Reference Manual
MS-00809-0100-1058, Rev AA
August 2024

Rosemount™ 1058 Dual Channel transmitter

ROSEMOUNT™

EMERSON™

Safety information

⚠ WARNING

Electrical hazards

Failure to follow these instructions could cause damaging and unsafe discharge of electricity, resulting in death or serious injury.

- Follow national, local, and plant standards to properly earth ground the transmitter and sensor. The earth ground must be separate from the process reference ground.
- Disconnect power before servicing circuits.
- Allow one to five minutes for charge to dissipate prior to removing electronics compartment cover. The electronics may store energy in this period immediately after power is removed.
- Avoid contact with leads and terminals. High voltage that may be present on leads could cause electrical shock.

⚠ WARNING

Physical Access

Unauthorized personnel may potentially cause significant damage to and/or misconfiguration of end users' equipment. This could be intentional or unintentional and needs to be protected against.

Physical security is an important part of any security program and fundamental to protecting your system. Restrict physical access by unauthorized personnel to protect end users' assets. This is true for all systems used within the facility.

⚠ CAUTION

Radio interference

This product generates, uses, and can radiate radio frequency energy and thus can cause radio communication interference. Improper installation or operation may increase such interference. As temporarily permitted by regulation, this unit has not been tested for compliance within the limits of Class A computing devices, pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference.

- Operation of this equipment in a residential area may cause interference, in which case the operator, at his own expense, will be required to take whatever measures may be required to correct the interference.

Contents

1 Introduction

1.1 Product overview

The Rosemount 1058 dual channel transmitter provides confident liquid analysis in a wide range of industrial, municipal, and commercial applications.

1.2 Key features

- Supports continuous measurement of liquid analysis inputs from one or two sensors.
- Each input channel can be independently configured with a wide range of signal input boards for digital or analog sensors.
- Modular design allows signal input boards to be replaced in the field, making configuration changes easy.
- Plug and play connection with automatic sensor recognition and data transfer when used with supported Rosemount digital sensors.
- Rugged engineered polymer enclosure for indoor or outdoor installations.
- Versatile enclosure design supports panel, pipe, and wall mount installations.
- High resolution full-color display allows at-a-glance viewing of process readings indoors or outdoors. Six additional process variables or diagnostic parameters are displayed for quick determination of process or sensor condition.
- Intuitive menus and alpha-numeric keypad enable easy configuration and calibration.
- The device auto-recognizes each signal input board and prompts the user to configure each sensor loop in a few quick steps for immediate commissioning.
- Extensive help and troubleshooting information is provided within the device's user interface and can be easily accessed by pressing the (i) key.
- The device continually monitors both itself and connected sensors and provides the user a wide range of sensor diagnostic information as well as detailed fault and warning info.
- Extensive onboard data storage captures measurement data from both channels every 30 seconds for 30 days for on-screen display or local upload to a USB 2.0 memory device. 300 events are recorded including start-up time, calibrations, hold outputs, configurations, alarms, power interruptions, faults, and more. All process data and events are time/date stamped.
- Built-in USB port allows local transfer of process data and events using a standard USB memory device.
- Four alarm relays are fully assignable and programmable to trigger alarms when measurement or diagnostics setpoints are reached or fault conditions occur.
- Compatible with Emerson wireless THUM adapter to enable wireless transmission of process variables and diagnostics from hard-to-reach locations.
- Many specialty measurements are supported including high reference impedance pH sensors, inferred pH determination using dual contacting conductivity inputs, differential conductivity, differential flow, totalized flow, current input from any 4-20 mA source, dual range calibration for chlorine sensors, and programmable polarizing voltage for amperometric oxygen sensors.

- Multiple supported languages to serve our global customers.

2 Specifications

2.1 Digital signal input board

When configured with the digital signal input board, the 1058 supports select digital sensors. The communication between the device and the digital sensor is Modbus RS-485 with a default baud rate of 19200 and a default address of 1. The device also supports searching at baud rates of 9600, 19200, and 38400; and addresses from 1 to 247.

Table 2-1: Supported digital sensors:

Measurement type	Supported sensors
Dissolved Oxygen	Rosemount 490A Optical Dissolved Oxygen Sensor(1)

(1) Only supports baud rate of 19200

2.2 Analog pH/ORP signal input board

Measurement choices are pH, ORP, or Redox.

2.2.1 pH specifications

Specifications listed below relate to the 1058 signal input board only. Total loop performance depends also on the sensor used. Refer to sensor datasheet for more information.

Supported sensors:	All current Rosemount analog and SMART preamp pH sensors and most analog pH sensors from other manufacturers.
Measurements type:	pH
Measurement range:	0 to 14 pH
Accuracy:	±0.01 pH
Temperature coefficient:	±0.002 pH / °C
Display resolution:	configurable: 0.1 or 0.01
Input filter:	configurable: 0 to 999 seconds
Preamplifier locations supported:	configurable: sensor, junction box, or analyzer
Sensor wiring supported:	configurable: normal or reference to ground
Buffer recognition:	NIST (including non-NIST pH 7.01 buffer), DIN 19267, Ingold, Merck, and Fisher
Calibration slope and offset error thresholds:	configurable
Sensor reference impedance supported:	configurable: low or high
Solution temperature correction:	configurable: pure water, high pH (dilute base), Ammonia, and custom

Glass and reference impedance diagnostics:	configurable on or off. Glass and reference impedance fault thresholds are also configurable.

2.2.2 ORP specifications

Specifications listed below relate to the 1058 signal input board only. Total loop performance depends also on the sensor used. Refer to sensor datasheet for more information.

Supported sensors:	All current Rosemount analog and preamp ORP sensors and most analog ORP sensors from other manufacturers.
Measurements type:	configurable: ORP or Redox
Measurement range:	-1500 to + 1500 mV
Display resolution:	1 mV
Temperature coefficient:	±0.12 mV / °C
Input filter:	configurable: 0 to 999 seconds
Sensor wiring supported:	configurable: normal or reference to ground
Sensor reference impedance supported:	configurable: low or high

2.3 Analog contacting conductivity signal input board

Specifications listed below relate to the 1058 signal input board only. Total loop performance depends also on the sensor used. Refer to sensor datasheet for more information.

Supported sensors:	All current Rosemount analog 2 and 4 electrode contacting conductivity sensors and most analog contacting conductivity sensors from other manufacturers.
Measurement type:	configurable: conductivity, resistivity, total dissolved solids, salinity, or percent concentration
Measurement units:	configurable
Measurement range:	0 to 600,000 µS/cm
Sensor operating temperature range supported:	0 to 200 °C (32 to 392 °F)
Temperature measurement accuracy, Pt-1000:	+/- 0.5 °C from 0 to 50 °C; +/-1 °C from 50 to 200 °C
Temperature compensation:	configurable: manual slope (X% / °C), high purity water (dilute sodium chloride), and cation conductivity (dilute hydrochloric acid).
Input filter:	configurable: 0 to 999 seconds
Conductivity ranging:	configurable: auto-range or manual
Salinity:	uses practical salinity scale

Total dissolved solids:	Calculated by multiplying conductivity at 25 °C by 0.65
Percent concentration curves:	0-12% NaOH, 0-15% HCl, 0-20% NaCl, 0-25% or 96-99.7% H2SO4. The conductivity concentration algorithms for these solutions are fully temperature compensated.

2.4 Analog toroidal conductivity signal input board

Specifications listed below relate to the 1058 signal input board only. Total loop performance depends also on the sensor used. Refer to sensor datasheet for more information.

Supported Sensors:	All current Rosemount analog toroidal conductivity sensors and most analog toroidal conductivity sensors from other manufacturers.
Measurement type:	configurable: conductivity, resistivity, total dissolved solids, salinity, and percent concentration
Measurement units:	configurable Measurement range: 1 to 2,000,000 µS/cm
Sensor operating temperature range supported:	-25 to 210 °C (-13 to 410 °F)
Temperature Measurement Accuracy, Pt-100:	±0.5 °C from -25 to 50 °C; ±1 °C from 50 to 210 °C
Temperature Compensation:	configurable: manual slope (X% / °C), neutral salt (dilute sodium chloride) and raw.
Input filter:	configurable: 0 to 999 seconds
Conductivity ranging:	configurable: auto-range or manual
Salinity:	uses Practical salinity scale
Total Dissolved Solids:	Calculated by multiplying conductivity at 25 °C by 0.65
Percent concentration curves:	0-12% NaOH, 0-15% HCl, 0-20% NaCl, 0-25% or 96-99.7% H_2SO_4. The conductivity concentration algorithms for these solutions are fully temperature compensated. For other solutions, the device accepts as many as five data points and fits either a linear (two points) or a quadratic function (three or more points) to the data. Reference temperature and linear temperature slope may also be adjusted for optimum results.

2.5 Analog chlorine signal input board

Specifications listed below relate to the 1058 signal input board only. Total loop performance depends also on the sensor used. Refer to sensor datasheet for more information.

Supported sensors:	All current Rosemount analog free chlorine, total chlorine, and monochloramine sensors
Measurement type:	configurable: free chlorine, pH Independent free chlorine, total chlorine, monochloramine
Measurement units:	configurable: ppm or mg/L

Accuracy:	±1% of reading
Display resolution:	configurable: 0.01 or 0.001 ppm
Input range:	0 nA to 100 µA
pH compensation (free chlorine only):	configurable:automatic or manual (6.0 to 10.0 pH)
Temperature compensation:	configurable: automatic or manual (0 to 50 °C)
Input filter:	configurable: 0 to 999 seconds
Dual slope calibration:	configurable: enable or disable

2.6 Analog ozone signal input board

Specifications listed below relate to the 1058 signal input board only. Total loop performance depends also on the sensor used. Refer to sensor datasheet for more information.

Supported sensors:	All current Rosemount analog ozone sensors
Measurement type:	Ozone
Measurement units:	configurable: ppm, mg/L, ppb, µg/L
Accuracy:	±1% of reading
Display resolution:	configurable: 0.01 or 0.001 ppm
Input Range:	0 nA to 100 µA
Temperature compensation:	Automatic or manual (0-50 °C).
Input filter:	configurable: 0 to 999 seconds

2.7 Analog dissolved oxygen signal input board

Specifications listed below relate to the 1058 signal input board only. Total loop performance depends also on the sensor used. Refer to sensor datasheet for more information.

Supported sensors:	all current Rosemount analog amperometric dissolved oxygen sensors
Sensor type:	configurable: water/waste, trace, BioRx, BioRx-Other, Brew, percent O2 in Gas
Measurement type:	configurable: concentration, percent saturation, partial pressure, Oxygen in Gas
Measurement units:	configurable: ppm, mg/L, ppb, µg/L, percent Sat, percent O2-Gas, ppm Oxygen-Gas
Accuracy:	±1% of reading
Display Resolution:	0.1%, 0.01 ppm, or 0.1 ppb depending on the sensor used
Input Range:	0 nA to 100 µA
Temperature compensation:	automatic or manual (0 to 50 °C)

Pressure Units:	configurable:mm Hg, in Hg, Atm, kPa, mbar, bar
Barometric pressure:	configurable: entered by user or sourced from external pressure sensor via mA input
Salinity:	configurable: entered by user as percent
Input filter:	configurable: 0 to 999 seconds

Note

Percent (%) saturation and Oxygen in gas measurements require barometric pressure value. For these measurements the device uses the most recent barometric pressure value input by the user during 100% saturation calibration, or a default value of 760 mm Hg.

2.8 Analog turbidity signal input board

The device supports the analog turbidity inputs from both USEPA 180.1 and ISO 7027-compliant sensors.

Specifications listed below relate to the 1058 signal input board only. Total loop performance depends also on the sensor used. Refer to sensor datasheet for more information.

Supported Sensors:	all current Rosemount analog turbidity sensors
Measurements type:	configurable: turbidity or total suspended solids (TSS)
Measurement units:	configurable: NTU, FTU, or FNU for turbidity; mg/L, ppm, or no units for total suspended solids.
Display resolution:	4 digits; decimal point moves from x.xxx to xxx.x
Bubble Rejection:	Intelligent software algorithm to eliminate erroneous readings caused by bubble accumulation in the sample; can be turned on or off.
Calibration methods:	User-prepared standard, commercially prepared standard, or grab sample. For total suspended solids, user must provide a linear calibration equation.

2.9 Analog flow/current input signal input board

2.9.1 Analog flow input

Specifications listed below relate to the 1058 signal input board only. Total loop performance depends also on the sensor used. Refer to sensor datasheet for more information.

Supported Sensors:	most pulse signal flow sensors
Measurement type:	pulse flow
Measurement units:	configurable: GPM (gallons per minute), GPH (gallons per hour), cu ft/min (cubic feet per min), cu ft/hour (cubic feet per hour), LPM (liters per minute), LPH (liters per hour), or m^3/hr (cubic meters per hour), and velocity in ft/sec or m/sec.
Frequency Range:	3 to 1000 Hz

Flow Rate:	0 to 99,999 GPM, LPM, m^3/hr, GPH, LPH, cu ft/min, cu ft/hr
Totalized Flow:	0 to 9,999,999,999,999 Gallons or m^3, 0 to 999, 999,999,999 cu ft.
Accuracy:	0.5%
Input filter:	configurable: 0 to 999 seconds

Note
The 1058 also acts as a totalizer in the chosen unit (gallons, liters, or cubic meters). Dual flow instruments can be configured as a percent recovery, flow difference, flow ratio, or total (combined) flow.

2.9.2 Analog current input

For use with any transmitter or external device that transmits 4-20 mA or 0-20 mA current outputs. Typical uses are for temperature compensation of live measurements (except ORP, turbidity and flow) and for continuous barometric pressure compensation of percent oxygen gas.

Externally sourced current input is can also be used for calibration of new or existing sensors that require temperature or atmospheric pressure inputs within the calibration method.

In addition to continuous compensation of live measurements, the current input board can also be used to display and trend the measured temperature or the calculated partial pressure from the external device. The current input board serves as a power supply for loop-powered devices that do not actively power their 4-20 mA output signals.

Measurement type:	configurable: temperature, pressure, flow, or other
Measurement units:	configurable: temperature can be displayed in °C or °F; partial pressure can be displayed in inches Hg, mm Hg, atm (atmospheres), kPa (kiloPascals), bar or mbar
Measurement range:	0-20 mA or 4-20 mA (current input not to exceed 22 mA)
Accuracy:	±0.03 mA
Low and high current input assignments:	configurable
Input filter:	configurable: 0 to 999 seconds

3 Installation

3.1 General installation information

Install the transmitter in an area where vibration, electromagnetic, and radio frequency interference are minimized or absent.

3.2 Mounting

The 1058 supports panel, wall, and pipe mounting. Refer to Mounting configuration for drawings showing each of these mounting configurations.

Mounting configuration

Figure 3-1: Panel mount, front view

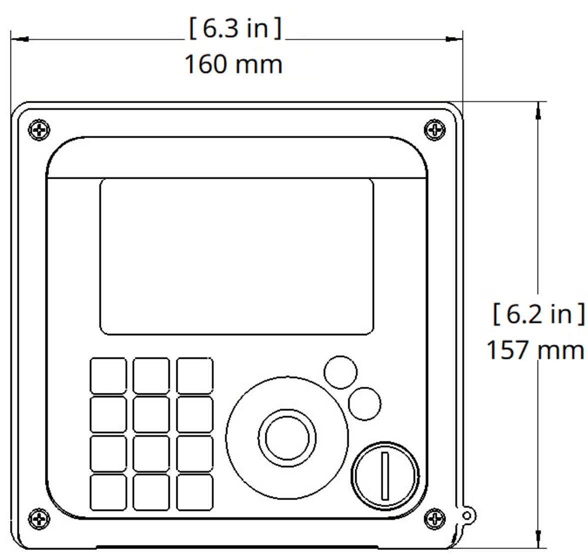
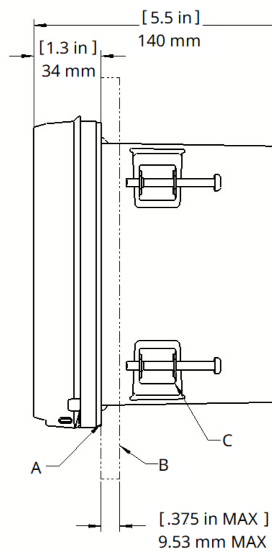
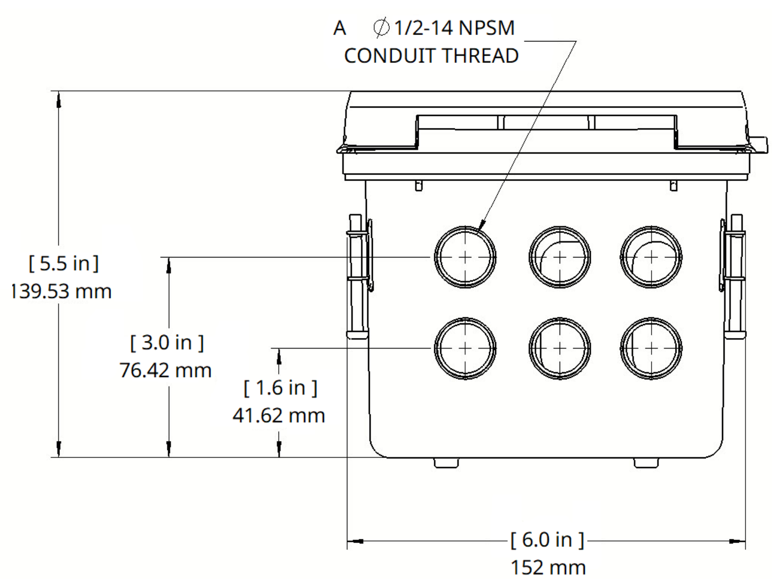


Figure 3-2: Panel mount, side view



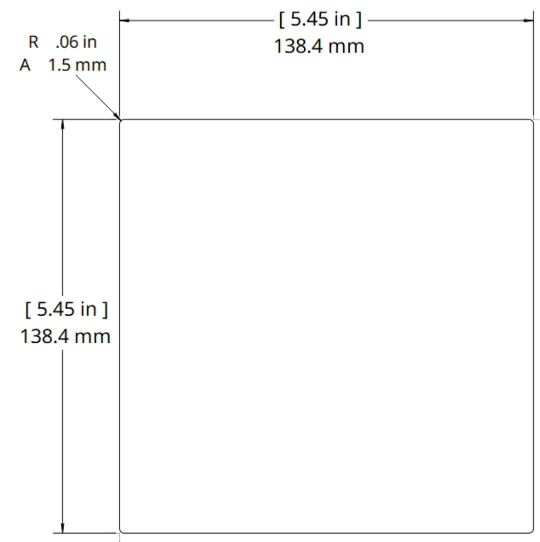
A. Panel mount gasket
B. Panel supplied by customer; maximum thickness: 0.375 in. (9.52 mm)
C. Four mounting brackets and screws provided with the instrument

Figure 3-3: Panel mount, bottom view



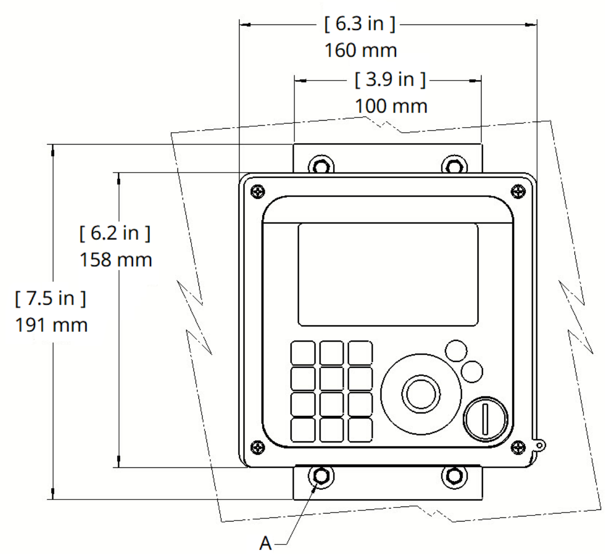
A. Conduit openings

Figure 3-4: Panel cut-out



A. Maximum

Figure 3-5: Wall mount, front view



A. QTY 4 Ø5/16 wall anchor screws

Figure 3-6: Wall mount, side view

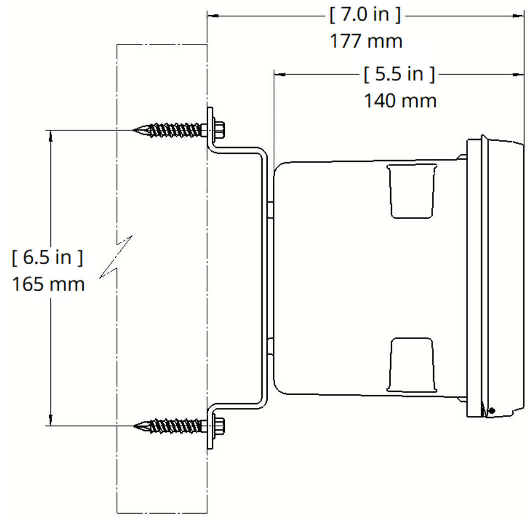
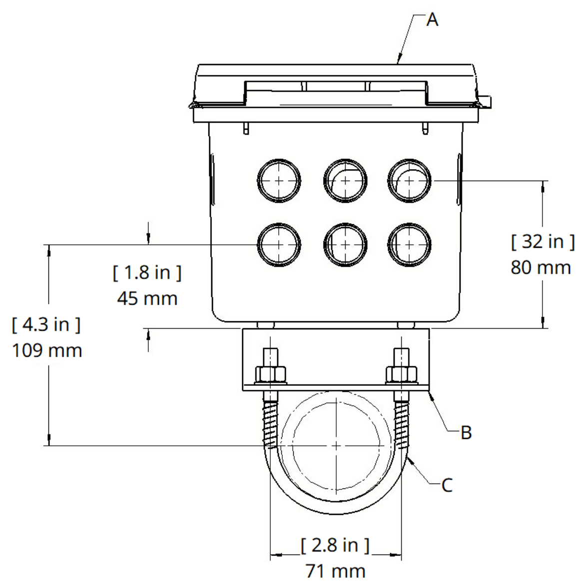
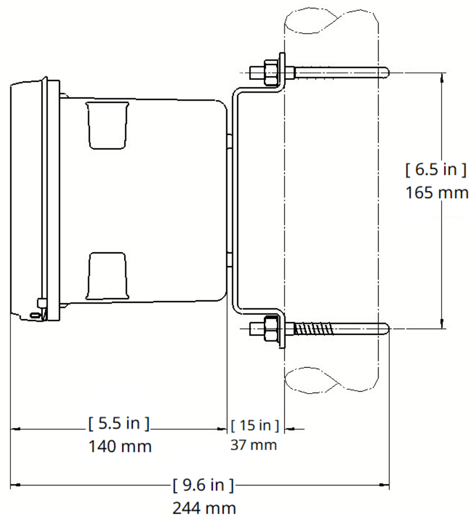


Figure 3-7: Wall mount, bottom view



A. Front panel
B. 2-in. (51 mm) pipe mount bracket
C. Two sets U-bolts for 2-in. (51 mm) pipe in kit, PN 23820-00

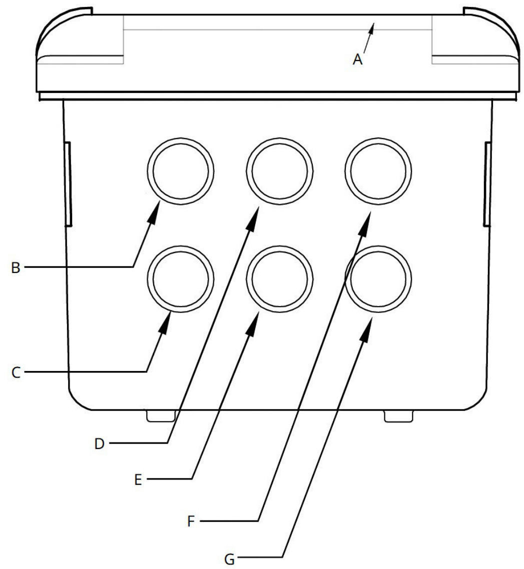
Figure 3-8: Pipe mount, side view



3.3 Preparing conduit openings

There are six conduit openings in all configurations of the transmitter. Conduit openings accept 0.5-in. (13 mm) conduit fittings or PG13.5 cable glands. A ½-in. NPT thread is recommended. To maintain ingress protection, use Type 4X or IP66 rated cable glands for all cables entering the device and block unused openings with Type 4X or IP66 conduit plugs.

Figure 3-9: Conduit openings



A. *Front panel/keypad*
B. *Power leads*
C. *Alarm relay leads*
D. *Sensor 1 cable*
E. *4-20 mA/HART®/leads*
F. *Sensor 2 cable*
G. *Spare opening*

3.4 Wiring

3.4.1 General installation information

Install the transmitter in an area where vibration, electromagnetic, and radio frequency interference are minimized or absent.

3.4.2 Sensor wiring

Digital sensors with M12 connectors

Digital sensors with M12 type connectors are connected to the transmitter by plugging the M12 male connector on the sensor cable into the M12 female connector installed in one of the transmitter conduit openings.

Analog sensors and digital sensors without M12 connectors

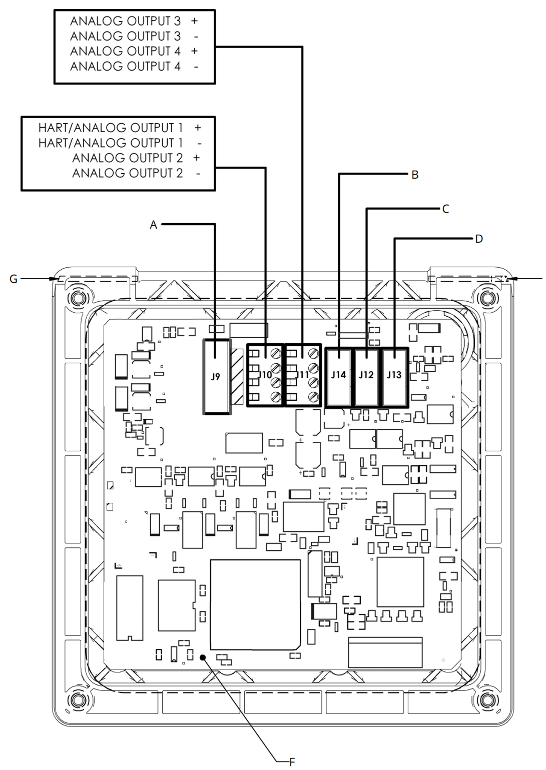
Note
For digital sensors with flying lead wiring, remove the M12 plug connector and feed the cable through the appropriate conduit opening on the Rosemount 1058 before proceeding.

1. Wire the sensor leads to the terminals on the signal input board following the lead locations marked on the board. Refer to the applicable sensor Quick Start Guide for more details.
2. Carefully slide the wired signal input board fully into the enclosure slot and take up the excess sensor cable through the cable gland.
3. Tighten the cable gland nut to secure the cable and ensure a sealed enclosure.

3.4.3 Output Wiring

The device has four 4-20 mA analog outputs. HART communications is superimposed on analog output 1. Wire the relay leads on each of the independent relays to the terminal on the main board using the lead markings (+/positive, -/negative) on the board. Emerson provides male mating connectors with each unit.

Figure 3-10: Output Wiring for Main PCB PN D0000333-02



A. To power supply PCB (ribbon cable)
B. Reserved
C. To sensor 1 signal board
D. To sensor 2 signal board
E. Hinge pin
F. Transmitter main board, PN D0000333-02
G. Hinge pin

Alarm relay wiring

The device has four alarm relay outputs. To use the relay outputs, wire the relay leads on each of the independent relays to the correct position on the power supply board using the printed lead markings (NO/Normally Open, NC/Normally Closed, or Com/Common) on the board.

3.5 Power wiring

USP alarm can be programmed to activate when the conductivity is within a user-selectable percentage of the limit.

Note
Conductivity/resistivity measurement only.

Table 3-1: Maximum Relay Current Rating(1)

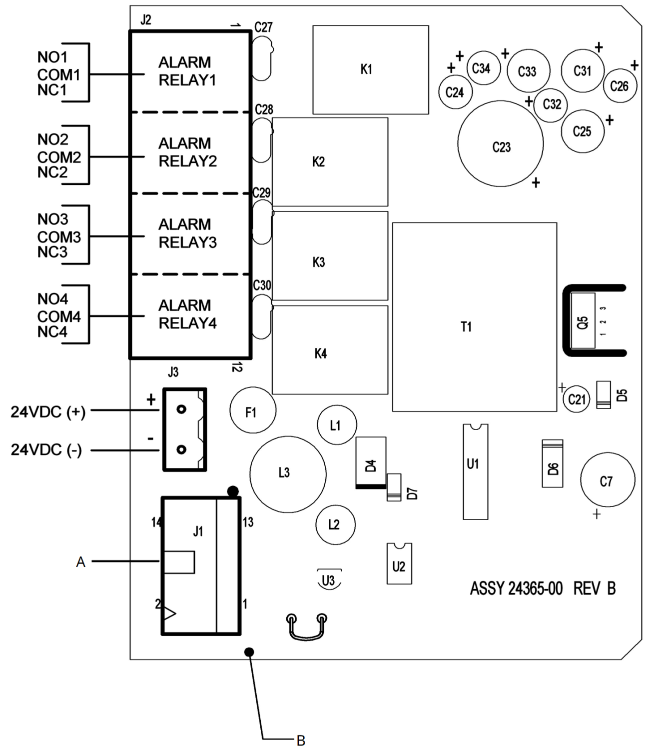
Power input	Resistive
28 VDC 5.0 A	5.0 A
115 VAC 5.0 A	5.0 A
230 VAC 5.0 A	5.0 A

(1) Relays: Form C, SPDT, epoxy sealed

Two power supply options are offered for the 1058: 24 VDC and 85-265 VAC. AC mains leads and 24 VDC leads are wired to the Power Supply board which is mounted vertically on the left side of the main enclosure cavity. Each lead location is marked on the Power Supply board. Wire the power leads to the Power Supply board using the lead markings on the board.

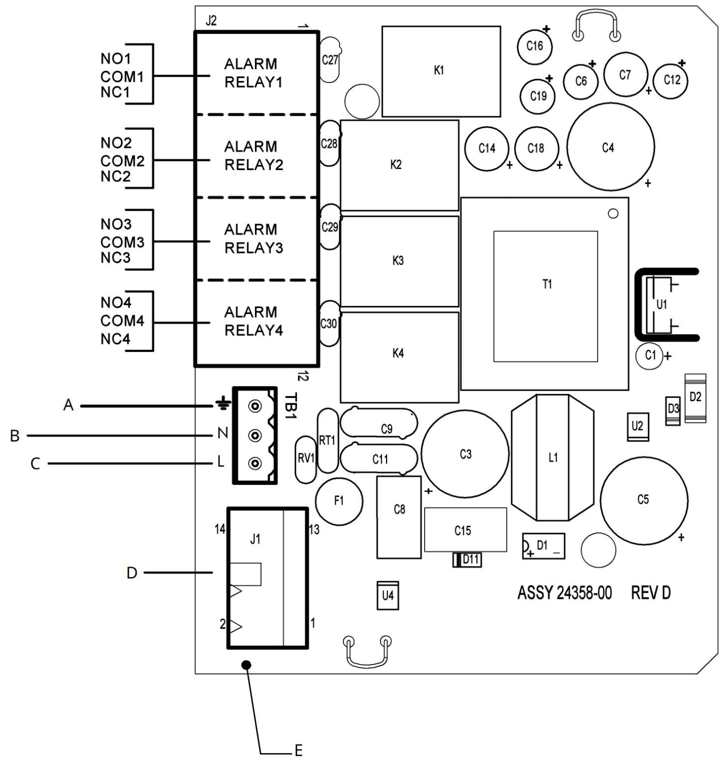
The grounding plate is connected to the earth terminal of the 85-265 VAC power supply device version. The green colored screws on the grounding plate are intended for connection to some sensors to minimize radio frequency interference. The green screws are not intended to be used for safety purposes.

Figure 3-11: Power Wiring for 24 VDC Power Supply PN 24365-030



A. To main board (ribbon cable)
B. Rosemount 1058 DC power supply board PN 24365-030

Figure 3-12: Power Wiring for 85-264 VAC Power Supply PN D0000340-01



A. *Earth ground*
B. *Neutral*
C. *Line power*
D. *To main board (ribbon cable)*
E. *Rosemount 1058 AC power supply board PN D0000340-01*

4 Start-up

Once all wiring connections are secured, close the front cover of the device, and install the four cover screws. Then apply power to the device.

When the device is powered up for the first time, Quick Start screens appear and guide you through the initial configuration of the device.

5 Display and operation

5.1 User interface

The 1058 has a large display which shows two live measurement readouts in large digits and up to six additional process variables or diagnostic parameters concurrently. The display is back-lit and the format can be customized to meet user requirements. The display flashes a red banner to indicate a Fault condition and a yellow banner for a Warning condition. Help screens are displayed for fault and warning conditions to guide the user in troubleshooting.

During calibration and programming, key presses guide the user step-by-step through procedures. An alpha-numeric keypad is available to allow the user to enter data during programming and calibration or lengthy tags to describe process points, sensors, or instrumentation.

The **Enter/Menu** key is used to access menus for programming and calibrating the instrument as well as retrieving stored data.

The **X** key returns to the previous menu level.

The **(i)** key provides detailed instructions and explanations during programming and calibrating procedures. It also provides troubleshooting tips for all faults and warnings that may occur during calibration or continuous operation in process.

The four Navigation keys arranged around the **Enter/Menu** key used to move the highlighted screen selection to another adjacent screen item. During tag entry, the left key is used to delete entries during active alpha-numeric character entry.

The nine alpha-numeric keys have multiple characters that can be entered for tag entries or during programming and calibration steps. Character selections are made by pressing the key multiple times to toggle to characters that are available on each key.

5.2 USB data port

USB 2.0 data port is accessible on the front panel of the device. The USB data port can be used for download of measurement data and events using a USB memory device. It can also be used to download and upload complete 1058 device configurations to copy all programmed settings to another 1058 device.

The USB data port can be accessed by inserting a coin in the vertical slot of the cover and rotating counterclockwise one quarter turn to remove the cover and Type 4 seal.

Note
To be compatible with the 1058, the USB device must have its file system formatted as FAT32.

Note
Not all USB memory devices will physically fit into the 1058 data port. After removing the USB cover and seal, make sure that the USB memory device can be easily and fully inserted into the USB data port without any mechanical conflict with the USB data port flange. The USB communications port is protected by a Type 4-rated seal and cover. Do not remove the cover during cleaning of the analyzer housing. Never remove the USB port cover when the instrument is operated in a hazardous rated area.

Note
The data logger and event logger are enabled by default setting upon initial startup from the factory.

5.3 Data logger and event logger download procedure

The 1058 supports download of stored data logger and event logger data at the device. The download process is performed using a USB 2.0 flash drive memory device inserted into the USB data port on the front panel of the device. The data can be uploaded to a PC for viewing in preformatted Excel tables.

Procedure

1. From the main menu, select **Data storage** → **Retrieval**.
2. Select the **Download** tab.
3. Select **Download measurement** data.
4. With the device powered, remove the USB cap from the front display by inserting a coin into the cap's vertical slot and rotating counterclockwise.
5. Carefully insert a USB 2.0 flash drive into the USB port on the 1058.
6. The Download screen will report Earliest data available and Latest data available that can be downloaded from the internal data logger file.
7. With a USB 2.0 flash drive properly inserted, choose **Selected Range (default)** or **All Data**.
8. If Selected Range is chosen, define the Start Date and End Date in the screen fields.

   Note
   The **Start Date** and **End Date** reported will default to the current data that is recognized by the 1058.

9. If All Data is selected, all stored date (up to 30 days) will be downloaded.
10. Select **Start** and press **Enter**.
11. A Data download information and instruction screen is displayed while data logger files are being downloaded. The download process will be completed in a few minutes.
12. When the data logger download is complete, a confirmation screen is display with the reported range of dates that were downloaded to the USB flash drive.
13. Carefully remove the USB 2.0 flash drive from the USB port and replace the USB port cap.
14. You may close (X) the Download completed screen by selecting **Back**.
15. To view data logger files, insert the USB flash drive into a computer. On the designated drive associated with the USB flash drive, individual data logger files for each day can be opened as Excel formatted files in the root directory of the USB drive.

    Note
    The data codes are assigned file names based on the analyzer's recognized dates.

5.3 Event logger download procedure:

Procedure

1. From the main menu, select **Data storage → retrieval**.
2. Select the **Download** tab.
3. Select **Download events**.
4. With the 1058 powered, remove the USB port cap from the front display by inserting a coin into the cap's vertical slot and rotating counterclockwise.
5. Carefully insert a USB 2.0 flash drive into the USB port on the 1058.
6. A ***Download events information*** screen is briefly displayed while events files are being downloaded. The download process may require a few minutes to complete.
7. When the events download is complete, a confirmation screen appears.
8. Carefully remove the USB 2.0 flash drive from the USB port and replace the USB port cap.
9. You may close (X) the Download completed screen by selecting **Back**.
10. To view event logger files, insert the USB flash drive into a computer. On the designated drive associated with the USB device, the single event logger file can be opened as an Excel formatted file in the root directory of the USB drive.

Note
The data codes are assigned file names based on the analyzer's recognized dates.

5.4 Configuration transfer procedure

The 1058 supports configuration transfer from one 1058 device to another. The transfer is done using a version 2.0 USB flash drive for downloading the existing configuration and uploading to another 1058.

Configuration transfer can only be performed between instruments of identical factory configuration. The devices must have the same signal boards installed. Several text files downloaded to the flash drive can be saved to a PC and used later. Only one set of configuration files will be stored on the flash drive. The files that are downloaded will over-write any existing files stored in the root directory of the flash drive.

Procedure

1. Confirm all user settings before transferring configuration.
2. From the main menu, select **Data storage → Retrieval**.
3. Select the **Transfer configuration** tab.
4. Select **Copy analyzer configuration to the flash drive**.
5. With the device powered, remove the USB port cap from the front display by inserting a coin into the cap's vertical slot and rotating counterclockwise. Remove the USB cap to access the data port.
6. Carefully insert a USB 2.0 flash drive into the USB port on the 1058.
7. Select **Copy data → Enter**.
8. An information screen appears warning users that any configuration files that exist in the root directly of the flash drive will be over-written upon configuration transfer. If **No** is selected (default setting), existing configuration files will not be overwritten. Select **Yes** to transfer the configuration file to the flash drive.

9. The configuration file will be transferred (downloaded) in about 20 seconds. A screen will report that the configuration file has been transfused.
10. Carefully remove the USB 2.0 flash drive from the USB port and replace the USB port cap.
11. Follow steps 2-3 above on the instrument that will receive the copied configuration.
12. On the device that will receive the copied configuration, remove the USB port cap from the front display.
13. Carefully insert the USB 2.0 flash drive containing the configuration file into the USB port.
14. Select **Copy configuration from the flash drive to the analyzer** → **Enter**.
15. You have two options for configuration transfer. Select one of the following and press **Enter**:
    a. **Copy configuration data only to the analyzer**
    b. **Copy configuration and calibration data to the analyzer**
16. Select **Copy data** → **Enter**.
17. The configuration file will be transferred (uploaded) in about 20 seconds. A screen will report that the configuration file has been transfused.
18. Carefully remove the USB 2.0 flash drive from the USB port and replace the USB port cap.

6 Configuration

Typical configuration steps include the following:

- Change the measurement type, measurement units, or temperature units
- Choose temperature units and manual or automatic temperature compensation mode
- Configure and assign values to the current outputs
- Set a security code for two levels of security access
- Accessing menu functions using a security code
- Enabling and disabling Hold mode for current outputs
- Choosing the frequency of the AC power (needed for optimum noise rejection)
- Resetting all factory defaults, calibration data only, or current output settings only

6.1 Measurement configuration

The Rosemount 1058 automatically recognizes each installed signal input board upon first power-up and each time the device is powered. Completion of Quick Start screen upon first power up enable measurements, but additional steps may be required to program the device for the desired measurement application.

Measurement configuration settings can be adjusted by pressing **Enter/Menu** from the main screen, opening the **Program** menu, and selecting the **Measure** tab.

Note
When going from a two sensor configuration to a one sensor configuration, the unused sensor card must be unplugged and a factory reset may be necessary.

Note
pH diagnostics and calibration error thresholds must be configured on the **Sensor Diagnostic Setup** tab within the **Program** menu.

6.2 Temperature configuration

Most liquid analysis measurements (except ORP) require temperature compensation. The 1058 performs temperature compensation automatically by applying internal temperature correction algorithms.

The following configuration settings can be adjusted by pressing **Enter/Menu** from the main screen and selecting **Temperature**.

Temperature compensation source:	automatic (from RTD in sensor) or manual
Manual temperature compensation value:	user input
Temperature units:	°C or °F

6.3 Analog outputs configuration

The 1058 accepts inputs from two sensors and has four analog current outputs. Ranging the outputs means assigning values to the low (0 or 4 mA) and high (20 mA) outputs.

To configure the outputs, access the ***Outputs*** screen by pressing **Enter/Menu** from the main screen.

6.4 Output hold

The device output is always proportional to the measured value. To prevent improper operation of systems or pumps that are controlled directly by the current output, place the device in hold before removing the sensor for calibration and maintenance.

The 1058 allows users to place outputs in hold indefinitely, or to set the hold to be automatically released after a defined period.

The hold screen can be accessed by pressing **Enter/Menu** from the main screen.

6.5 Relay configuration

The 1058 comes standard with four alarm relays for process measurement or temperature. Each alarm can be configured as a fault alarm instead of a process alarm. Each relay can be programmed independently, and each can be programmed as an interval timer or with one of four advanced timer functions.

The following relay functions can be programmed to any relay from the ***Configure Relay*** screen:

- assign a relay
- define a relay function
- assign a measurement
- set relay logic
- enter set points
- set deadband
- set normal state
- set USP Safety level (contacting conductivity)

To program the alarm relays, access the **Program** screen by pressing **Enter/Menu** from the main screen and then select the **Relay** tab and the **Configure relay** control.

To simulate alarm relay conditions, access the ***Simulate relay action*** screen by pressing **Enter/Menu** from the main ***Relay programming*** screen.

Alarm relays can be manually set for the purposes of checking devices such as valves or pumps. Under the **Alarms settings** menu, this screen will appear to allow manual forced activation of the alarm relays. Select the desired alarm condition to simulate.

6.6 Setting a security code

The security code prevent accidental or unwanted changes to program settings, displays, and calibration. The 1058 has two levels of security code to control access and use of the instrument to different types of users.

The two levels of security are:

All: This is the Supervisory security level. It allows access to all menu functions, including Programming, Calibration, Hold and Display.

Calibration/Hold: This is the operator or technician level menu. It allows access to only calibration and Hold of the current outputs.

To set security codes, access the ***Security*** screen by pressing **Enter/Menu** from the main screen.

6.7 Factory reset

The 1058 offers three options for resetting factory defaults.

- Reset all settings to factory defaults
- Reset sensor calibration data only
- Reset analog output settings only

The reset process also clears all fault messages and returns the display to the first **Quick Start** screen. The reset screen can be accessed by pressing **Enter/Menu** from the main screen.

7 Calibration

7.1 pH calibration

New sensors must be calibrated before use. Regular recalibration is also necessary. The auto calibration enables more accurate calibrations by allowing the device to recognize the buffer and use temperature corrected pH values in the calibration. Once the device successfully completes the calibration, it calculates and displays the calibration slope and offset. The slope is reported as the slope at 25 °C.

Access the **Calibrate** menu by pressing **Enter/Menu** from the main screen. The following methods are supported:

Auto buffer	2-point buffer calibration with auto buffer recognition
Manual buffer	2-point buffer calibration with manual buffer value entry
Standardize (grab)	1 point standardization against grab sample
Standardize (in process)	1 point in process standardization
Slope/offset	user enters a known slope and offset value
Slope and standardize	user enters a known slope value and standardizes sensor against a buffer of known pH value

7.2 ORP calibration

It is often important to make sure the measured ORP value agrees with the ORP of a standard solution. During calibration, the measured ORP is made equal to the ORP of a standard solution at a single point.

Access the **Calibrate** menu by pressing **Enter/Menu** from the main screen.

7.3 Contacting conductivity calibration

New contacting conductivity sensors rarely need calibration. The cell constant printed on the label is sufficiently accurate for most applications.

After a conductivity sensor has been in service for a period, recalibration may be necessary. There are three ways to calibrate a sensor:

1. Use a standard instrument and sensor to measure the conductivity of the process stream. It is not necessary to remove the sensor from the process piping. The temperature correction used by the standard instrument may not exactly match the temperature correction used by the 1058. To avoid errors, turn off temperature correction in both the analyzer and the standard instrument.
2. Place the sensor in a solution of known conductivity and make the analyzer reading match the conductivity of the standard solution. Use this method if the sensor can be easily removed from the process piping and a standard is available. Be careful using standard solutions having conductivity less than 100 µS/cm. Low conductivity standards are highly susceptible to atmospheric contamination. Avoid calibrating sensors with 0.01/cm cell constants against conductivity standards having conductivity greater than 100 µS/cm. The resistance of these solutions may be too low for an accurate measurement. Calibrate sensors with 0.01/cm cell constant using method c.

3. To calibrate a 0.01/cm sensor, check it against a standard instrument and 0.01/cm sensor while both sensors are measuring water having a conductivity between 5 and 10 µS/cm. To avoid drift caused by absorption of atmospheric carbon dioxide, saturate the sample with air before making the measurements. To ensure adequate flow past the sensor during calibration, take the sample downstream from the sensor. For best results, use a flow-through standard cell. If the process temperature is much different from ambient, keep connecting lines short and insulate the flow cell.

Access the **Calibrate** menu by pressing **Enter/Menu** from the main screen. The following methods are supported:

Zero Cal	Zero the analyzer with the sensor attached
In Process Cal	Standardize the sensor to a known conductivity
Cell K	Enter the cell constant for the sensor
Meter Cal	Calibrate the device to a lab conductivity instrument
Cal Factor	Enter the Cal Factor for 4-Electrode sensors from the sensor tag

7.4 Toroidal conductivity calibration

Access the **Calibrate** menu by pressing **Enter/Menu** from the main screen. The following methods are supported:

Zero Cal	Zero the analyzer with the sensor attached
In Process Cal	Standardize the sensor to a known conductivity
Cell K	Enter the cell constant for the sensor

7.5 Amperometric free chlorine calibration

A free chlorine sensor generates a current directly proportional to the concentration of free chlorine in the sample. Calibrating the sensor requires exposing it to a solution containing no chlorine (zero standard) and to a solution containing a known amount of chlorine (full-scale standard). The zero calibration is necessary because chlorine sensors, even when no chlorine is in the sample, generate a small current called the residual current. The analyzer compensates for the residual current by subtracting it from the measured current before converting the result to a chlorine value. New sensors require zeroing before being placed in service, and sensors should be zeroed whenever the electrolyte solution is replaced.

Access the **Calibrate** menu by pressing **Enter/Menu** from the main screen. The following methods are supported:

Zero Cal	Zeroing the sensor in solution with zero free chlorine
Grab Cal	Standardizing to a sample of known free chlorine concentration

7.6 Amperometric total chlorine calibration

Total chlorine is the sum of free and combined chlorine. The continuous determination of total chlorine requires two steps. First, the sample flows into a conditioning system (TCL) where a pump continuously adds acetic acid and potassium iodide to the sample. The acid lowers the pH, which allows total chlorine in the sample to quantitatively oxidize the iodide in the reagent to iodine. In the second step, the treated sample flows to the sensor. The sensor is a membrane-covered amperometric sensor, whose output is proportional to the concentration of iodine.

Because the concentration of iodine is proportional to the concentration of total chlorine, the analyzer can be calibrated to read total chlorine. Because the sensor really measures iodine, calibrating the sensor requires exposing it to a solution containing no iodine (zero standard) and to a solution containing a known amount of iodine (full-scale standard). The Zero calibration is necessary because the sensor, even when no iodine is present, generates a small current called the residual current. The analyzer compensates for the residual current by subtracting it from the measured current before converting the result to a total chlorine value. New sensors require zeroing before being placed in service, and sensors should be zeroed whenever the electrolyte solution is replaced. The best zero standard is deionized water. The purpose of the In Process Calibration is to establish the slope of the calibration curve. Because stable total chlorine standards do not exist, the sensor must be calibrated against a test run on a grab sample of the process liquid. Several manufacturers offer portable test kits for this purpose.

Access the **Calibrate** menu by pressing **Enter/Menu** from the main screen. The following methods are supported:

Zero Cal	Zeroing the sensor in solution with zero total chlorine
Grab Cal	Standardizing to a sample of known total chlorine concentration

7.7 Amperometric monochloramine calibration

A monochloramine sensor generates a current directly proportional to the concentration of monochloramine in the sample. Calibrating the sensor requires exposing it to a solution containing no monochloramine (zero standard) and to a solution containing a known amount of monochloramine (full-scale standard). The Zero calibration is necessary because monochloramine sensors, even when no monochloramine is in the sample, generate a small current called the residual or zero current. The analyzer compensates for the residual current by subtracting it from the measured current before converting the result to a monochloramine value. New sensors require zeroing before being placed in service, and sensors should be zeroed whenever the electrolyte solution is replaced. The best zero standard is deionized water.

The purpose of the In Process calibration is to establish the slope of the calibration curve. Because stable monochloramine standards do not exist, the sensor must be calibrated against a test run on a grab sample of the process liquid. Several manufacturers offer portable test kits for this purpose.

Access the **Calibrate** menu by pressing **Enter/Menu** from the main screen. The following methods are supported:

Zero Cal	Zeroing the sensor in solution with zero monochloramine
Grab Cal	Standardizing to a sample of known monochloramine concentration

7.8 Amperometric dissolved ozone

An ozone sensor generates a current directly proportional to the concentration of ozone in the sample. Calibrating the sensor requires exposing it to a solution containing no ozone (zero standard) and to a solution containing a known amount of ozone (full-scale standard). The Zero Calibration is necessary because ozone sensors, even when no ozone is in the sample, generate a small current called the residual or zero current. The analyzer compensates for the residual current by subtracting it from the measured current before converting the result to an ozone value. New sensors require zeroing before being placed in service, and sensors should be zeroed whenever the electrolyte solution is replaced. The best zero standard is deionized water. The purpose of the In Process Calibration is to establish the slope of the calibration curve. Because stable ozone standards do not exist, the sensor must be calibrated against a test run on a grab sample of the process liquid. Several manufacturers offer portable test kits for this purpose.

Access the **Calibrate** menu by pressing **Enter/Menu** from the main screen. The following methods are supported:

Zero Cal	Zeroing the sensor in solution with zero total chlorine
Grab Cal	Standardizing to a sample of known ozone concentration

7.9 Amperometric dissolved oxygen

Amperometric Oxygen sensors generate a current directly proportional to the concentration of dissolved oxygen in the sample. Calibrating the sensor requires exposing it to a solution containing no oxygen (zero standard) and to a solution containing a known amount of oxygen (full-scale standard). The Zero Calibration is necessary because oxygen sensors, even when no oxygen is present in the sample, generate a small current called the residual current. The analyzer compensates for the residual current by subtracting it from the measured current before converting the result to a dissolved oxygen value. New sensors require zeroing before being placed in service, and sensors should be zeroed whenever the electrolyte solution is replaced. The recommended zero standard is 5% sodium sulfite in water, although oxygen-free nitrogen can also be used. Rosemount sensors used for the determination of trace (ppb) oxygen levels have very low residual current (typically less than 0.5 ppb oxygen) and do not normally require zeroing. The purpose of the In Process Calibration is to establish the slope of the calibration curve. Because the solubility of atmospheric oxygen in water as a function of temperature and barometric pressure is well known, the natural choice for a full-scale standard is air-saturated water. However, air-saturated water is difficult to prepare and use, so the universal practice is to use air for calibration. From the point of view of the oxygen sensor, air and air-saturated water are identical. The equivalence comes about because the sensor really measures the chemical potential of oxygen. Chemical potential is the force that causes oxygen molecules to diffuse from the sample into the sensor where they can be measured. It is also the force that causes oxygen molecules in air to dissolve in water and to continue to dissolve until the water is saturated with oxygen. Once the water is saturated, the chemical potential of oxygen in the two phases (air and water) is the same. Oxygen sensors generate a current directly proportional to the rate at which oxygen molecules diffuse through a membrane stretched over the end of the sensor. The diffusion rate depends on the difference in chemical potential between oxygen in the sensor and oxygen in the sample.

An electrochemical reaction, which destroys any oxygen molecules entering the sensor, keeps the concentration (and the chemical potential) of oxygen inside the sensor equal to zero. Therefore, the chemical potential of oxygen in the sample alone determines the diffusion rate and the sensor current. When the sensor is calibrated, the chemical potential of oxygen in the standard determines the sensor current. Whether the sensor is calibrated in air or air-saturated water is immaterial. The chemical potential of oxygen is the same in either phase. Normally, to make the calculation of solubility in common units (like ppm DO) simpler, it is convenient to use water-saturated air for calibration. Automatic air calibration is standard. The user simply exposes the sensor to water-saturated air. The analyzer monitors the sensor current. When the current is stable, the analyzer stores the current and measures the temperature using a temperature element inside the oxygen sensor. The user must enter the barometric pressure. From the temperature the analyzer calculates the saturation vapor pressure of water. Next, it calculates the pressure of dry air by subtracting the vapor pressure from the barometric pressure. Using the fact that dry air always contains 20.95% oxygen, the analyzer calculates the partial pressure of oxygen. Once the analyzer knows the partial pressure of oxygen, it uses the Bunsen coefficient to calculate the equilibrium solubility of atmospheric oxygen in water at the prevailing temperature. At 25 °C and 760 mmHg, the equilibrium solubility is 8.24 ppm. Often it is too difficult or messy to remove the sensor from the process liquid for calibration. In this case, the sensor can be calibrated against a measurement made with a portable laboratory instrument. The laboratory instrument typically uses a membrane-covered amperometric sensor that has been calibrated against water-saturated air.

Access the **Calibrate** menu by pressing **Enter/Menu** from the main screen. The following methods are supported:

Zero Cal	Zeroing the sensor in a medium with zero oxygen
Air Cal	Calibrating the sensor in a water-saturated air sample
In Process Cal	Standardizing to a sample of known oxygen concentration
Sen at 25 °C	Entering a known slope value for sensor response

7.10 Optical dissolved oxygen

There are three ways to calibrate the optical dissolved oxygen probe. This is done with water at set concentration points of dissolved oxygen for saturation calibrations, or against a reference instrument.

Access the **Calibrate** menu by pressing **Enter/Menu** from the main screen. The following methods are supported:

- One-point saturation
- Two-point saturation
- Concentration

7.11 Turbidity

Turbidity sensors are typically calibrated against a user-prepared standard as a 2-point calibration with deionized water, against a 20 NTU user-prepared standard as a single point calibration, or against a grab sample using a reference turbidimeter.

Access the **Calibrate** menu by pressing **Enter/Menu** from the main screen. The following methods are supported:

Slope	Slope calibration with pure water and a standard of known turbidity
Standardize	Standardizing the sensor to a known turbidity
Grab	Standardizing the sensor to a known turbidity based on a reference turbidimeter

7.12 Pulse flow

A variety of pulse flow sensors can be wired to the Flow signal input board to measure flow volume, total volume and flow difference (if 2 Flow signal boards are installed). The Flow signal input board will support flow sensors that are self-driven (powered by the rotation of the impeller paddle-wheel).

Access the **Calibrate** menu by pressing **Enter/Menu** from the main screen. The following methods are supported:

K Factor	A constant value representing pulses/Gal of flow
Frequency/Velocity	Requires manual entry of frequency (Hz) per velocity and pipe diameter used
In Process Cal	Based on known volume per unit of time

7.13 Temperature

Most liquid analysis measurements require temperature compensation (except ORP). The 1058 performs temperature compensation automatically by applying internal temperature correction algorithms. In some instances, temperature correction can also be turned off. If temperature correction is off, the device uses the manual temperature entered by the user in all temperature correction calculations.

To calibrate temperature, if applicable, access the **Calibration** screen by pressing **Enter/Menu** from the main screen, select **S1 or S2 Temperature** and press **Enter/Menu**.

8 Diagnostics

8.1 Warning and faults

The 1058 continuously monitors itself and the sensor(s) for wide range of Fault and Warning conditions. A display banner flashes red to indicate a Fault condition and yellow for a Warning condition. Details and troubleshooting information for any Fault or Warning can be accessed by pressing the **(i)** key.

8.2 pH/ORP sensor diagnostics

The 1058 provides useful diagnostic parameters for all types of connected pH/ORP sensors. This info can be viewed by pressing the (i) key and selecting **Sensor information**.

Depending on the sensor being used, available diagnostic info may include:

- Raw mV reading
- Glass and reference impedance
- Calibration slope and offset
- Sensor or signal input board hardware and software versions

8.2.1 SMART preamp pH advanced diagnostics

When used with Rosemount SMART pH sensors the 1058 provides advanced diagnostics to help the user understand the history of the sensor and how its health is changing over time. These diagnostics can be viewed by pressing **Enter/Menu**, selecting the **Data Storage and Retrieval menu**, navigating to the **View tab** → **View Digital Sensor Data**.

The available data includes the following:

- Sensor factory information
- Sensor calibration records

8.3 Conductivity sensor diagnostics

The 1058 provides useful diagnostic parameters for connected conductivity sensors. This info can be viewed by pressing the (i) key and selecting **Sensor information**.

Depending on the sensor being used, available diagnostic info may include:

- Sensor type
- Raw conductivity value
- Cell constant and zero offset
- Temperature reading, slope, and offset
- RTD resistance and cable resistance
- Signal input board hardware and software versions

8.4 Analog Oxygen, Ozone, and Chlorine sensor diagnostics

The 1058 provides useful diagnostic parameters for connected conductivity sensors. This info can be viewed by pressing the (i) key and selecting **Sensor information**.

Depending on the sensor being used, available diagnostic info may include:

- Measurement
- Sensor current
- Sensitivity at 25 °C
- Zero current
- Polarizing voltage
- Pressure at air calibration (oxygen sensors only)
- Temperature, temperature offset, and RTD resistance
- Signal input board hardware and software versions

8.5 Turbidity sensor diagnostics

The 1058 provides useful diagnostic parameters for connected conductivity sensors. This info can be viewed by pressing the (i) key and selecting **Sensor information**.

Depending on the sensor being used, available diagnostic info may include:

- Calibration slope
- Turbidity detector high and low mV values
- Lamp detector mV value
- Lamp current, voltage, and power
- Sensor type
- Signal input board hardware and software versions

8.6 Optical dissolved oxygen

The 1058 provides useful diagnostic parameters for connected optical dissolved oxygen sensors. The info can be viewed by pressing the (**i**) key and selecting **Sensor Information**.

Depending on the sensor being used, available diagnostic info may include:

- Sensor factory information
- Estimated remaining cap life
- Partial pressure
- Concentration
- Saturation
- Temperature
- Calibration offset
- Calibration slope

9 PID control

9.1 Introduction

9.1.1 Meaurement and setpoint (feedback control)

The 1058 controller is given two items of information: measurement and set point. The controller reacts to the difference in value of these two signals and produces an analog output signal to eliminate that difference. As long as the difference exists, the controller will try to eliminate it with the output signal. When measurement and set point are equal, the condition of the controller is static and its output is unchanged. Any deviation of measurement from set point will cause the controller to react by changing its output signal.

9.1.2 Proportional Mode

The simplest control is proportional control. In this control function, the error from set point, divided by the control range, is multiplied by the Gain constant to produce the output.

The control range is the percent of the analog output span (the difference between the 4 (or 0) mA and 20 mA settings) through which the measured variable must move to change the output from minimum to maximum.

The smaller the Gain, the less the controller reacts to changes in the measured variable. The larger the Gain, the more the controller reacts to changes in the measured variable.

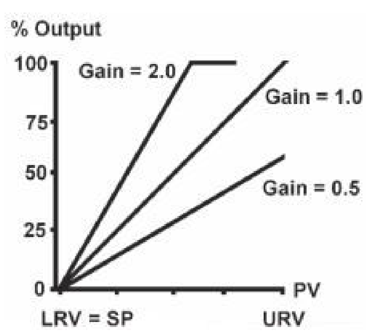
The proportional control output is given by the expression below. As can be seen, the overall gain is determined by the control range chosen (URV and LRV) and the Gain:

$$\text{Proportional Output}(\%) = \frac{Gain \times (PV - SP) \times 100}{(URV + LRV)}$$

Direct acting control action

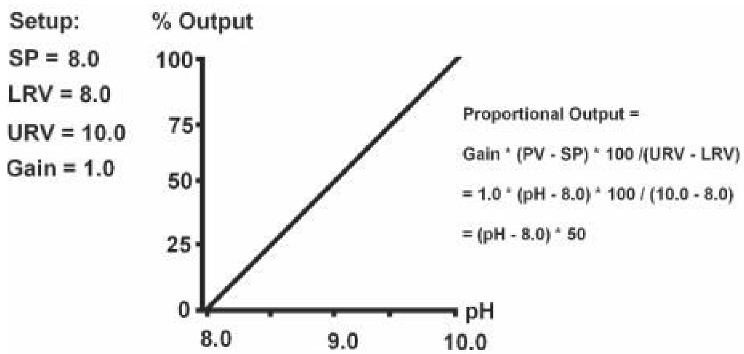
Direct acting control action increases the control output as the measured variable increases above the setpoint. The LRV is usually set to the setpoint value, so that the control output is 0% at the setpoint, and the URV is greater than the setpoint so that the 100% control output is at a higher measurement value. The Gain parameter can then be adjusted to produce the desired gain.

Figure 9-1: Direct acting control action



Example of direct acting control: Lower the pH of a solution at 10 pH by adding acid to control it at 8 pH with the Gain parameter assumed to be 1.0. The higher the measured pH, the more acid is required to lower the pH toward the setpoint, but as the pH approaches the setpoint less acid is required:

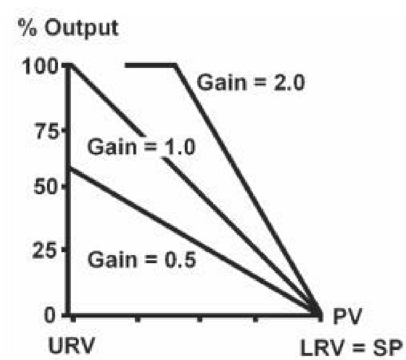
Figure 9-2: Example of direct acting control



Reverse acting control action

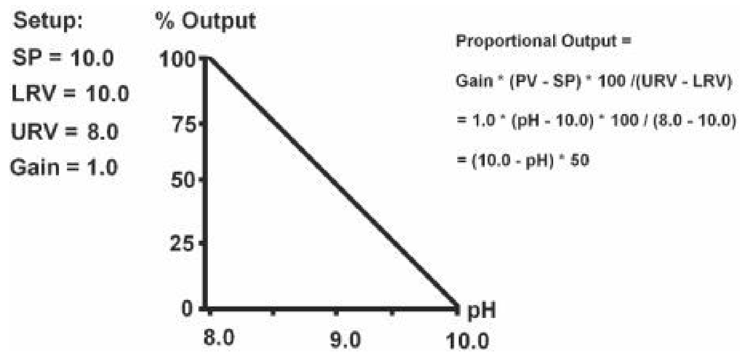
Reverse acting control action, decreases the control output as the measured variable increases toward the setpoint. The LRV is usually set to the setpoint value, so that the control output is 0% at the setpoint, and the URV is less than the setpoint value so that the 100% control output is at a lower measurement value. The Gain can then be adjusted to produce the desired gain.

Figure 9-3: Reverse acting control



Example of reverse acting control: Add base to a solution at 8.0 pH, to control the pH to 10.0 pH with an assumed Gain parameter of 1.0. The lower the measured pH, the more base is required to raise the pH toward the setpoint, but as the pH approaches the setpoint less base is required:

Figure 9-4: Example of reverse acting control



9.1.3 Proportional bias

Most processes require that the measured variable be held at the set point. The proportional mode alone will not automatically do this, if an output greater than 0% is needed to keep the PV at setpoint. At setpoint, the control output is 0%, and if a non-zero control output is needed to keep the PV at the setpoint, proportional alone will only stabilize the measured variable at some offset (deviation) from the desired setpoint.

Bias is used to provide a constant control output at the setpoint to maintain PV at the setpoint. The effect of Bias is expressed as follows:

$$\text{Proportional Output}(\%) = \left[\frac{Gain \times (PV - SP) \times 100}{(URV - LRV)}\right] + BIAS$$

Figure 9-5: Direct acting control with bias

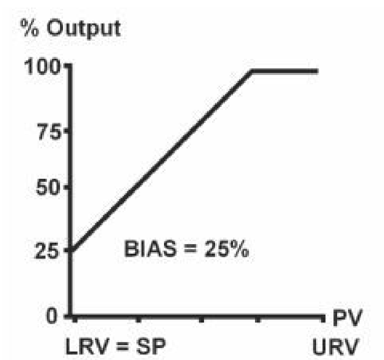
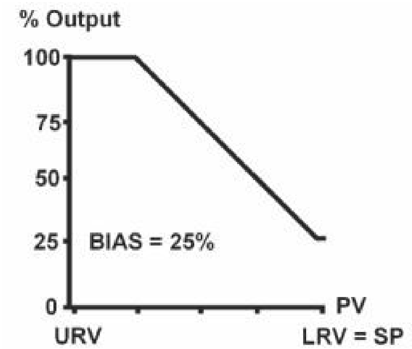


Figure 9-6: Reverse acting control with bias



9.1.4 Proportional plus integral (Reset)

For the automatic elimination of deviation, Integral mode, also referred to as Reset, is used. The proportional function is modified by the addition of automatic reset, rather than a constant Bias value. With the reset mode, the controller continues to change its output until the deviation between measurement and set point is eliminated.

The action of the reset mode depends on the overall gain. The rate at which it changes the controller output is based on the overall gain band size and the reset time (I). The reset time is the time required for the reset mode to repeat the proportional action once. It is expressed as seconds per repeat, adjustable from 0-3,000 seconds.

The reset mode repeats the proportional action as long as an offset from the set point exists. Reset action is cumulative. The longer the offset exists, the more the output signal is increased. If the PV overshoots the setpoint, the reset action will decrease. When the measurement reaches the setpoint and the proportional control action becomes zero, there will be an accumulated integral control action to keep the process at the setpoint.

The controller configured with reset continues to change until there is no offset. If the offset persists, the reset action eventually drives the controller output to its 100% limit - a condition known as "reset windup".

Once the controller is "wound up", the deviation must be eliminated or redirected before the controller can unwind and resume control of the measured variable. The integral time can be cleared and the "windup" condition quickly eliminated by manually overriding the 1058 analog output using the manual mode to reduce the control output and then setting the reset time to 0 seconds to make integral control action 0%. The reset time can then be changed to avoid reset windup.

The proportional plus integral control output is given below. Note that the larger the reset time (I), the slower the integral response will be:

$$Output = \left[\frac{Gain \times 100}{(URV - LRV)}\right] \times \left[\frac{(PV - SP) + 1}{I(PV_t - SP)\Delta t}\right]$$

9.1.5 Derivative mode (Rate)

Derivative mode provides a 3rd control mode, which responds to the rate of change of the Proportional control output, multiplied by the Derivative parameter D which has units of seconds. The contribution of the derivative response is given below:

$$Output = \left[\frac{Gain \times 100}{(URV - LRV)}\right] \times D \times \frac{[(PV_t - SP) - (PV_{t-1} - SP)]}{\Delta t}$$

The purpose of derivative action is to provide a quick control response to changes in the measured parameter. In general, it is not often used in concentration control, and in fact, it has been estimated that 90 to 95% of all control applications use only Proportional plus Integral control. Any noise in the measurement causes problems with derivative action. Temperature measurements tend to be less noisy than other measurements, and derivative action is most often used for temperature control.

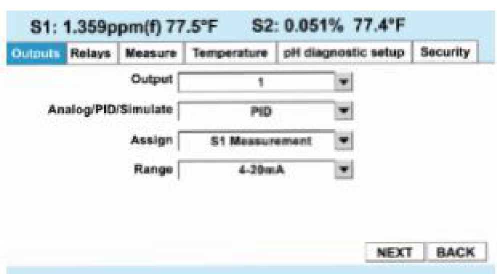
9.2 PID setup

9.2.1 PID control

The 1058 current ¬outputs (one or all four) can be programmed for PID control. PID control can be applied to any of the measurements provided by the sensor boards, such as pH, conductivity, and concentrations. In addition, PID control can be applied to temperature and any measurement input to the 1058 using the flow/4-20 mA board. The output signal of PID control is used with a final control element, which can vary is output from 0 to 100% in response to the control signal. Final control elements can include control valves, pumps or heaters.

9.2.2 Selecting PID control

Select PID control, the analog output to be used, and the measurement and range from the main analog output setup window:



Basic definitions

Output	Select the analog output (1 through 4) to be configured for PID control
Analog/PID/ Simulate	Choose PID
Assign	Select the measurement to be controlled

Note
This measurement can also be a 4-20 mA signal input brought in by the flow/ 4-20 mA board.

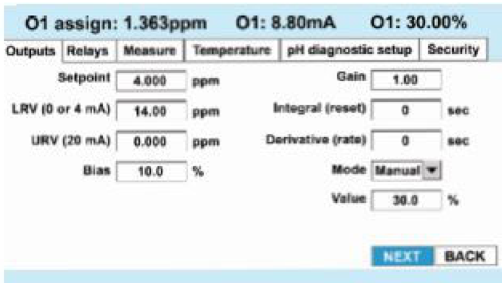
Range	Select either 0-20 mA or 4-20 mA range, depending on the signal range used by the final control element, e.g. a pump or valve

Select **Next** to go to the PID Setup parameters.

9.2.3 PID setup parameters

The PID control setup window contains the PID control tuning parameters.

Also note that the upper portion of the screen shows the measurement chosen for control (PV), and the control output in mA and percent output. This makes it possible to observe the primary variable (PV) and the control output, in terms of percent and milliamps, while tuning PID control.



Basic definitions

Setpoint
Select the desired setpoint.

Upper Range Value (URV)
The value of PV (in the above example, 14.00 pH) at which the control will be 20 mA or 100% output.

Lower Range Value (LRV)
The value of PV (in the above example 0.00 pH) at which the control will be 0 or 4 mA or 0% output. Reference Manual Section 7: PID Control 00809-0100-3056 March 2020 PID Control 60

Note
If you want the control output to increase as PV (in this case pH) increases, URV should be greatert han LRV. This is direct acting control action. Examples of direct acting control are the addition of acid to decrease pH and adding water to a solution to decrease the concentration.

Bias
range: 0 to 100%; default 0%

Bias is a fixed control output which allows the control output to be greater than zero when the measurement (PV) is at setpoint. It is used in proportional only control to prevent cycling resulting from the control output going to zero at the setpoint.

Gain
range: 0.0 to 1000.0; default 0.0

In proportional (P) only control, the output is directly proportional to the difference between the process variable (PV) and the setpoint divided by the output span (URV – LRV). Gain is a factor which multiplies the proportional output to meet the requirements of the process being controlled. Using Gain values less than 1 reduce the proportional output while Gain values greater than 1 increase the proportional output.

Integral (Reset, I)
range: 0 to 3,000 seconds; default 0 seconds

Integral repeats the proportional action in a time period given by the reset time (I). The reset time is given in seconds per repeat and is adjustable from 0 to 3,000 seconds. Integral control acts as an automatic bias which increases or decreases the overall control output in response to the error (PV – SP) to keep the PV at the setpoint.

Derivative (Rate, D)
range: 0 to 3,000 seconds; default 0 seconds

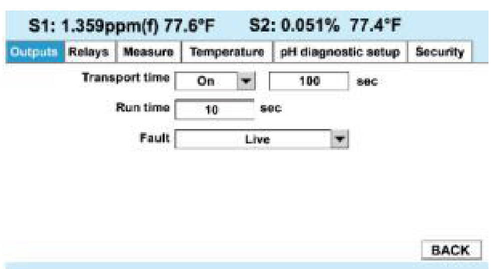
Derivative action, gives an immediate control output in response to changes in the proportional output with time (derivative). The amount of increase or decrease depends on the rate of change of the error. The rate constant (D) allows the user to adjust the amount derivative

	control contributes to the control signal. Smaller values reduce the effect of derivative control.
Mode	Mode has two settings, Auto (Automatic) and Man (Manual). In the Auto mode the control output is controlled automatically by the PID algorithm. In manual mode, the control output can be set to a constant value; this is useful during transmitter calibration or servicing.
Value (Manual)	range: 0 to 100% When the Manual mode is chosen; this control appears on the screen and allows you to write the constant control output value in the Manual mode.

Using the **Next** button lead to the final PID control window.

9.2.4 Transport time

Transport Time makes it possible to apply PID control action to a process flowing in a pipe for a short period of time (run time), and then hold the control output fixed to allow the treated sample time to mix and travel to the pH or other analytical sensor (transport time). If properly tuned the PV should reach the setpoint after successive time periods. It is best used when raw sample pH (or concentration) remains relatively steady for long periods of time, as is the case for samples flowing from a large body of water. It should not be used where process upsets are possible because the delay in applying control will make recovery from the upset slow, and can result in overshoot after the incoming sample has



Basic definitions (transport time parameters)

Transport time (On/Off)	Turns the Transport Time feature on or off.
Transport time	range 1 to 600 seconds When Transport Time is turned On; a control appears at the right of it, which allows the value of the Transport Time to be enter. This will be the time period that PID control output is held constant, while the treated sample travels to the sensor.
Run time	range 0 to 60 seconds This is the time period that PID control action is automatic. It always must be a shorter time than Transport Time.

Basic definitions (fault)

Fault	When a measurement fault occurs (either sensor or transmitter) the control output can be setup to continue providing a live control output or the output can be set to a fixed value. If the live reading is used during a fault condition, the control output could be based on an erroneous measurement, which might

cause problems. Using a fixed value for control output during a fault condition can ensure that the control output goes to an acceptable value.

Fault current If a fixed value on fault is chosen, this parameter selects the output. The control output on fault can be set to a value to prevent a major upset or an unsafe condition.

Note
If a fixed fault current output is chosen and PID control Mode is set to Manual, the Manual output value will override the Fault Current value.

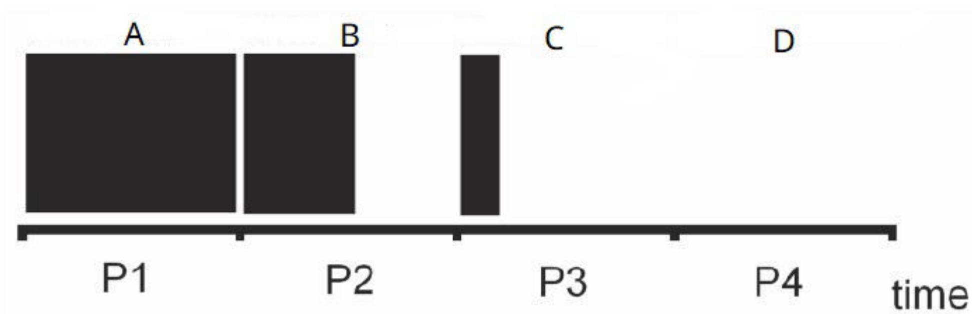
10 Time proportional control

10.1 Introduction

10.1.1 Time proportional control

Time Proportional Control is more commonly known as Duty Cycle or Pulse Width Modulation. It applies PID control to the activation of a relay rather than using an analog output.

The TPC output is defined as the percent of time that a relay is on (% On Time), during a user selected time period (Time Period). As the control output increases the on time increases:



A. 100% on time
B. 50% on time
C. 20% on time
D. 0% on time

The proportional, integral, and derivative are defined the same as analog PID control, but use % On Time instead of % Output:

$$Proportional\ On\ Time(\%) = \left[\frac{Gain \times (PV - SP) \times 100}{(URV - LRV)}\right] + BIAS$$

Proportional and Integral Control:

$$On\ Time = \left[\frac{Gain \times 100}{(URV - LRV)}\right] + \left[\frac{(PV - SP) + 1}{I(PV_t - SP)\Delta t}\right]$$

Derivative Mode:

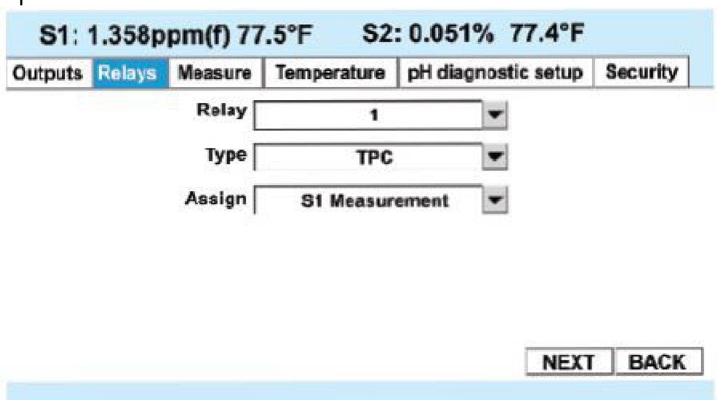
$$On\ Time = \left[\frac{Gain \times 100}{(URV - LRV)}\right] \times D \times \left[\frac{(PV_t - SP) - (PV_{t-1} - SP)}{\Delta t}\right]$$

As with analog PID control, TPC can be direct acting (URV > LRV) or reverse acting (LRV > URV).

10.2 TPC setup

10.2.1 Selecting TPC

Select TPC control, the relay to be used, and the measurement to be controlled from the main relay setup window:



Basic Definitions

Relay Select the relay (1 through 4) to be use for TPC control

Type Choose TPC

Assign Select the measurement to be controlled

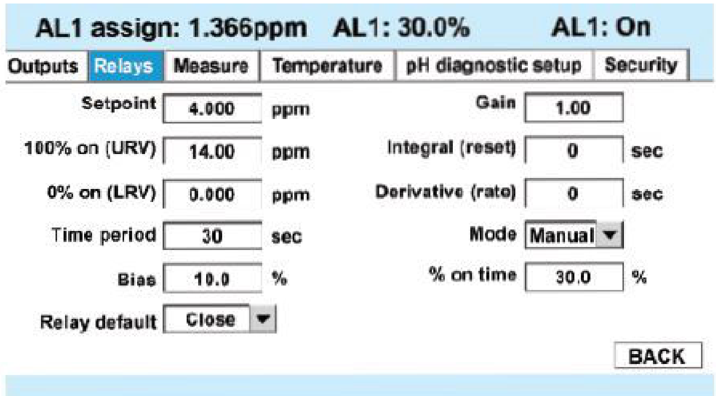
Note
This measurement can also be a 4-20 mA signal input brought in by the flow/ 4-20 mA board.

Select **Next** to go to the PID Setup parameters.

10.2.2 TPC setup parameters

The TPC setup window contains the PID control tuning parameters.

Also note that the upper portion of the screen shows the relay number and the value of the measurement assigned to it, the % On Time for the relay, and the current state of the relay, i.e. On or Off. This makes it possible to observe the primary variable (PV), the % On Time, and the relay state, while tuning time proportional control.



PID control parameters (basic definitions)

Setpoint Select the desired setpoint.

URV The value of PV (in the above example, 14.00 pH) at which the control will be 100% On Time.

LRV The value of PV (in the above example 0.00 pH) at which the control will be 0% On Time.

Note
If you want the control output to increase as PV (in this case pH) increases, URV should be greater than LRV. This is direct acting control action. Examples of direct acting control are the addition of acid to decrease pH and adding water to a solution to decrease the concentration.

Note
If you want the control output to decrease as PV increases, i.e. reverse acting control action, the URV should be less than LRV. Examples of reverse acting control are adding caustic to increase pH and adding a concentrated solution to water to make a solution of lower concentration.

Time Period range: 10 to 3000 seconds; default 30 seconds

The time period for each cycle of TPC.

Bias range: 0 to 100%; default 0%

Bias is a fixed control output which allows the % On Time to be greater than zero when the measurement (PV) is at setpoint. It is used in proportional only control to prevent cycling resulting from the % On Time going to zero at the setpoint.

Relay default (Close, Open, None) Select the relay action during a fault condition.

Gain range: 0.0 to 1000.0; default 0.0

In proportional (P) only control, the output is directly proportional to the difference between the process variable (PV) and the setpoint divided by the output span (URV – LRV). Gain is a factor which multiplies the proportional output to meet the requirements of the process being controlled. Using Gain values less than 1 reduce the proportional output while Gain values greater than 1 increase the proportional output.

Integral (Reset, I) range: 0 to 3000 seconds; default 0 second

Integral repeats the proportional action in a time period given by the reset time (I). The reset time is given in seconds per repeat and is adjustable from 0 to 3000 seconds. Integral control acts as an automatic bias which increases or decreases the overall control output in response to the error (PV – SP) to keep the PV at the setpoint.

Derivative (Rate, D)

range: 0 to 3000 seconds; default 0 second

Derivative action, gives an immediate control output in response to changes in the proportional output with time (derivative). The amount of increase or decrease depends on the rate of change of the error. The rate constant (D) allows the user to adjust the amount derivative control contributes to the control signal. Smaller values reduce the effect of derivative control.

Mode

Mode has two settings, Auto (Automatic) and Man (Manual). In the **auto mode** the control output is controlled automatically by the PID algorithm. In **manual mode**, the control output can be set to a constant value; this is useful during transmitter calibration or servicing.

On Time (Manual)

range: 0 to 100%

When the manual mode is chosen; this control appears on the screen and allows you to write the constant On Time value in the manual mode.

11 Alarm relay functions

11.1 General

An alarm is a relay that closes a set of contact points (a switch) inside the analyzer. In doing so, the relay closes an electrical circuit and turns on a device wired to the contacts. The 1058 Advanced Analyzer has four alarm relays and seven relay control functions. The relays are turned on and off by the analyzer based on the control points, setpoints or control parameters that you program into the analyzer through the keypad. See Section 11.2 through 11.7 to program the alarm relay functions. Each relay functions section includes a description, a figure detailing its operation, a step-by-step setup procedure, and a table or default and programmable limit settings.

The 1058 has the following relay control functions:

Table 11-1: Alarm relay functions

Relay control functions	Common applications
High/Low concentration alarm	measurement setpoint control
Delay timer	chemical mixing and neutralization
Bleed and feed	blowdown and chemical addition
Totalizer based relay activation	chemical dosing in reactors
Interval timer	periodic probe cleaning
Date and time activation	seawater-cooled condensers

The analog alarm and saturation values used by the transmitter depend on whether it is configured to standard or NAMUR-compliant operation. These values are also custom-configurable in both the factory and the field using the HART communications.

The limits are:

- $21.0 \leq I \leq 23$ for high alarm
- $20.5 \leq I \leq 20.9$ for high saturation
- $3.70 \leq I \leq 3.90$ for low saturation
- $3.50 \leq I \leq 3.75$ for low alarm

Note
A 0.1 mA separation between low saturation and low alarm is required.

Table 11-2: Values for Standard and NAMUR Operation

Standard operation		NAMUR-compliant operation	
Fail high	22.5 mA	Fail high	22.5 mA
High saturation	20.8 mA	High saturation	20.5 mA
Low saturation	3.9 mA	Low saturation	3.8 mA
Fail low	$I \leq 3.75$ mA	Fail low	$I \leq 3.6$ mA

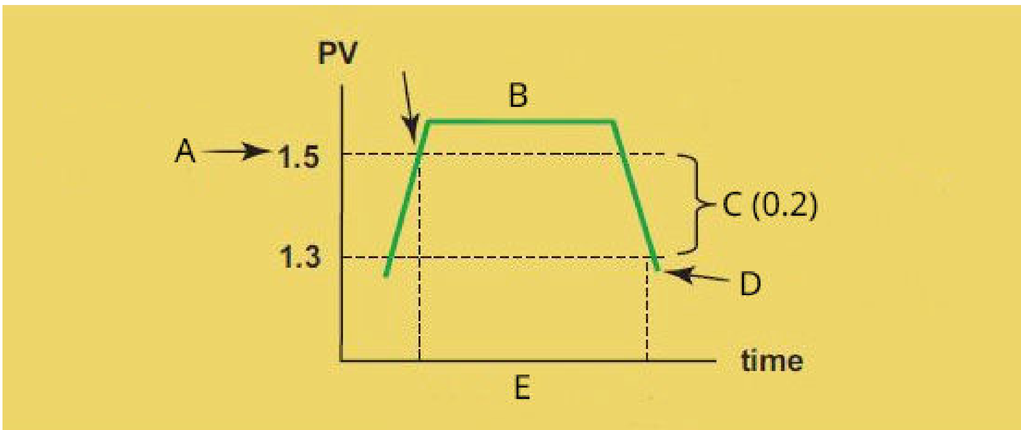
11.2 High/Low concentration alarm

11.2.1 Description

High/Low concentration alarms are setpoint alarms with adjustable deadband. These operate as simple on/off alarms used for applications requiring discrete on/off control of pumps and valves. Typical applications include demineralizer bed regeneration and blowdown in boilers and cooling towers. Any active device variable in the 1058 analyzer can be programmed as a high/low concentration alarm including the primary or secondary variables, temperature, raw values and diagnostics.

A schematic of the high/low concentration (setpoint) alarm operation is shown below.

Figure 11-1: High/Low concentration alarm operations



A. *High alarm setpoint*
B. *Alarm activates*
C. *Deadband*
D. *Alarm deactivates*

11.2.2 Setup

Access high/low concentration (setpoint) alarms by pressing **Enter/Menu** from the main screen and then **Program/Relays/Configure Relay**. From the main relay programming screen, program this feature as follows:

Procedure

1. Assign a relay by highlighting the desired relay 1-4 and press **Enter/Menu**.
2. Select **Setpoint** as the relay type and press **Enter/Menu**.
3. Assign S1 (sensor 1), S2 (sensor 2 if available) or other available parameters to the designated relay and press **Enter/Menu**.
4. Set **High** for high reading setpoint logic or **Low** for low reading setpoint logic and press **Enter/Menu**.
5. Enter the desired setpoints value. Press **Enter/Menu**.
6. To set deadband as a measurement value, enter the change in the process value needed after the relay deactivates to return to normal (and thereby preventing repeated alarm activation). Press **Enter/Menu**.

7. Select **Next**. Press **Enter/Menu** to advance to the next setup screen.
8. Set the normal alarm condition as **Open** or **Closed** and press **Enter/Menu**. Program the normal state to define the desired alarm default state to normally open or normally closed upon power up.

Table 11-3: Defaults and progammable limits (High/Low concentration alarm)

Relay Function	Limits and selections	Default
Setpoint	NA	NA
Logic	Low/High	High
Setpoint	(1)	(1)
Deadband	(1)	0.00
On time	0 to 999.9 min	0 min
Delay time	0 to 999.9	0 min
Normal state	Close/Open	Open

(1) See Appendix 1 – HART and Device Variables

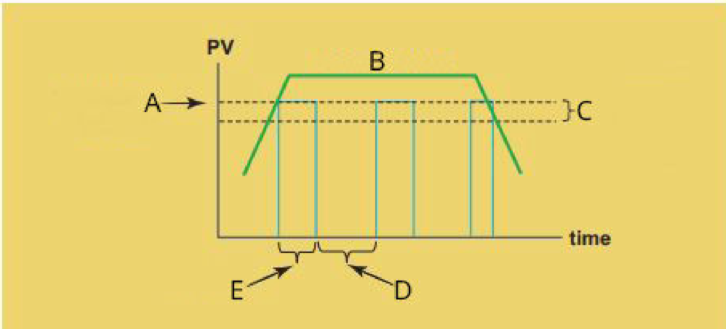
11.3 Delay timer

11.3.1 Description

Delay Timer is a concentration control scheme which delays live measurement after chemical addition using (one or all four of) of the 1058 alarm relays. This ensures sufficient mixing time in a vessel or recirculation loop before live sensor measurement, preventing unmixed readings that might cause overshooting. Relay On time and Delay times are fieldprogrammable. Typical applications that would utilize the Delay Timer are: concentration control in vessels, pH adjustments for neutralization and endpoint control for oxidationreduction reactions

A schematic of the Delay Timer operation is shown:

Figure 11-2: Delay timer Alarm operation



A. High alarm setpoint
B. Measurement
C. Deadband
D. Delay time
E. On time

11.3.2 Setup

Access Delay Timer by pressing **Enter/Menu** from the main screen and then **Program/Relays/Configure Relay**. From the main relay programming screen, program this feature as follows:

Procedure

1. Assign a relay by highlighting the desired relay 1-4 and press **Enter/Menu**.
2. Select **Delay Timer** as the relay type and press **Enter/Menu**.
3. Assign S1 (sensor 1), S2 (sensor 2 if available) or other available parameters to the designated relay and press **Enter/Menu**.
4. Set **High** for high reading setpoint logic or **Low** for low reading setpoint logic and press **Enter/Menu**.
5. Enter the desired setpoints value. This will activate an alarm event when the process measurement reaches the entered setpoint value. Press **Enter/Menu**. See Table 11-4 for entry limits.
6. To set deadband as a measurement value, enter the change in the process value needed after the relay deactivates to return to normal (and thereby preventing repeated alarm activation). Press **Enter/Menu**.
7. Select **Next**. Press **Enter/Menu** to advance to the next setup screen.
8. Enter the time in minutes (X.X min) for the relay to remain energized. The assigned measurement value will be on hold during this time.
9. Enter the time in minutes (X.X min) to take the assigned measurement off hold after the relay is re-energized to begin reporting live values.
10. Set the normal alarm condition as **Open** or **Closed** and press **Enter/Menu**. Program the normal state to define the desired alarm default state to normally open or normally closed upon power up.

Table 11-4: Defaults and programmable limits (Delay Timer)

Relay functions	Limits and selection	Default
Delay timer	NA	NA
Logic	Low/High	High
Setpoint	(1)	(1)
Deadband	(1)	0.000
Normal state	Close/Open	Open

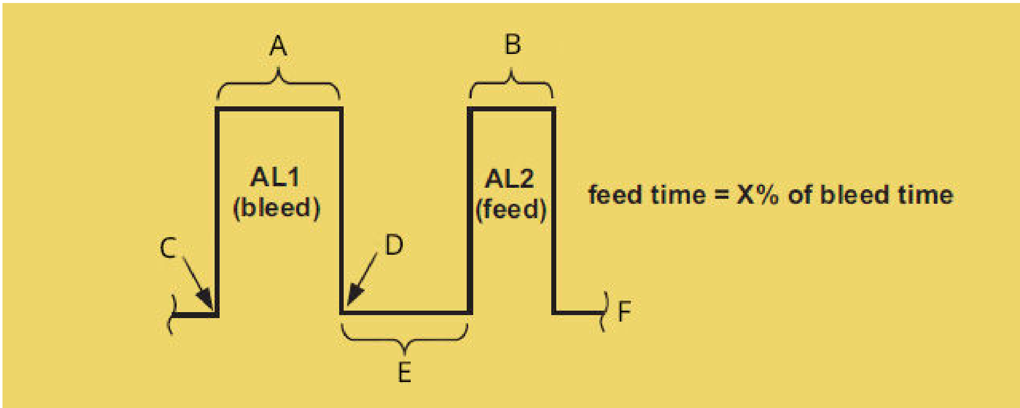
11.4 Bleed and feed

11.4.1 Description

A bleed and feed timer is typically used to replace chemicals lost during blowdown. It involves two or more relays. The bleed relay is a normal setpoint alarm relay. Once the bleed relay deactivates, one or more feed relays activate for a percentage of the time the bleed relay was on. Bleed and Feed supports continuous monitoring of blow-down water conductivity to determine the point of excessive conductivity. At a programmable maximum concentration value, dumping (bleeding) of the excessively dirty blow-down water is triggered. Subsequently, pumping (feeding) of additional make-up water chemicals is enabled to account for lost blow-down water. Through level control, make-up water is added in proportion to the volume of blowdown material lost through dumping and evaporation.

A schematic of the Bleed and Feed timer operation is shown:

Figure 11-3: Bleed and feed timer alarm operation



A. Bleed on
B. Feed on
C. On
D. Off
E. Delay
F. Time

11.4.2 Setup

Access Bleed and Feed Timers by pressing **Enter/Menu** from the main screen and then **Program/Relays/Configure Relay**. From the main relay programming screen, program this feature as follows:

Procedure

1. Assign relay 1 for Bleed and Feed and press **Enter/Menu**.
2. Select **Bleed and Feed** as the relay type and press **Enter/Menu**.
3. Assign S1 (sensor 1), S2 (sensor 2 if available) or other available parameters to the designated relay and press **Enter/Menu**.
4. Set **High** for high reading setpoint logic or **Low** for low reading setpoint logic and press **Enter/Menu**.
5. Enter the desired setpoints value. This will activate an alarm event when the process measurement reaches the entered setpoint value. Press **Enter/Menu**. See Table 11-5 for entry limits.
6. Select **Next**. Press **Enter/Menu** to advance to the next setup screen.
7. To set deadband as a measurement value, enter the change in the process value needed after the relay deactivates to return to normal (and thereby preventing repeated alarm activation). Press **Enter/Menu**.
8. Set the normal alarm condition as **Open** or **Closed** and press **Enter/Menu**. Program the normal state to define the desired alarm default state to normally open or normally closed upon power up.
9. Select **Next**. Press **Enter/Menu** to advance to the next setup screen: ***Configure feed relay***.

10. Assign relay 2, 3, or 4 as a feed relay and press **Enter/Menu**.
11. No entry required on the linked to bleed relay. The relay originally programmed as the bleed relay is displayed.
12. Enter the time in minutes (X.X min) after the bleed time is activated before triggering this feed relay.
13. Enter the percent of time that the Bleed timer is on (X.X%) to activate this feed relay (for pumping make-up water chemicals).

Table 11-5: Defaults and programmable limits (Bleed and Feed)

Relay Function	Limits and selections	Default
Bleed and Feed	NA	NA
Logic	Low/High	High
Setpoint	(1)	(1)
Deadband	(1)	0.000
Normal state	Close/Open	Open
Feed relay	1,2,3,4	not assigned
Linked to bleed relay	1,2,3,4	1
Delay time	0-999.9 min	1.0 min
Feed time equals	0.999.9% of bleed time	10.0%
Normal state	Close/open	Open

11.5 Totalizer based relay activation

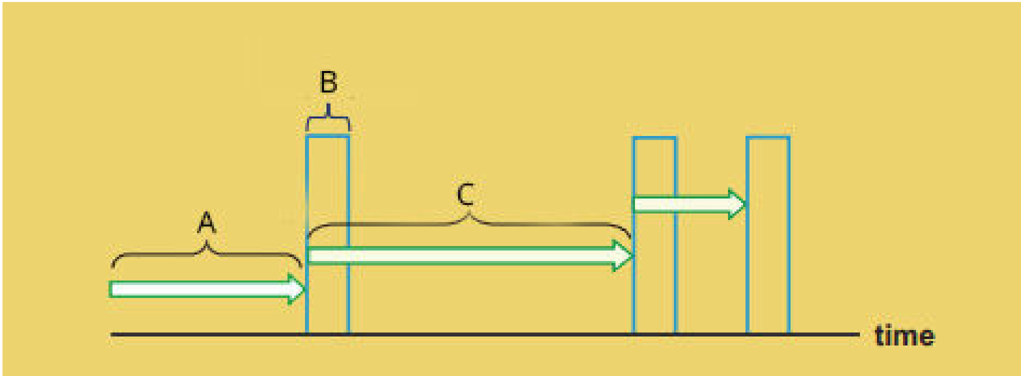
11.5.1 Description

A totalizer based timer feeds chemicals for a preset period every time a programmed volume of liquid has been added to or removed from a vessel. The relay energizes when the volume has been reached and remains energized for a fixed time. The process repeats once the volume has been reached again. Totalizer Based Relay Activation triggers a relay at user-defined intervals based on accumulated totalized flow. The scheme uses pulse inputs from a flow meter or 4-20mA current input(s) from a flow transmitter to calculate total flow (as volume).

A typical application fortotalized flow relay activation is controlling chemical dosing in reactors.

A schematic of the Totalizer timer operation is shown:

Figure 11-4: Totalizer alarm operation



A. X volume accumulated
B. Relay on time
C. X volume accumulated

11.5.2 Setup

Access Totalizer Timers by pressing **Enter/Menu** from the main screen and then **Program/ Relays/Configure Relay**. From the main relay programming screen, program this feature as follows:

Procedure

1. Assign a relay by highlighting the desired relay 1-4 and press **Enter/Menu**.
2. Select Totalizer timer as the relay type and press **Enter/Menu**.
3. Assign Pulse flow S1 (sensor 1) or S2 (sensor 2) as the measurement input and press **Enter/Menu**.
4. Enter accumulated volume (XX.XXXX) and units of measurement (gal, thousand gal, million Gal, trillion Gal).
5. Enter the time in minutes (X.X min) for the relay to remain energized. The assigned measurement value will be on hold during this time.
6. Set the normal alarm condition as **Open** or **Closed** and press **Enter/Menu**. Program the normal state to define the desired alarm default state to normally open or normally closed upon power up.

Table 11-6: Defaults and programmable limits (Totalizer Based Relay Activation)

Relay functions	Limits and selection	Default
Totalizer Based Timer	NA	NA
Activate relay after	0 to 99.9990	10
Units	Gal, Liters, cu ft,m^3 accumulated	E3 gal (x1000 gal) accumulated
On time	0 to 999.9 min	0 min
Normal state	Close/Open	Open

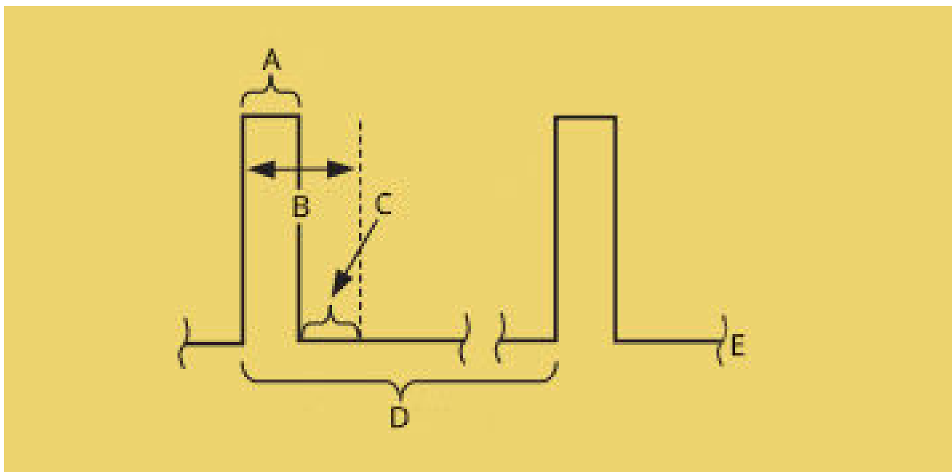
11.6 Interval timer

11.6.1 Description

The interval timer may be used for periodic sensor cleaning or periodic process adjustment. The cycle begins at the Interval time when the switch is turned on. When the Interval time has expired, the analyzer activates hold mode on the assigned measurement and the relay is energized for the On time period.

A schematic of the Interval timer operation is shown:

Figure 11-5: Interval timer alarm operations



A. On time
B. Hold
C. Recovery time
D. Interval time
E. Time

11.6.2 Setup

Access Interval timer by pressing **Enter/Menu** from the main screen and then **Program/ Relays/Configure Relay**. From the main relay programming screen, program this feature as follows:

Procedure

1. Assign a relay by highlighting the desired relay 1-4 and press **Enter/Menu**.
2. Select Interval timer as the relay type and press **Enter/Menu**.
3. Enter the time in hours (XX.X hours) between complete interval cycles.
4. Enter the time in minutes (X.X min) for the relay to remain energized. The assigned measurement value will be on hold during this time.
5. Enter the time in minutes (XX min) before the process is restored and live measurements can resume.
6. **Note**
   1058 units with software ver. 2.1X and greater allow override of interval timer to ensure that all relays and outputs are held if desired.

Select which sensors outputs should be on hold (S1, S2 or both) during the interval timer activation time. Press **Enter/Menu**.

7. Select **Next**. Press **Enter/Menu** to advance to the next setup screen.
8. Set the normal alarm condition as **Open** or **Closed** and press **Enter/Menu**. Program the normal state to define the desired alarm default state to normally open or normally closed upon power up.

Table 11-7: Defaults and programmable limits (Interval Timer)

Relay functions	Limits and selections	Default
Interval timer	NA	NA
Interval time	0 to 999.9 hr	24.0 hr
On time	0 to 999.9 sec	10sec
Recovery time	0 to 999 sec	60 sec
Hold while active	0 to 999 sec	0 sec
Normal state	Sensor 1, Sensor 1, both	Sensor 1

11.7 Date and time activation

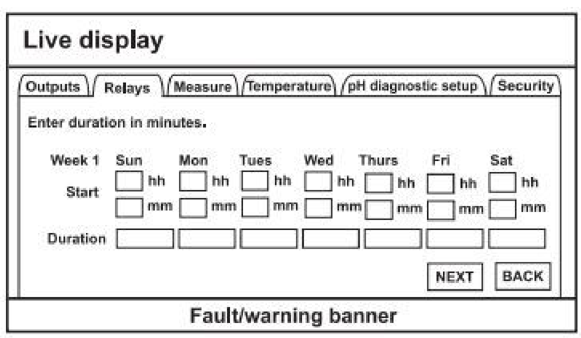
11.7.1 Description

This relay feature allows programming of 1 to 4 relays to activate on an assigned day of the week and time of day or night for an assigned interval. They function like sprinkler timers. The programmable timeframe cycle is two weeks.

An example application for Date and Time Activation is daily chlorine dosing in seawatercooled condensers.

The Date and Time relay setup screen is shown:

Figure 11-6: Date and Time alarm operation



11.7.2 Setup

Access Date and Time timer by pressing **Enter/Menu** from the main screen and then **Program/Relays/Configure Relay**. From the main relay programming screen, program this feature as follows:

Procedure

1. Assign a relay by highlighting the desired relay 1-4 and press **Enter/Menu**.
2. Select Date and Time timer as the relay type and press **Enter/Menu**.
3. Select **Next**. Press **Enter/Menu** to advance to the next setup screen.
4. The Week 1 calendar will appear. Program the start relay activate time by entering day(s) of week, hour(s) of day and minutes for each hour. Enter the duration of time in minutes (XX min) for relay activation.

   Note
   Up to four relays can be simultaneously energized for any programmed times.

5. Select **Next**. Press **Enter/Menu** to advance to the next setup screen.
6. The Week 2 calendar will appear. Repeat the programming entries for week 2 in the same manner as week 1.

   Note
   Up to four relays can be simultaneously energized for any programmed times.

   ⚠ CAUTION

   Date and Time timer operation depends on accurate setup of the internal real time clock. Continuous powered operation of the 1058 analyzer is recommended to preserve programmed Date and Time timer clock settings.

12 HART® communications

The 1058 can communicate with a HART host using HART Revision 7. Examples of HART hosts include Emerson AMS Device Manager and an Emerson TREX Field Communicator. HART communications is superimposed on Analog Output 1 for all of the measurements and parameters of the 1058.

12.1 Confirming correct device driver

Verify that the latest device driver (DD/DTM™) is loaded on your systems to ensure proper communications

- Download the latest DD at Emerson.com or FieldCommGroup.org.
- In the **Browse by Member drop-down** menu, select **Emerson**.
- Select the desired product.
- Use the device revision numbers to find the correct DD.

Table 12-1: Device revision information

Release Date	NAMUR software revision(1)	NAMUR hardware revision (1)	HART Universal Revision	Device Revision(2)	Manual Document Number	Change Description
March 2023	1.3.xx	1.0.xx	7	1	TBD	Initial release

(1) NAMUR hardware and software revision can be accessed within the device by pressing (i) and selecting Analyzer Information. Differences in level 3 changes, signified above by the xx, represent minor product changes as defined by NE53. Compatibility and functionality are preserved, and you can use the product interchangeably.

(2) Device Driver file names use Device and DD Revision, e.g., 10_01. HART Protocol is designed to enable legacy device driver revisions to continue to communicate with new HART devices. To access new functionality, you must download the new Device Driver. Emerson recommends downloading new Device Driver files to ensure full functionality

12.2 HART® configuration

To access the ***HART Configuration*** screens, press the **HART** button in the main menu. The following controls are available:

Tag	The traditional 8-character HART tag number.
Long tag	HART tag number of up to 32 characters (HART 7 only).
Polling address	Choose **0** unless multidrop is being used. If multidrop is being used, each transmitter should have its own polling address of from 1 to 15. When the polling address is greater than "0", the 4-20 mA output is held at 3 mA.
Loop current mode	Set Output 1 current to a minimum value for multidrop applications.
Output 1 Power	Select **Internal** to power Output 1 with the 1058. Select **External** to power the current loop with an external 24 VDC power supply or a host I/O that provides power (source) to the transmitter (sink).

12.3 Measurements available via HART®

Several live measurements are made available by HART in addition to the main measurements such as pH or Conductivity. All these measurements are called Device Variables, which can be mapped to the Dynamic Variables PV, SV, TV, and QV for regular reading by the typical HART host.

The 1058 assigns the Dynamic Variables PV, SV, TV, and QV to Analog Outputs 1, 2, 3, and 4 respectively. Conversely, measurements assigned to Outputs 1 through 4, will automatically be assigned to PV through QV.

Each signal input board has its own set of Device Variables, based on the secondary measurements used in making the main measurement.

12.4 Wireless communication

The 1058 can communicate by Wireless HART using an Emerson Wireless THUM Adaptor and an Emerson Smart Wireless Gateway. All the information available with the wired device can be accessed wirelessly, making it possible to have the measurements and benefits of HART® communication in locations where running cable would be difficult or expensive.

13 Maintenance

The 1058 needs almost no routine maintenance. Periodically clean the analyzer window and housing as needed with a cloth dampened with water. Do not use abrasives or cleaning solutions.

14 Product certifications

For Rosemount 1058 Dual Channel Transmitter product certifications, see the *Rosemount 1058 Dual Channel Transmitter Quick Start Guide*.

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