ratings. Rugged designs ensure long operating life, even in demanding test environments.

### Hardline design

MTS has extensive experience helping test labs implement smart hydraulic distribution solutions that satisfy both their functional and budgetary requirements. We understand the design and installation challenges involved, and can help you deploy a versatile solution that will serve you well over the long term. Throughout your relationship with us, we will also provide valuable services for prolonging equipment life and keeping your system operating safely, smoothly and reliably.

### Global service and support

The MTS global team of service, support and consulting professionals can offer complete lifecycle management services for your test technology and hydromechanical components. We will help you to achieve maximum productivity and uptime, as well as develop and deploy new test programs rapidly.

There are several service offerings that are designed specifically for hydraulic systems. One that is key to maintaining optimum performance is the MTS Fluid Care Program which provides fluid condition assessment specific to hydraulic test systems.

Another option is our MTS SilentFlo Pump/Motor Module Exchange Program that allows the exchange of a pump/motor module to extend HPU life. We also offer several upgrade options to allow you to bring older equipment up to newer operating standards.

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