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Роботы (инструменты) для осмотра и анализа

ТЕХНИЧЕСКИЕ ХАРАКТЕРИСТИКИ

SM-23G

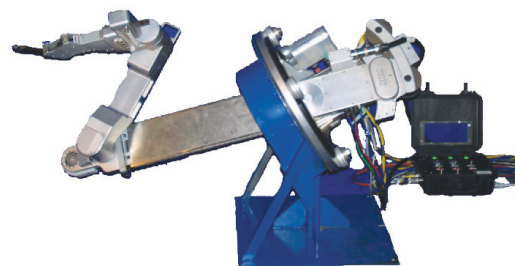
Remote Inspection Robot

Zetec's SM-23G remote fixture mechanically positions inspection probes or custom tooling at a steam generator's tubesheet. The SM-23G incorporates a motorized manway for fast, accurate fixture installations. Zetec fixtures can inspect 100% of the tubesheet without exclusion/no test zones or manually moving the fixture. Additionally, the SM-23G incorporates the auto-latching tool changer into the tool head.

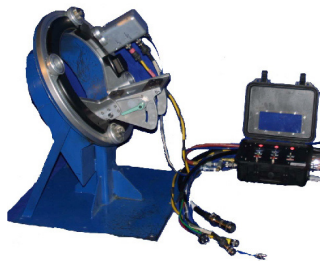
Installation of the SM-23G using five major components - the manway mount, support plate, trunk, arm and camera head - is specifically designed to be easily handled and assembled by two operators.

FEATURES & BENEFITS

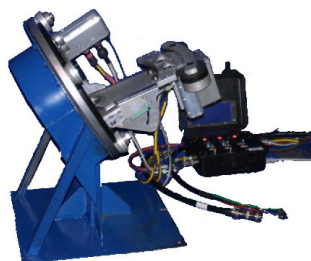
- ▶ Modular Form Factor
 - Five modules increases reliability and simplifies handling
- ▶ Unique design
 - No cables or cords enter the bowl
- ▶ Simplified Set-up and Tear-down
 - Manway assembly has a Pneumatic Locking system for quick installation and removal
 - Separate Manway/Trunk component for easy installation
 - All-in-one extruded trunk with internal tilt mechanisms
- ▶ Non-entry fixture
 - No manual entry required
- ▶ Mechanical drive swing, roll, and tilt for auto-leveling
- ▶ Real-time graphic representation
- ▶ Machine Vision



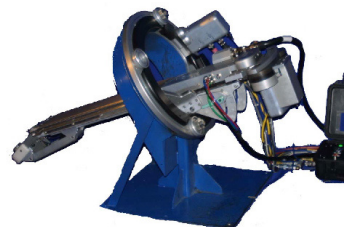
The modular design of the SM-23G allows the robot to be easily installed by one person



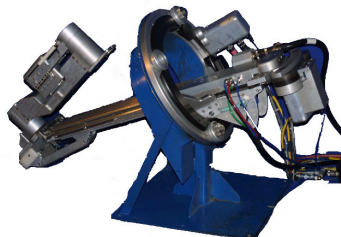
Installation of the Manway



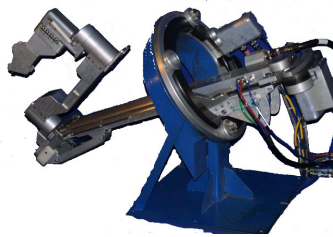
Installation of the Support Plate



Installation of the Trunk



Installation of the Arm/Pole



Installation of the Toolhead

Materials

Stainless Steel & Aluminum

Motor Types

Arm and Pole:	Brushed DC motor
Roll and Swing:	Brushless Servo motor
Lift, Tilt, Guidetube, Camera:	24 volts DC
Light Source:	LED Array
Controller:	UFC-1

Weights

Manway	60 lbs (27.2 kg)
Support Plate	33 lbs (15.0 kg)
Trunk	61 lbs (27.7 kg)
Camera Arm (w/out Camera Head)	33 lbs (15.0 kg)
Camera Head/Guidetube Assembly	4 lbs (1.8 kg)
Arm/Pole	30 lbs (13.6 kg)
Toolhead	3 lbs (1.3 kg)
Total	224 lbs (101.6 kg)

Ordering Information

SM-23G Remote Inspection Robot

Robot Modules

Installation Toolkit

10' Fixture Breakout Cable

Operating Guide (English)

Shipping Case

1 Year Warranty (Contact Zetec for details)

Additional Accessories:

UFC-1 Controller

10D4 Probe Pusher

Modular Pusher for Custom Configurations

FEATURES & BENEFITS

Performance Features

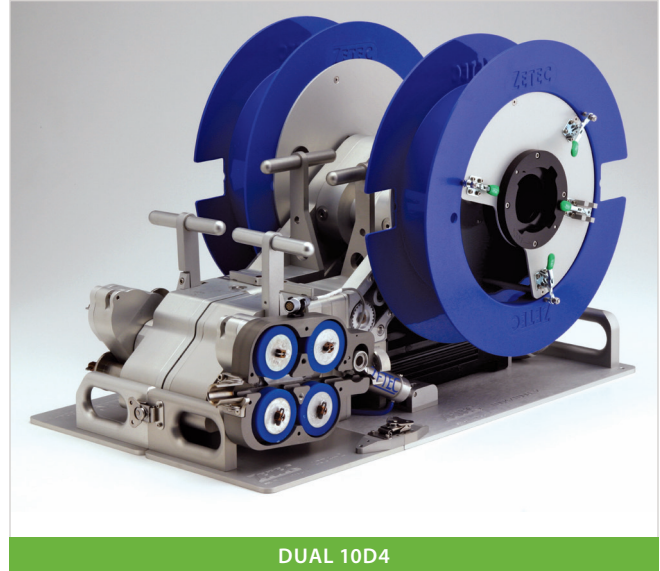
- ▶ Traction Control
- ▶ Wheel configuration reduces stress and prevents probe shaft kinking
- ▶ Heavy-duty construction

Probe Speed

- ▶ 10D4: 0 – 95 inches/second

Supports

- ▶ PM-3 and PM-3A Motor Controllers
- ▶ 10D Power Supply at 115 or 220VAC (factory set)
- ▶ 4-pin, MRPC, Multipurpose, and Universal Slip Rings



PRECISE AND INNOVATIVE MOTION CONTROL

Zetec's 10D4 Probe Pusher is completely modular. Its design consists of two main modules—the Pusher Head and Drive-Gearmotor Take-Up assemblies. Modules are interchangeable as well as configured with different options to optimize the probe pusher for its specific application.

Similar to the Zetec standard 10D, two mirror-image probe pushers combine to form a compact dual unit or separate easily for a convenient space saving layout.

Access when servicing the drive wheels or changing probes is straight-forward without any extra component disassembly. With versatility in mind, probe control can be either independent or simultaneous, depending on your selected test plan.

Powered by a DC Brushless Servo Motor with resolver feedback, the 10D4 Probe Pusher allows precision control of the probe's travel speed. Innovative motion control circuitry provides smooth transition between low- and high-speeds without time-consuming gear changes.

The 10D4 modular design has a tracking encoder accessory available that enables a new pushing feature—Traction Control. Traction Control is a closed-loop motion control process that optimizes push force while preventing premature probe shaft failures. Traction Control monitors the probe speed as well as the drive wheel speed. If Traction Control detects a discrepancy between the two speeds, it automatically adjusts drive speed and wheel pressure to maintain optimum traction on the probe shaft with minimal wear.

10D4 Probe Pusher

MODULAR PUSHER FOR CUSTOM CONFIGURATIONS

Ordering Information

PART #	SHORT DESCRIPTION
10D4 Pusher Head	
10024216	10D4 Pusher Head — Right-Hand Unit
10024218	10D4 Pusher Head — Left-Hand Unit
10D4 Drive Gearbox Take Up	
10024900	10D4 Drive-Gearbox Take-Up — Right-Hand Unit
10024899	10D4 Drive-Gearbox Take-Up — Left-Hand Unit
10D4 Power Supply	
10024799	10D4 Power Supply III for PM3A
10038276	10D4 Power Supply III for MIZ-85ID
10053657	10D4 Power Supply III for MIZ-200
10D4 Accessories	
10024805	10D4 PM3A Controller
5-000376	ZEC-ACC-MP-36PIN_UNIV_SLIP_RING_90D
10013316-1	ZEC-ACC-MP-36P_66C_SLIP_RING_90DEG
2-501966	ZEC-ACC-10D4-TENSIONER
10004561-1	ZEC-SP-10D-FRONT_CONN_J-LOCK_RS
10004561-4	ZEC-SP-10D-FRONT_CONN_J-LOCK_LS
10007842-1	10D WHEEL REMOVAL TOOL
10008353-1	ZEC-ACC-10D4-VAC_COVER_-1RH_MAN
10008353-2	ZEC-ACC-10D4-VAC_COVER_-2LH_MAN
10024904	ZEC-ACC-10D4-VAC_COVER_-1RH_1.50
10024906	ZEC-ACC-10D4-VAC_COVER_-2LH_1.50
10011860-1	ZEC-SP-10D4-TFENDER_-1RH_1/4IN
10011860-2	ZEC-SP-10D4-TFENDER_-1RH_5/16IN
10011860-3	ZEC-SP-10D4-TFENDER_-1RH_11MM
10012419-2	ZEC-SP-10D8-TFENDER_-1RH_5/16IN
10011860-4	ZEC-SP-10D4-TFENDER_-2LH_1/4IN
10011860-5	ZEC-SP-10D4-TFENDER_-2LH_5/16IN
10011860-6	ZEC-SP-10D4-TFENDER_-2LH_11MM
10012419-5	ZEC-SP-10D8-TFENDER_-2LH_5/16IN
10024530	ZEC-SP-10D-POWER_SUPPLY_SHIP_CASE
10024796	ZEC-SP-10D-MOTOR_WIRED
10024806	ZEC-SP-10D-SPOOL_16IN

PART #	SHORT DESCRIPTION
10D4 Spare Parts Kit	
10012963	10D4 Drive Gearbox / Take Up Maintenance Kit
10038276	10D4 Pusher Head Maintenance Kit
10053657	10D4 Service Tool Kit
10D4 Cables	
10024800	ZEC-CBL-10D-MTR_PWR_W/AIR_10FT
10024919	ZEC-CBL-10D-MTR_PWR_W/AIR_25FT
10024920	ZEC-CBL-10D-MTR_PWR_W/AIR_50FT
10024921	ZEC-CBL-10D-MTR_PWR_W/AIR_75FT
10024922	ZEC-CBL-10D-MTR_PWR_W/AIR_100FT
10024923	ZEC-EXT-10D-MTR_PWR_W/AIR_10FT
10024924	ZEC-EXT-10D-MTR_PWR_W/AIR_25FT
10024925	ZEC-EXT-10D-MTR_PWR_W/AIR_50FT
10024926	ZEC-EXT-10D-MTR_PWR_W/AIR_75FT
10024927	ZEC-EXT-10D-MTR_PWR_W/AIR_100FT
10025711	ZEC-EXT-10D-MTR_PWR_W/AIR_150FT
10024801	ZEC-CBL-10D-MTR_RES_10FT
10024911	ZEC-CBL-10D-MTR_RES_25FT
10026023	ZEC-CBL-10D-MTR_RES_30FT
10024912	ZEC-CBL-10D-MTR_RES_50FT
10024913	ZEC-CBL-10D-MTR_RES_75FT
10024914	ZEC-CBL-10D-MTR_RES_100FT
10024798	ZEC-EXT-10D-MTR_RES_10FT
10024915	ZEC-EXT-10D-MTR_RES_25FT
10024916	ZEC-EXT-10D-MTR_RES_50FT
10024917	ZEC-EXT-10D-MTR_RES_75FT
10024918	ZEC-EXT-10D-MTR_RES_100FT
10025712	ZEC-EXT-10D-MTR_RES_150FT
10024802	ZEC-CBL-10D-PWR_SUP_TO_PM-X_MTR_CTRL_10FT
10024907	ZEC-CBL-10D-PWR_SUP_TO_PM-X_MTR_CTRL_25FT
10024908	ZEC-CBL-10D-PWR_SUP_TO_PM-X_MTR_CTRL_50FT
10024909	ZEC-CBL-10D-PWR_SUP_TO_PM-X_MTR_CTRL_75FT
10024910	ZEC-CBL-10D-PWR_SUP_TO_PM-X_MTR_CTRL_100FT
10038273	ZEC-CBL-MIZ-85_TO_10D-MTR_CTRL_10FT
10038238	ZEC-CBL-MIZ-85_TO_10D-MTR_CTRL_25FT

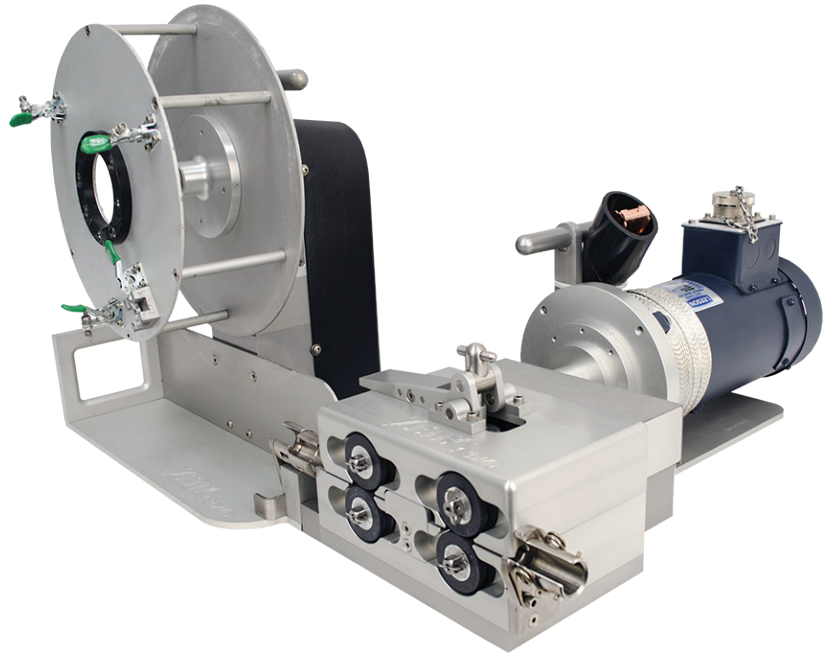
High-Speed 3D Probe Pusher

Superior Performance For Inspecting Bop Tubing

The High-Speed 3D Probe Pusher System is a variable-speed probe driver with separate control box and power supply for inspecting BOP tubing.

FEATURES & BENEFITS

- ▶ Independent forward and reverse control
- ▶ Variable speed settings and constant probe speed regulation
- ▶ High torque
- ▶ Drive probe speeds up to 83 in/sec



Zetec's High-Speed 3D Probe Pusher

More ways to find more defects in less time

Designed for remote inspection of heat exchangers and condensers, the 3D variable-speed probe driver has independent controls for forward, reverse, and jog speeds. The powerful 3/4 horsepower motor offers adjustable speed rates that remain constant during operation. Incorporating high-quality bearings and precision ground shafts, the 3D is built for endurance. Corrosion-resistant, hard-anodized surfaces prevent pitting from harsh environments.

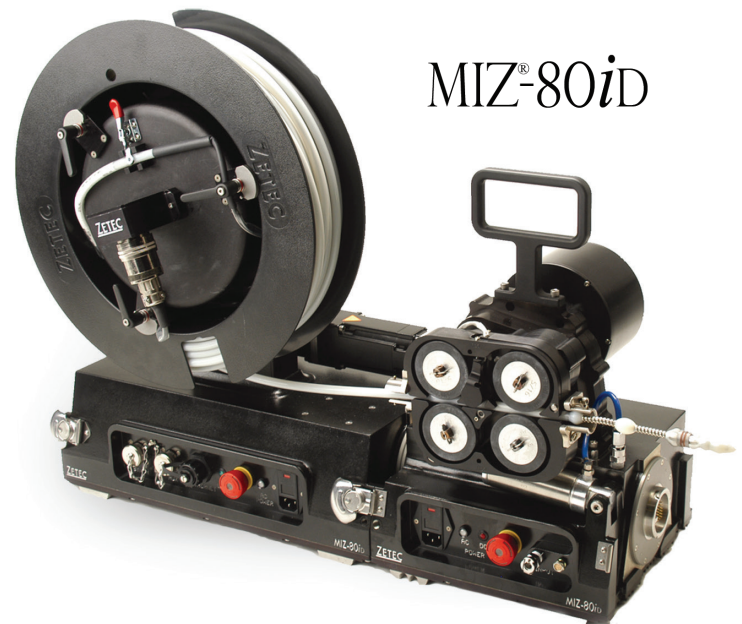
The complete High-Speed 3D Probe Pusher system includes a motor controller, power supply, and the interconnecting cables. The controller provides independent forward and reverse controls, as well as variable speed settings and constant probe speed regulation. With this system, you can drive the probe at speeds from 1 to 83 inches/second.

MIZ[®]-80iD

Integrated Data Acquisition System

FEATURES & BENEFITS

- ▶ All-in-one eddy current instrument, probe pusher, and controller reduces system setup from hours to minutes
- ▶ Supports all common steam generator inspection techniques
- ▶ Integral probe interface module (PIM) eliminates the need for probe adapters
- ▶ Integral eddy current instrument improves data quality by the elimination of probe extensions and slip-rings
- ▶ MIZ-iD *Intelligent Device* technology provides automatic probe configuration validation with MIZ-iD equipped probes



INTEGRATED PERFECTION

The MIZ-80iD has revolutionized eddy current data acquisition for tubing inspections by providing an integrated eddy current instrument, probe pusher, and control system into one lightweight and efficient package. This innovative approach eliminates complexities associated with deployment, setup, and maintenance resulting in lower costs of operation and reduced human radiation exposure.

A modular design allows the MIZ-80iD to quickly be separated into three modules for ease of handling and transportation. Advanced locating features manage probe life by developing motion profiles to control speeds and positioning of the probes to reduce the risk of probe damage.

MIZ[®]-80iD

The MIZ-80iD is ready to revolutionize your inspection experience.

General Specifications

- ▶ **Power:** 100-240 VAC 50-60Hz
- ▶ **Operational Temperature:** 32°F to 113°F (0°C to 45°C)
- ▶ **Storage Temperature:** -4°F to 140°F (-20°C to 60°C)

MIZ-80iD Eddy Current Instrument

- ▶ **Weight:** 7.0lb (3.18kg)
- ▶ **Size:** 13.0" dia x 7.0"W (33.0 x 17.8 cm)
- ▶ **Frequency Range:** 20 Hz to 1 MHz
- ▶ **Drive:** 0 – 20 Vpp
- ▶ **Supported Probe Technology:**
Array Probes, Bobbin Probes, and MRPC[®]
- ▶ **Channel Capability:**
40 Continuous Mode
512 Multiplex
640 Super-Multiplex
- ▶ **Gain:** 23-53 dB in 1 dB steps, variable
- ▶ **Maximum Sample Rates:**
Continuous Mode: 40,000 Hz
Multiplex & Super-Multiplex : 20,000 Hz

MIZ-80iD Take-up Reel

- ▶ **Weight:** 40.2 lb (18.2 kg)
- ▶ **Size:** 21"H x 18"L x 11"W (53.3 x 45.7 x 28.0 cm)
- ▶ **Inputs/Outputs:** Ethernet 10/100Base T

MIZ-80iD Pusher Drive

- ▶ **Weight:** 43.8 lb (19.9 kg)
- ▶ **Size:** 18"H x 11"L x 11"W (45 x 28 x 28 cm)
- ▶ **Probe Speeds:**
X-Probe 40 inches/second (101 cm/second)
Bobbin 95 inches/second (241 cm/second)
MRPC +Point 2 inches/second (5 cm/second)



Ordering Information

MIZ-80iD Eddy Current Inspection System Includes:

- ▶ 5/16" to 3/8" Fender and Wheels
(J-lock or Push-Button conduit attach)
- ▶ Operating Guide
- ▶ MIZ-80iD Certification
- ▶ 2 Power Cords, Shop Air Adaptor
- ▶ Shipping/Storage Cases
- ▶ Pusher Wheel Safety Cover

Accessories and Consumables:

- ▶ External Sense Coil, Adaptor, and cables
- ▶ Drive Wheels (Contact Zetec Customer Service for Correct Size)
- ▶ 18-inch Quick Release Spool
- ▶ Pre/Post Calibration Kit
- ▶ Manual Wheel Tensioner
- ▶ CE Safety Protection Kit

Zetec: Innovation That Delivers Results

For nearly 50 years, Zetec has advanced NDT standards and science. We provide new insight and control through inspection solutions that protect our customers' most important assets and ensure the quality of their products. By integrating design and engineering with our own manufacturing, Zetec delivers solutions that optimize productivity, safety and total cost of ownership.

ZR-100

Inspection and Repair Robot

FEATURES & BENEFITS

- ▶ Quick, accurate and reliable
- ▶ Smallest footprint and most agile robot available
- ▶ Multiple robots conveniently controlled from EddyNet/AQ software
- ▶ A completely non-entry installation that is both fast and easy
- ▶ Supports Eddy Current and Repair Tools
- ▶ Easily configured for various steam generator models



WHY YOU NEED THIS ROBOT

Field proven to be faster and easier to use than any other inspection or repair robot. You can install and calibrate two ZR-100 robots in less than 20 minutes. Run up to two robots and four Zetec probes in each channel head. Operate each robot and dual probes with the MIZ-80iD integrated acquisition system simultaneously using EddyNet/AQ software.

Efficiently inspect every tube and analyze data quickly with EddyNet®/AN or RevospECT™. Change tools remotely without removing the robot for complete and efficient inspection to repair operations. Reconfigure the robot in less than an hour for a different steam generator inspection.

ZR-100

FOR NUCLEAR STEAM GENERATOR INSPECTION & REPAIR

Quick, Accurate and Reliable

- ▶ Can quickly inspect every tube in the steam generator faster than any other robot
- ▶ All eddy current and repair tools can reach every steam generator tube
- ▶ Field proven in horizontal and vertical OTSG in-service inspections and vertical pre-service inspections

Intelligent Motion

- ▶ Allows for multiple robots within same vessel for high productivity
- ▶ Multi-robot awareness system intelligently coordinates multiple robots within same vessel to avoid collisions
- ▶ Multi-robot awareness system coordinates probing to avoid pushing a probe into an adjacent plenum robot

Easy and Fast Installation

- ▶ ZR-100 installation system and the EddyNet™/AQ install wizard allow for an easier and faster installation than any other robot
- ▶ The installation process is based on controlled science and process to be less demanding of the operator
- ▶ The zero entry installation positions the operators for the lowest dose achievable during installation
- ▶ Allows you to be collecting data from up to four MIZ-80s in less than 20 minutes from platform arrival

Supports Eddy Current and Repair Tools

- ▶ Zetec's dual guide tube tool allows for testing of 2 tubes simultaneously per ZR-100
- ▶ Quickly change to roll plugging, TIG shrinker insert, plug puller insert, stake installation and plug inspection tools
- ▶ Up to 30 lb tool payload



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