BEST-IN-CLASS STEAM TRAP MANAGEMENT

A CRITICAL, NO-REGRET STEP TOWARDS ACHIEVING YOUR NET-ZERO GOAL

Armstrong®
EXPERIENCE MATTERS™

SUSTAINABLE, PROACTIVE STEAM TRAP MANAGEMENT

Armstrong is here to solve your problems and prevent them with a proven, best-in-class trap management program. We take a holistic approach to trap management that considers your entire steam system, as well as the unique requirements of your facilities and industry. From utility system optimization and expert coordination for steam trap replacements to complete turnkey solutions, Armstrong does it all.

Our specialists will work with you to implement a trap management program that's custom-designed to increase reliability, efficiency and safety, while helping to bring your goal of net-zero within reach.

ARMSTRONG IS THE TRUSTED THERMAL UTILITY PARTNER FOR SATISFIED CUSTOMERS IN MORE THAN 100 COUNTRIES

We're global leaders in energy management, with more than a century of knowledge and experience. Whether your company has 10 steam traps or 10,000, in one location or facilities all over the world, Armstrong can show you how to manage your steam system better than anyone.

ABOUT ARMSTRONG INTERNATIONAL

Founded in 1900, Armstrong International is a privately held, fifth-generation, family-owned company. Our unique heritage of knowledge, experience and insight enables us to serve you in ways no one else can. Often the first to market, Armstrong invented the inverted bucket steam trap and our company has been granted more than 70 patents on exceptional products, technology and software.

WE WANT YOU TO ENJOY WORKING WITH US

Building strong, lasting relationships with our customers is a top priority at Armstrong. We become an integral part of your team, consistently delivering on our promises and exceeding your expectations, while remaining transparent and simple to do business with. We want working with us to be an experience you enjoy, every single time.

SAGE UMT®

WIRELESS MONITORING

HOLISTIC APPROACH

CUSTOM PIPING SOLUTIONS

ONLINE COURSES AND TRAINING

TRAINED SPECIALISTS

RUGGED, DEPENDABLE STEAM TRAPS

BEST-IN-CLASS TRAP MANAGEMENT HAS MANY REWARDS

Armstrong's trap management program is an all-in-one solution, engineered to maintain the low trap failure rates necessary for: improving efficiency and safety; lowering energy use and environmental emissions; reducing costs for fuel, equipment and maintenance; and avoiding unplanned downtime. Proactive steam trap management is one of the most important steps you can take towards reaching a net-zero goal.

ACHIEVE TOP-LEVEL TRAP MANAGEMENT WITH ARMSTRONG—ONE STEP AT A TIME

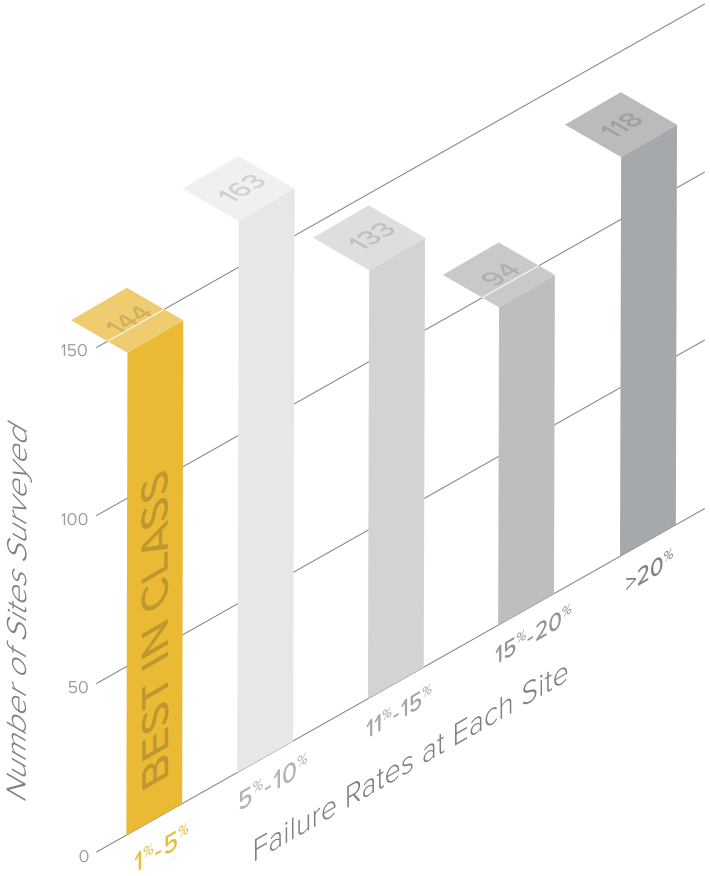
We offer a complete range of solutions to address your needs, including:

- Reliable, accurate trap surveys performed by Armstrong's trained, certified technicians
- Tools and training to help you conduct your own surveys more accurately and efficiently
- Expert studies to assess one or more issues on your site
- Energy audits to detect failed traps, determine the cause of any failures, and find ways to reduce your energy consumption
- Operations and maintenance services to help you manage your utilities more effectively
- Innovative products and technology for accurate system monitoring and effective steam trapping
- Access to real-time data and deep, comprehensive insight into your thermal utility system
- Detailed reporting, regular updates, and recommendations for trap replacements and system optimizations

THE ADVANTAGES OF ACCURATELY EVALUATING YOUR TRAP POPULATION CAN BE SIGNIFICANT

By conducting frequent surveys, replacing traps as needed, and addressing the root cause of any failures, Armstrong's trap management program helps customers significantly reduce failure rates and move into the best-in-class category of the chart.

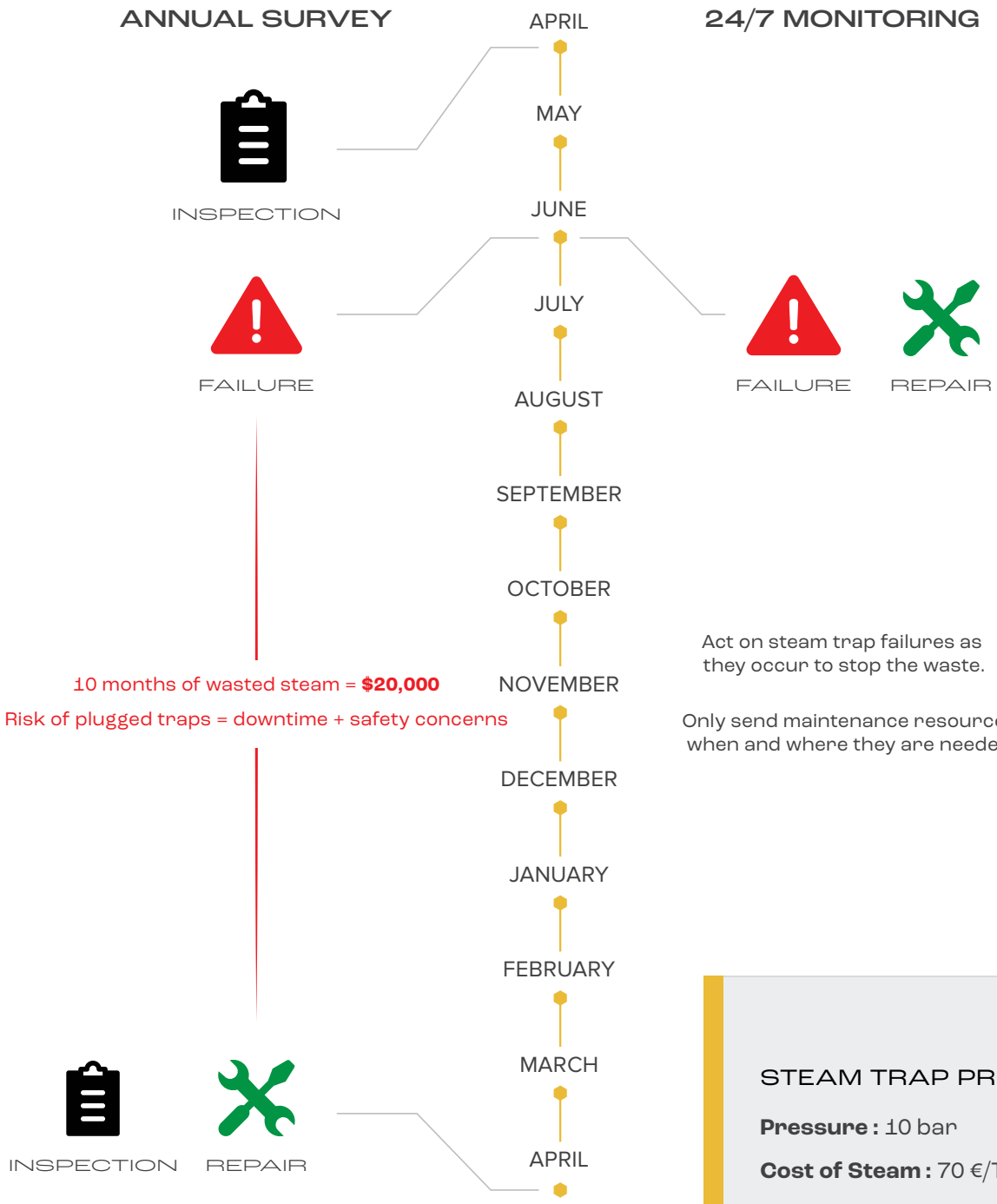
Shown here are leakage rates for sites using SAGE® that have been surveyed by Armstrong. Only 20% of these customers utilize a true trap management program that maintains failure rates at below 5%.



FAILURE IDENTIFICATION AND REPLACEMENT TIMELINE

EVERY YEAR, 5% TO 15% OF THE STEAM TRAPS IN SERVICE WILL FAIL.

PAYBACK FOR REPLACING THOSE FAILED TRAPS
IS TYPICALLY WITHIN 6 TO 10 MONTHS.



Act on steam trap failures as they occur to stop the waste.

Only send maintenance resources when and where they are needed.

STEAM TRAP PROFILE

Pressure : 10 bar

Cost of Steam : 70 €/T

Orifice Diameter : 1/4"

Application : Drip and Tracer

Blow-Thru Trap Loss : 2 912 kg/day

Annual Loss : 74 400 €

RELIABLE, ACCURATE STEAM TRAP TESTING IS ESSENTIAL

REGULAR TRAP SURVEYS ARE AN INTEGRAL PART OF COMPREHENSIVE TRAP MANAGEMENT

Armstrong's trap surveys provide:

- Evaluation of steam trap performance, such as proper functioning, leaking, plugged, cold, etc.
- Diagnosis of the root cause of any trap failures
- Visual assessment of valve status and condition
- Identification of any steam system issues around traps, such as: insulation defects, water hammer, condensate return, piping issues, back pressure, stall conditions

AVOID THE COSTLY CONSEQUENCES OF IRREGULAR OR INFREQUENT TRAP TESTING

Accurate, consistent surveys help prevent serious issues such as: water hammer, elevated energy waste and fuel consumption, frozen lines, production stoppages and unscheduled downtime, as well as increased equipment maintenance, repair and associated hours.

THREE OPTIONS FOR MORE EFFECTIVE TRAP SURVEYS

WHETHER YOU PERFORM YOUR OWN SURVEYS OR OUR CERTIFIED EXPERTS HANDLE THEM FOR YOU—YOU OWN YOUR DATA AND WE KEEP IT SECURE

We have the knowledge, tools and expertise necessary to help you maintain low trap failure rates and shorten the lead time between detection of an issue and replacement. By providing access to the real-time status of your steam traps, we make it possible to replace failed traps before they have a negative impact on your processes and efficiency. Whichever option you choose, your data is owned by you and protected by the high-level security of SAGE®.

Test Your Own Traps More Accurately And Efficiently—Armstrong Will Show You How

Armstrong's experts can train your personnel and contractors to consistently and reliably perform more accurate, efficient steam trap surveys using state-of-the-art tools and technology.

Armstrong's Trained, Certified Technicians Can Handle Trap Surveys For You

Our technicians are steam and condensate system experts, with extensive experience in testing thousands of steam traps each year. Armstrong survey techs have met all requirements and have satisfactorily completed all the appropriate Armstrong University coursework for their level.

Monitor Your Critical Traps Or Your Entire Steam Trap Population In Real Time, 24 Hours A Day

Wireless monitoring technologies work seamlessly with SAGE® to alert you of trap failures as they occur, allowing you to repair or replace failing traps before they cause any serious problems.

LEADING-EDGE SOLUTIONS TO MAKE YOUR LIFE EASIER

Armstrong offers durable, hardworking products, groundbreaking tools and technology, and complete steam and condensate system solutions to satisfy your most difficult challenges. Our products all work together to consistently deliver outstanding performance, longevity and value for your company, whatever industry you're in.

SAGE® SMART STEAM SYSTEM MONITORING AND DOCUMENTATION

SAGE® keeps you fully informed, 24 hours a day with regular updates, precise documentation, custom-filtered reports, and real-time alerts notifying you of any problems. SAGE® works seamlessly with our real-time monitoring products, ensuring that it always has access to the most current data. With SAGE®, you are the owner of your data and it's always protected by high-level security.

WHATEVER YOUR INDUSTRY, SAGE® IS THE INTELLIGENT SOLUTION YOU NEED

Our powerful software calculates steam loss data as well as C02 emissions and reports them using Armstrong's advanced steam system efficiency methodology relating to steam traps, that has been approved by the United Nations Framework Convention on Climate Change (UNFCCC).

- Survey steam traps quickly and accurately with SAGE® Mobile
- Maximize your equipment's reliability, efficiency and safety
- Customizable user experience
- Accessible on your smartphone, tablet and computer
- Real-time dashboard monitoring
- Multi-location views

Watch a video to learn more about SAGE® Steam Systems

SAGE UMT® WIRELESS, HANDHELD TESTER

Testing steam traps is as simple as pressing a button with SAGE UMT®. Armstrong's state-of-the-art, automatic trap testing device eliminates user error and raises the quality of trap testing to a new level. With SAGE UMT® any steam trap technician can survey traps quickly, easily and accurately on a regular basis, while information syncs seamlessly to SAGE®.

SAGE UMT® IS A FUNDAMENTAL TOOL IN YOUR COMPLETE TRAP MANAGEMENT PROGRAM

- Detects traps in good, cold and blow-through condition
- Piezoelectric acoustic sensor, developed and tuned specifically for the unique conditions found in steam traps
- Non-contact infrared temperature sensor
- RFID technology significantly reduces the time required to locate and identify traps
- SAGE UMT® works seamlessly with SAGE® Mobile and SAGE® Smart Utility System Management platform
- SAGE® immediately uploads data to the cloud where it's protected by high-level security and automated backups
- Customers own their own data

Watch a video to learn more about SAGE UMT®

ARMSTRONG PIPING SOLUTIONS

CUSTOM-ENGINEERED FOR EASIER MAINTENANCE, IMPROVED RELIABILITY AND PERFORMANCE, AND QUICKER UPDATES AND CHANGES

- **Compact Design and Savings** — Fewer leak points, reduced inventory and requires less time for installation and maintenance.
- **Increased Flexibility and Versatility** — Our space-saving piping solutions allow any manufacturer's two-bolt steam trap to be piped in-line with Armstrong's universal connector block for installation in virtually any piping configuration.
- **Faster, Easier Maintenance** With No System Shutdown — Repair and replace traps and components quickly and simply while the connector remains in-line.
- **Sustainability** — Even where welded connections are preferred, integrated or made-to-order flanged connections matching existing face-to-face dimensions are not discarded when traps are replaced.

REPLACING FAILED TRAPS IS QUICKER AND EASIER WITH ARMSTRONG'S TRAP VALVE STATIONS

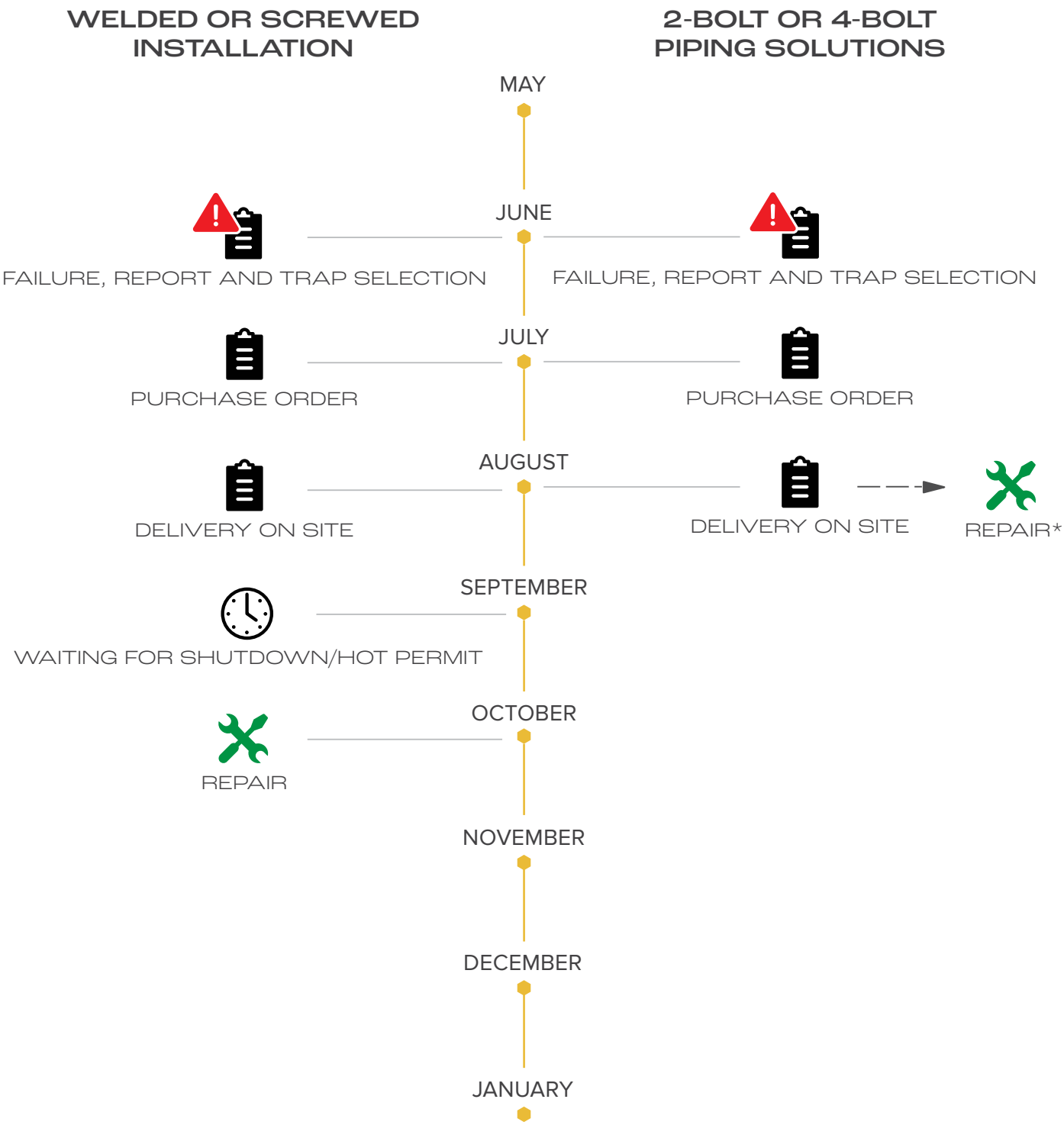
Our state-of-the-art Trap Valve Stations are designed to eliminate risk, improve safety and save space while allowing simpler steam trap testing and fast, easy trap replacement—with no need for a system shutdown.

RUGGED, DEPENDABLE STEAM TRAPS

Armstrong's comprehensive range of steam traps provides energy efficiency, minimal steam loss, corrosion resistance, air and CO2 venting, operation against back pressure, freedom from dirt problems, and long, reliable service. Our specialists can ensure that your steam traps are all properly selected, sized, placed, installed and in working order, for the most effective, energy-efficient steam system.

Watch a video to learn more about the TVS6000

HOW TO REPLACE A TRAP QUICKLY



* *Standardizing to a single trap type and keeping inventory on-hand allows you to forgo the Purchase Order and Delivery On Site steps. You simply change the trap when the failure occurs. Replacing a trap in days instead of months will increase your energy savings.*

24/7 TRAP MONITORING

FROM CRITICAL PROCESS TRAPS TO YOUR ENTIRE STEAM TRAP POPULATION, WIRELESS MONITORING RAISES TRAP MANAGEMENT TO A HIGHER LEVEL

As a crucial tool in your advanced trap management program, wireless, real-time monitoring supports your goals for decarbonization by helping you significantly reduce wasted energy and excess emissions. It's easy to install, and compatible with all makes and models of steam traps.

STEAM TRAP MONITORING WORKS SEAMLESSLY WITH SAGE®

Armstrong brings you breakthrough technologies to deliver continuous, real-time insight. You'll receive alerts on trap failures as they occur, enabling you to repair or replace failing traps before they create serious steam system issues.

SteamEye®

AIM™
ARMSTRONG INTELLIGENT MONITORING

STEAM TRAP MONITORING

NAME	STEAMEYE*		AIM	
MODEL	4300	4700	ST5700	ST6700
WIRELESS PROTOCOL	Proprietary		WirelessHART	ISA100
DATA COLLECTION	On-Site or Cloud		On-Site or Cloud	
GATEWAY	Armstrong		Centero/ Emerson/ Honeywell	Centero/ Honeywell/ Yokogawa
NUMBER OF SENSORS PER GATEWAY	2,000		100-500	
MINIMUM STEAM PRESSURE	0 psig (0 barg)	15 psig (1 barg)	15 psig (1 barg)	
MAXIMUM PROCESS TEMPERATURE	500°F (260°C)	600°F (315°C)	824°F (440°C)	
MAXIMUM STEAM PRESSURE	600 psig (42 barg)	1500 psig (104 barg)	1500 psig (104 barg)	
IP	IP64		IP66	
HAZARDOUS LOCATION	Not rated		Class I, Div 1 / ATEX Zone 0	
BATTERY	Duracell 123A		Epoxy Lithium-metal battery pack	
SAGE CLOUD	✓		✓	
SAGE ON-SITE	✓		✓	
CONNECTIVITY TO SAGE	Ethernet		Ethernet with Proxy	
ANNUAL SUBSCRIPTION	X		X	
PRICE	$		$$$	

** Not available in EU.*

ONLINE COURSES, TRAINING AND SEMINARS

ARMSTRONG UNIVERSITY GIVES YOU EASY, ONLINE ACCESS TO MORE THAN A CENTURY OF IN-DEPTH KNOWLEDGE AND EXPERIENCE

At Armstrong, we're committed to sharing all that we've learned to help you make the smartest possible decisions for your company. We offer an extensive array of online education, training and seminars, as well as on-demand webinars and educational packages that provide industry-specific content and learning opportunities to help you address tough, everyday issues.

Customized Online Courses—Armstrong University can customize an online curriculum for your organization, to be delivered at your site or one of our global learning centers, whichever is most convenient.

Introductory, Intermediate and Advanced Courses—Choose from over 200 online courses in steam, humidification, hot water, water treatment, refrigeration, flow measurement, environmental health and safety, and more.

Onsite training opportunities are available in our state-of-the-art global learning centers.

RECOMMENDED COURSES FOR TRAP MANAGEMENT

Steam Traps—Learn about: the purpose of steam traps, steam trap types, how to size and select traps, and typical maintenance and preventative measures.

Testing Steam Traps—Learn about: reasons for steam trap testing, economics of energy savings associated with repair or replacement of failed traps, how to test common types of traps and recommended frequency.

College of Steam Users Package—Includes 12 courses. Lessons cover typical steam users in industrial and institutional environments. Other areas of focus include heat exchangers, steam tracing, control valves, steam traps and more.

O&M Best Practices for Steam Users—Topics include: the importance of steam user quality, identification of key performance indicators, best practices for steam users, equipment maintenance and routine checks, and key attributes of standard operating procedures.

Water Hammer—Find out about the basic mechanics of water hammer; learn to identify conditions conducive to water hammer and how to apply preventative solutions.

Smart Solutions—This course will discuss: smart solutions and industry applications, how smart solutions can help identify system issues and reduce energy costs, the basics of wire technology, and the value of steam asset management.

CONTACT ARMSTRONG

If you're interested in having a certified Armstrong expert manage your steam trap population for you, or you're ready to know more about tools and training to start your own trap management program, contact us for details.

To get more information or to find your representative, visit **armstrong**international.eu

INTELLIGENT THERMAL UTILITIES SOLUTIONS FROM A GLOBAL
LEADER IN ENERGY MANAGEMENT AND ENJOYABLE EXPERIENCES

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