581 Rapid Transfer Device (RTD)

Instruction Manual

TELEDYNE ISCO
A Teledyne Technologies Company

Foreword

This instruction manual is designed to help you gain a thorough understanding of the operation of the equipment. Teledyne Isco recommends that you read this manual completely before placing the equipment in service.

Although Teledyne Isco designs reliability into all equipment, there is always the possibility of a malfunction. This manual may help in diagnosing and repairing the malfunction.

If the problem persists, call or e-mail the Teledyne Isco Technical Service Department for assistance. Simple difficulties can often be diagnosed over the phone.

If it is necessary to return the equipment to the factory for service, please follow the shipping instructions provided by the Customer Service Department, including the use of the **Return Authorization Number** specified. **Be sure to include a note describing the malfunction.** This will aid in the prompt repair and return of the equipment.

Teledyne Isco welcomes suggestions that would improve the information presented in this manual or enhance the operation of the equipment itself.

Teledyne Isco is continually improving its products and reserves the right to change product specifications, replacement parts, schematics, and instructions without notice.

Contact Information

Customer Service

Phone:	(800) 228-4373	(USA, Canada, Mexico)
	(402) 464-0231	(Outside North America)
Fax:	(402) 465-3022	
Email:	IscoCSR@teledyne.com	

Technical Support

Phone:	(800) 775-2965	(Analytical)
	(866) 298-6174	(Samplers and Flow Meters)
Email:	IscoService@teledyne.com	
Return equipment to:	4700 Superior Street, Lincoln, NE 68504-1398	

Other Correspondence

Mail to:	P.O. Box 82531, Lincoln, NE 68501-2531
Email:	IscoInfo@teledyne.com
Web site:	www.isco.com

☑ *Note*

This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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Section 1 Operation

1.1 Introduction

The Isco Rapid Transfer Device (RTD) is a data collection unit designed for tough field conditions. Its maintenance-free, pocket-sized design requires no battery and is very durable. Using the RTD is as easy as plugging it into a 6712 Sampler, 4100 Series Flow Logger, or 4200 Series Flow Meter. The RTD automatically collects the available data reports from multiple instruments and saves each report separately in its 900 kilobytes of storage space.

Back in the office, the RTD connects directly to your PC with its own power cable and Isco software. With a few keystrokes, the data collected from every new site will be uploaded to files on your PC's hard drive. You may choose between Isco SAM-PLINK®, TEXTLINK™, or Flowlink 4® software, depending on how much detail and flexibility you require in your reports. When the data reports have been uploaded from the RTD at least once, the RTD is ready for use again in the field.

Although the RTD is rugged, it is an electronic device and should be protected from extreme heat or cold, such as inside a vehicle. Note the storage and operating temperature ratings in Table A-1 (Appendix A Technical Specifications).

1.2 Collecting Data with the RTD

The RTD has three colored indicators on one end. These lights report the status of the RTD and show the result of each data transfer. Table 1-1 explains the purpose of each light.

To collect data:

1. Plug the RTD into the instrument's interrogator connector. The interrogator connector is labeled with the interrogator icon (shown left).

2. While the RTD is operating, the yellow light will blink to indicate power, then the green light will blink as the data reports are collected.

3. The green light will remain constant when the transfer is successfully completed. With this light constant, you can be sure that all the data has been collected and stored within the RTD.

Interrogator Icon

☑ *Note*

The RTD is powered by the instrument to which it is connected. To prevent unnecessary power consumption from battery-powered instruments, remove the RTD as soon as the data transfer is complete.

The red light reports two other RTD conditions: *Memory Full* and *Transfer Error.*

A constant red light indicates a *Memory Full* condition. There is not enough RTD memory available to collect data reports from another instrument similar to the one now connected. Check the green light to see if the last transfer was successful. Uploading the data reports from the RTD to your PC files will allow the RTD to reuse the memory.

A blinking red light reports a *Transfer Error.* The RTD was unable to complete the transfer. Unplug the RTD, wait briefly, and repeat step 1. If that does not work after several tries, check the voltage level of the instrument's power supply, then make sure the connection between the RTD and the instrument is clean and dry. If this fails, call the Isco Customer Service Department.

Table 1-1 Reading the Indicators	
LIGHT	**INDICATES**
YELLOW **Flashing** ● ● ● ●	**Power** – The RTD is on and running its program.
GREEN **Flashing** ● ● ● ●	**Transfer in Progress** – An average file transfer for a 6712 Sampler will take several minutes. Large transfers will take even longer.
Solid ▬▬▬	**Transfer Complete** – Disconnect the RTD when this light is solid.
RED **Flashing** ● ● ● ●	**Transfer Error** – Unplug the RTD and try again.
Solid ▬▬▬	**Memory Full** – The memory is almost full. Data collected by the RTD must be uploaded to a computer file before collecting more data.

1.2.1 Slate Partition Reset

When the green light stops blinking, the RTD resets the instrument's slate mode partitions. The 6712 Sampler's memory partitions are an exception. To reset the sampler's partitions, refer to the *6712 Sampler Instruction Manual*.

1.3 Uploading Data to a PC

You can upload the data collected by the RTD to your personal computer with Isco software. The software you choose will depend on your needs once the data is uploaded.

- SAMPLINK – uploads each instrument's text reports for easy printing and viewing.
- TEXTLINK – uploads text reports and detailed data for printing and viewing. It can also format the detailed data for use with your office software.
- Flowlink 4 – uploads text reports and detailed data for complete management of your monitoring data. You control the data as site files in a database. It is ideal for analyzing, viewing, editing, and printing. In addition, you can produce custom graphs, summaries, and reports.

Your personal computer must have a serial RS-232 port and Isco's SAMPLINK, TEXTLINK, or Flowlink software installed.

Connect the RTD to your PC with the RTD Power Cable. This cable powers the RTD through a wall- outlet connection, and links the RTD to the PC's serial port.

To upload text reports with SAMPLINK:

1. Run SAMPLINK (version 3.00 or higher) by typing **SAMPLINK** at the DOS prompt and pressing **Enter**.

2. Answer the prompts on the screen.

3. SAMPLINK stores data in files with an ".smp" file name extension.

To upload text and data with TEXTLINK:

1. Run TEXTLINK by typing **TEXTLINK** at the DOS prompt and pressing **Enter**.

2. Answer the prompts on the screen.

3. Save the report data to a file or send it directly to a printer.

Before TEXTLINK saves the data to a file, you must specify a format with the file name extension. A "**.TXT**" file name extension will create an ASCII text file for word processing. A "**.CSV**" file name extension will create a comma separated values file formatted for importing your data into spreadsheets.

To upload data with Isco's Flowlink 4: Refer to instructions in the Flowlink Tutorial.

1.3.1 Non-Isco Data Transfer Programs

You can also upload text reports to your PC using a serial-communications program. Use the following configuration settings:

- 9600 baud
- 1 stop bit
- 8 data bits
- No parity

To transfer data with your serial communications program:

1. Run your communications program. When the program opens communications with the RTD, you will see a ? (question mark) at half-second intervals on the monitor.

Press the ? key a few times until a line identifying the RTD appears and the cursor follows a > prompt.

2. Upload the reports using one of the following options:

    a. Set your program to capture a text file. At the > prompt, type **REPORT** in capital letters and press the **Enter** key. The RTD will transmit new reports using xon/xoff protocol. The memory space occupied by these reports in the RTD is now available for collecting new files from a sampler.

    b. Set your program to capture a text file. At the > prompt, type **REPORT DUMP** using capital letters and press the **Enter** key. The RTD will transmit all new and old text reports still in memory using xon/xoff protocol. Use this option to recover old files no longer available with REPORT. A large amount of data will be transmitted. The memory space occupied by the new reports in the RTD is not released by this option. To free the memory space, the REPORT option should be used before collecting new files.

3. When the RTD transfer is complete, it sends a ? at half-second intervals. At this point you can safely disconnect the RTD and exit the communications program.

1.4 RTD Data Capacity

The RTD can collect data from a maximum of 255 Isco instruments, or until the maximum storage capacity of over 900,000 bytes is reached. When you reach either maximum value, the RTD will not accept more data until the data already collected is uploaded to a PC. After the data reports are successfully uploaded from the RTD, the storage space occupied by those reports is made available to collect new data from field instruments.

☑ *Note*

Most Isco instruments allow you to enable or disable certain portions of the data reports. You may save substantial RTD storage space by disabling the outputs you do not need.

The number of instruments you can interrogate with a single RTD depends on each instrument's partition setup and the number of events in each text report. For example, if you have several 4250 Flow Meters programmed to record level and velocity at a five minute interval, the RTD would be able to collect 32 of these sites at 16 day service intervals.

Another example would be several 4150 Flow Loggers recording level, velocity, flow, and rainfall at two minute intervals. If you collected data every 32 days, the RTD could store the data from four of these instruments. However, if you did not set up a flow partition and used Flowlink 4 to calculate the flow rate instead, the RTD would then be able to collect data from seven instruments. The number of instruments from which you can collect

will vary with each application. It is possible to calculate the number of instruments, determine field service intervals, or a need for additional RTDs with the information found in the appendix – *RTD Storage Calculation.*

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Section 2 Parts and Maintenance

2.1 RTD Software Upgrades

The RTD uses Flash memory to store its software. With Flash technology, you can upgrade your RTD's software without sending it back to the factory or replacing a chip. Connect the RTD to a computer with the RTD Power Cable, and follow the instructions received with the Flash Update program.

2.2 Cleaning/Repairs

The RTD should only require cleaning with soap and water if necessary. Keep the connector clean and dry.

The RTD is not repairable; the internal components are completely encapsulated for durability. If for some reason an RTD fails to operate properly, you may be able to fix it by updating its internal software.

2.3 Accessories

581 Rapid Transfer Device (RTD) *(Includes RTD, RTD Power Cable, and instruction manual)* 68-6700-056

581 RTD *(Includes RTD and instruction manual)* 60-9004-027

581 RTD Power Cable 60-9004-077

581 RTD Instruction Manual 60-9003-085

Sampler Extension Cable (25 ft.) 60-3774-012

SAMPLINK® 60-3774-013

TEXTLINK™ 60-2544-045

Flowlink 4® *(Includes software and instruction manual)* 60-2544-052

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Appendix A Technical Specifications

The following table contains technical data for the 581 Rapid Transfer Device, including physical dimensions, material, operational and storage temperatures, and power, communication, and storage specifications.

| Table A-1 Technical Specifications for the 581 Rapid Transfer Device (RTD)	
General Notes: 1. All weights may vary ± 0.2 lb (± 0.1 kg). 2. All dimensions may vary ± $\frac{1}{4}$ inch (± 0.64 cm).	
Weight:	0.44 lbs (0.2 kg)
Dimensions:	Length: 5.2 inches (13.2 cm) Width: 3 inches (7.6 cm) Thickness: 1.9 inches (4.9 cm)
Material:	Epoxy
Operational Temperature:	32° to 120^oF (0° to 49^oC)
Storage Temperature:	0° to 140^oF (-18° to 60^oC)
Enclosure:	Totally encapsulated: NEMA 4X and 6, IP68
Power:	12 volts DC provided by Isco instruments or RTD Power Cable. 40 mA average current draw.
Memory:	Non-volatile programmable Flash. Can be field updated through the RTD Power Cable.
Communications:	RS-232 serial, 8 data, no parity, one stop, 9600 baud.
Storage Capacity:	943 kilobytes (with Version 2.0 Software)

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Appendix B RTD Storage Calculation

It is possible to calculate how much data the RTD will collect from a particular instrument. This is useful when figuring how much memory is available for other instruments, scheduling service intervals, determining a need for additional RTDs, etc.

To calculate the amount of data that will be collected from an instrument, you must first calculate the size of each data report. There are two kinds of data reports: the detailed data from the instrument's memory partitions, and text reports.

B.1 Data Partition Calculation

The number of bytes stored in a data partition can be calculated if the *time span*, *reading interval*, and *data storage width* are known. This information is displayed on the Memory Status screen when the instrument is connected to Flowlink 4. The figure below shows a time span of 7 days and 2 hours. The reading interval is 5 minutes.
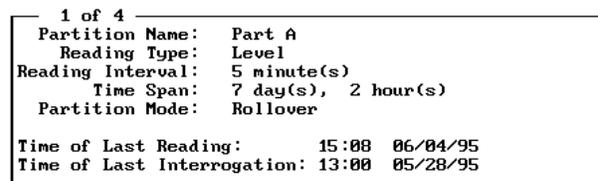
```
┌─ 1 of 4 ──────────────────────────────────────────┐
│  Partition Name:    Part A                        ↑│
│    Reading Type:    Level                          │
│Reading Interval:    5 minute(s)                    │
│      Time Span:     7 day(s),  2 hour(s)          ▓│
│ Partition Mode:     Rollover                      ▓│
│                                                    │
│Time of Last Reading:        15:08  06/04/95        │
│Time of Last Interrogation: 13:00  05/28/95        ↓│
└────────────────────────────────────────────────────┘
```

Figure B-1   Partition Information from Flowlink's Memory Status Screen

The data storage width is the number of bytes needed to express the information in each reading. It is determined by the reading type of the partition. Figure B-1 shows "Level," which uses 2 bytes/reading. The table below lists the bytes/reading for each reading type.

Table B-1 Data Storage Width	
Reading Type	**Bytes/Reading**
Rainfall pH Dissolved Oxygen	1
Level Velocity Temperature Conductivity* 3240 Flow Rates	2

Table B-1 (Continued)Data Storage Width	
Reading Type	**Bytes/Reading**
All Other Flow Rates	
Sampler Events	4

*Conductivity includes readings reported as Specific Conductance, Salinity, Total Dissolved Solids, and Conductivity.

Apply the Time Span in Days, Time Span in Hours, Reading Interval, and Bytes/Reading to the equation below to calculate the number of bytes used in a data partition.

$$\frac{[(D \times 24) + H] \times 60}{R} \times B \times 1.03 = \text{Partition Memory Used}$$

Where:

D = Time Span in Days
H = Time Span in Hours
R = Reading Interval
B = Bytes/Reading
1.03 = Housekeeping/Overhead

The example would be applied as follows:

$$\frac{[(7 \times 24) + 2] \times 60}{5} \times 2 \times 1.03 = 4202 \text{ bytes}$$

B.2   Text Report Calculation

Some Isco instruments can generate text reports, such as a Sampler Combined Results report or a Flow Meter History report.

All text reports consume memory at the rate of 41 bytes per line of text. The number of lines in each text report depends on how the instrument was programmed and the number of events recorded. Counting all of the lines and then multiplying by 41 will yield the size of the text report.

B.3   Instrument Data Calculation

The total number of bytes that the RTD collects from each instrument is the sum of all the text reports, partition data, and the *Site Overhead*. Site overhead contains information about each instrument and its setup. This adds approximately 4,000 bytes to the data collected.

Partition A
Partition B
⋮
Text Report A
Text Report B
⋮
+ 4,000 (Site Overhead)
───────────────
Total Bytes Collected

B.4   Available RTD Memory

RTD memory is available as long as you do not exceed 255 instruments or 943 kilobytes of data (with version 2.0 software).

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Appendix C 4200 Series Connectors

The following figures demonstrate how to connect the 581 Rapid Transfer Device to the interrogator port of an Isco Model 4200 Series Flow Meter.

Before connecting the RTD to a Model 4200 Flow Meter, check the key position of the interrogator connector.

Figure C-1 shows an interrogator connector with the key positioned at the top. As shown in Figure C-2, the RTD will easily plug into the connector.

If your interrogator connector's key is at any position other than the top, you may find that access is obstructed by cables or limited by the mounting of the flow meter.

Your flow meter can be modified to reposition the key. Contact the Isco Customer Service Department.
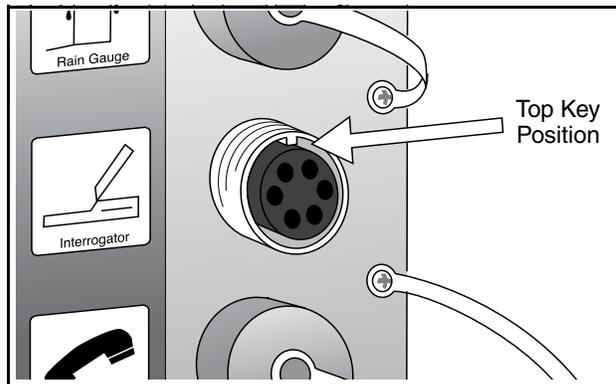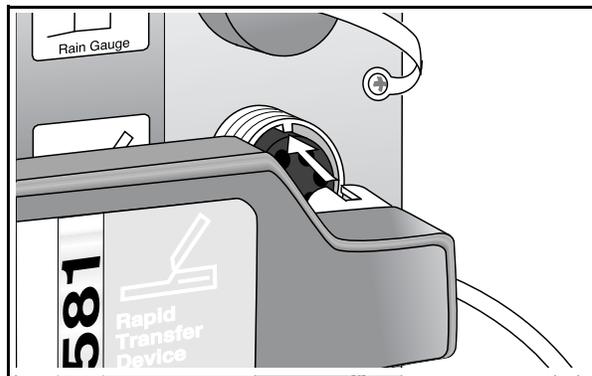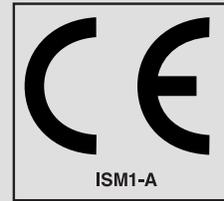

Figure C-1Interrogator connector

Figure C-2Connector key position

DECLARATION OF CONFORMITY

CE
ISM1-A

Application of Council Directive:	89/336/EEC – The EMC Directive
	73/23/EEC – The Low Voltage Directive
Manufacturer's Name:	Teledyne Isco, Inc.
Manufacturer's Address:	4700 Superior, Lincoln, Nebraska 68504 USA
	Mailing Address: P.O. Box 82531, Lincoln, NE 68501
Equipment Type/Environment:	Laboratory Equipment for Light Industrial/Commercial Environments
Trade Name/Model No:	581 RTD
Year of Issue:	1996
Standards to which Conformity is Declared:	EN 50082-1 Generic Immunity for Commercial, Light Industrial Environment
	EN 61010-1 Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use

Standard	Description	Severity Applied	Performance Criteria
IEC 801.2	Electrostatic Discharge	Level 3 - 6kV contact discharge Level 3 - 8kV air discharge	B B
IEC 801.3	Radiated RF Immunity	27 MHz to 500MHz Level 2 - 3 V/m	A
IEC 801.4	Electrical Fast Transient	Level 2 - 1kV on ac lines	B
CISPR11/ EN 55011	RF Emissions	Group 1, Class A Industrial, Scientific, and Medical Equipment	

We, the undersigned, hereby declare that the design of the equipment specified above conforms to the above Directive(s) and Standards as of November 8, 1996.

William Foster

William Foster
USA Representative

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60-9003-433
Rev B

Teledyne Isco One Year Limited Warranty*

Factory Service for Teledyne Isco Flow Meters, Waste Water Samplers, and Syringe Pumps

This warranty exclusively covers Teledyne Isco instruments, providing a one-year limited warranty covering parts and labor.

Any instrument that fails during the warranty period due to faulty parts or workmanship will be repaired at the factory at no charge to the customer. Teledyne Isco's exclusive liability is limited to repair or replacement of defective instruments. Teledyne Isco is not liable for consequential damages.

Teledyne Isco will pay surface transportation charges both ways within the 48 contiguous United States if the instrument proves to be defective within 30 days of shipment. Throughout the remainder of the warranty period, the customer will pay to return the instrument to Teledyne Isco, and Teledyne isco will pay surface transportation to return the repaired instrument to the customer. Teledyne Isco will not pay air freight or customer's packing and crating charges. This warranty does not cover loss, damage, or defects resulting from transportation between the customer's facility and the repair facility.

The warranty for any instrument is the one in effect on date of shipment. The warranty period begins on the shipping date, unless Teledyne Isco agrees in writing to a different date.

Excluded from this warranty are normal wear; expendable items such as charts, ribbon, lamps, tubing, and glassware; fittings and wetted parts of valves; and damage due to corrosion, misuse, accident, or lack of proper maintenance. This warranty does not cover products not sold under the Teledyne Isco trademark or for which any other warranty is specifically stated.

No item may be returned for warranty service without a return authorization number issued by Teledyne Isco.

This warranty is expressly in lieu of all other warranties and obligations and Teledyne Isco specifically disclaims any warranty of merchantability or fitness for a particular purpose.

The warrantor is Teledyne Isco, Inc. 4700 Superior, Lincoln, NE 68504, U.S.A.

* This warranty applies to the USA and countries where Teledyne Isco Inc. does not have an authorized dealer. Customers in countries outside the USA, where Teledyne Isco has an authorized dealer, should contact their Teledyne Isco dealer for warranty service.

Before returning any instrument for repair, please call, fax, or e-mail the Teledyne Isco Service Department for instructions. Many problems can often be diagnosed and corrected over the phone, or by e-mail, without returning the instrument to the factory.

Instruments needing factory repair should be packed carefully, and shipped to the attention of the service department. Small, non-fragile items can be sent by insured parcel post. **PLEASE BE SURE TO ENCLOSE A NOTE EXPLAINING THE PROBLEM.**

Shipping Address:	Teledyne Isco, Inc. - Attention Repair Service 4700 Superior Street Lincoln, NE 68504 USA
Mailing Address:	Teledyne Isco, Inc. PO Box 82531 Lincoln, NE 68501 USA
Phone:	Repair service: (800) 775-2965 (lab instruments) (866) 298-6174 (samplers & flow meters) Sales & General Information: (800) 228-4373 (USA & Canada)
Fax:	(402) 465-3001
Email:	IscoService@teledyne.com

March 8, 2011 P/N 60-1002-040 Rev E

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