ATC880 Series

Process Controller

1/4 DIN Self-Tuning Controller

Stocked, Distributed, and Supported by

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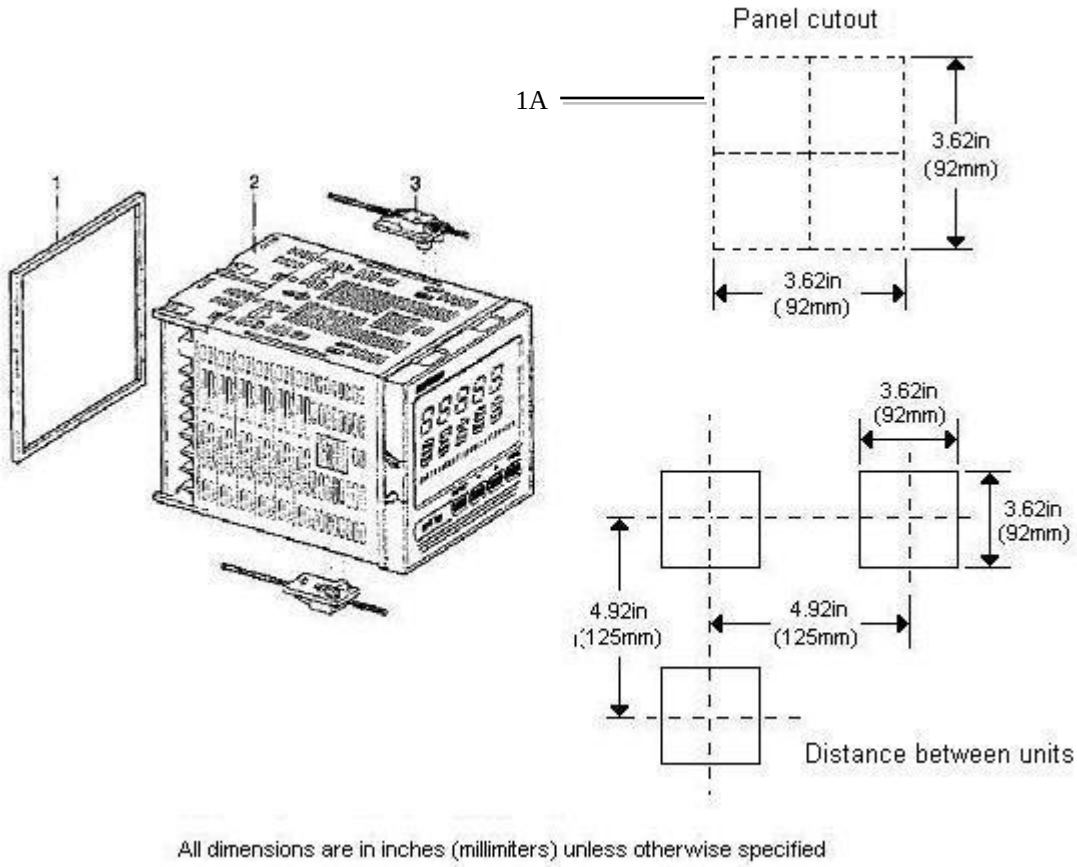
Symbols used on the labeling	
	Refer to the Manual for instruction
	Functional Earth

One or more of the symbols below may appear on the labelling

QUICK START INSTRUCTIONS

Mounting

- Prepare panel cutout to dimensions shown below (1A).
- If more instruments are mounted in the same panel near together, maintain the distances between one instrumento to another like as in the figure.
- Slide the rubber gasket (1) over the case.
- Slide the instrument case into the cutout (2,1A).
- Attach the panel mounting hardware tightening the threaded rod (3) for a secure fit and with a screwdriver, turn the screws with a torque between 0.3 and 0.4 Nm.



All dimensions are in inches (millimiters) unless otherwise specified

Wiring

- Refer to Section 4 for wiring/connections and terminal diagram
- Connect the wires from transducer cable as shown in the terminal diagram, turn the screws with a torque between 1.0 and 1.2 Nm..
- Connect final control device.
- Connect alarm(s) if applicable. Note that alarm defaults are High, Reverse Acting for alarms 2 & 3 – alarm 1 is low inhibited.
- Connect power to the appropriate terminals as shown.

Scaling

- Apply power to the instrument; Upper display will give a reading near zero.
- Lower display will read the manual output %.
- Press ***FUNC*** key until the Upper display reads NONE and lower display reads ***GROUP***.
- If your transducer is not a 10,000-psi model, select **GROUP 3** using the ▲ Up arrow, enter with function key.
- Lower display reads **PI.FSV** (Full Scale Value), and the upper display reads 10,000. **Note:** If your transducer is a 10,000-psi model skip next two steps. Scroll to **GROUP** and select **2**.
- Using the ▼ Down arrow key set the appropriate Full Scale Value for your transducer.
- Enter using the ***FUNC*** key to scroll until **GROUP** legend appears again.
- Using ▲ Up arrow key, select **GROUP 2**. Enter with ***FUNC*** key.
- Follow instructions for Calibration and Operation in Step 4 of Quick Start

Calibration and Operation

- Lower display reads **ZERO.C** and upper display reads **OFF**. Be sure transducer is at operation temperature and that no pressure is applied.
- Change upper display to **ON** by using the ▲ Up arrow key. Enter with the ***FUNC*** key. After a few seconds, the lower display will show **SPAN.C** and upper display will show **OFF**.
- Change upper display to **ON** using ▲ Up arrow key. Enter with the ***FUNC*** key. In a few seconds lower display shows **SMART** and upper display shows **OFF**. Calibration is complete.
- Using the ***FUNC*** key, scroll to the **GROUP** display. Enter **1** with the ▲ Up arrow, and enter with the ***FUNC*** key. Instrument shows **0** on upper display and **SP** on lower display.
- Set Process Set point. Press ***FUNC*** twice.
- Set Alarm 1, 2, 3 thresholds (if applicable) by pressing ***FUNC***. Change threshold with the ▲ up and ▼ down keys.
- Press ***FUNC*** twice. Lower display will read **GROUP**, and upper display will read none.
- Press ***FUNC*** key. Upper display will read 0 +/- 10 process pressure, lower display will read **0**. This is control output %.
- Be sure process is at operating temperature.
- Utilizing ▲ up and ▼ down keys, manipulate the output % until the upper display is reading at approximately the set point.
- Press ***FUNC*** key until lower display reads ***GROUP***. Select group **2**.
- Press ***FUNC*** key three times. Lower display reads **SMART** and upper display reads **OFF**.
- Using ▲ up arrow key, turn **SMART** function to on. Enter with ***FUNC*** key.
- **SMART LED** will flash and a countdown will begin as the controller arrives at initial P&I (D) parameters.
- Return to ***GROUP*** none and observe that the value in the upper display is the actual set point you wish to control.
- When the **SMART** LED has stopped flashing, press and hold the **A/M** key for at least 5 seconds. The manual LED will extinguish, and you will be in automatic control mode.

- Again, return to **GROUP 2** and select **SMART**. Turn the function on with the ⏶ up arrow, and enter with the ***FUNC***. This will activate the Adaptive Tune algorithm, and will maintain the correct P&I (D) parameters for the process. It will remain on until manually turned off. It will also come on anytime the ATC880 is the automatic control mode.
- Return to **GROUP, None**, and observe the process. The set point may be adjusted in **GROUP 1** while the controller is in automatic mode.
- Operator may alternately display Output %, Set Point, Deviation, Peak Value, or RPM by pressing the ⏶ up arrow key.

The preceding Quick Start instructions are the basic settings required to install, wire, and get the controller operating. Please refer to the complete installation and operation manual for additional functions. Questions on your transducer will be addressed in the manual included with your transducer.
References to Profibus features and instructions should be ignored. Profibus is being considered for a future line expansion and has been accommodated in the current design.

1.0 INTRODUCTION

The ATC880 Pressure/Process Controller is a microprocessor-based instrument with the capability of controlling an extruder or other process using an advanced proprietary SMART self-tuning algorithm. The input is user configurable to be 350Ω Strain Gage, high-level voltage or high level current. The voltage or current inputs are compatible with many process transmitter combinations. Three fully programmable alarms and an analog retransmission output are also included as part of the standard ATC880 package.

Five groups of configuration parameters are available from the keyboard, and are protected by three levels of user definable software locks. (A sixth group of read-only parameters can also be viewed) In the programming mode the lower display will show the parameter being displayed, and the upper display will show its value. In the operating mode, the upper display will show the process variable, and the lower display offers the choice of displaying set point, deviation from set point, output %, RPM or peak. In addition, a red LED bar graph presents an analog representation of the main input (process variable), as well as indication of the alarm set points. The alarms are shown relative to the span of process and are indicated as missing or present bars relative to the process input.

References to Profibus features and instructions should be ignored. Profibus is being considered for a future line expansion and has been accommodated in the current design.

WARNING NOTE: The user should be aware that if this equipment is used in a manner not consistent with the specifications and instructions in this manual, the protection provided by the equipment might be impaired.

Product Codes (ordering options)

	Second Input	**Options**	**Power**
	Code Description	**Code Description**	**Code Voltage**
ATC880	0 Not Present	2 Auxiliary Power supply & retransmission output	3 100-240Vac, switching
	1 Analog, remote set point	3 RS-485 and 4 digital inputs.	5 24Vac/dc, switching

Note: UL pending only for Power Code Voltage equal to 5 (24Vac/dc, switching)

2.0 SPECIFICATIONS

2.1 Mechanical Specifications

Case: Polycarbonate Black color Self-extinguishing degree V0 according to UL 94

Front Panel: Designed and verified for IP65 and NEMA 4X for indoor location

Installation: Panel mounting

Rear Terminal Block: 46 screw terminals with rear safety cover

2.2 Main Power Supply & Environmental Specification

Main Power Supply: From 100 to 240Vac (-15% to 10%), 50/60Hz switching. Option: 24Vac/dc

Power supply variation: From -15% to 10% (for 100 to 240Vac). From 14 to 32 Vac/dc (for optional 24Vac/dc).

Power Consumption: Max 22VA at 50Hz or Max 27VA at 60Hz for Main Power Supply from 100 to 240 Vac

Insulation Resistance: 100MΩ @500Vdc

Dielectric Strength: 1500V rms for 1 min, 1800V for 1 sec.

Ambient Temperature: From 0 to 50°C. Ensure the enclosure provides adequate ventilation

Storage Temperature: From -20 to 70°C

Humidity: Max 85% RH non-condensing

Altitude: This product is not suitable for use above 2000m (6562ft) or in explosive or corrosive atmospheres

Watchdog: Hw/Sw is provided for automatic restart

Agency Approvals: UL File # 193253

Self-Certification: CE

Electromagnetic Compatibility:
The instrument is compliant with the European Directive 2004/108/CE according to Product Standard EN 61326-1.

Emission limit: class A – group 1 ISM for equipment suitable for use in all establishments other then domestic and those directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.

Immunity:

- Electrostatic discharge (according to EN 61000-4-2):
  contact discharge = 4kV; air discharge = 8kV
- Radio-frequency electrical magnetic (according to EN 61000-4-3):
  EM field (amplit. mod.) = 10 V/m (80MHz to 1 GHz);
  3V/m (1,4 GHz to 2 GHz);
  1 V/m (2 GHz to 2,7 GHz)
- Electrical fast transient/burst (according to EN 61000-4-4):
  AC Power = 2kV;
  I/O Signal/Control = 2kV (5/50 ns, 5 kHz);
  I/O Signal/Control connected directly to mains supply = 2kV (5/50 ns, 5 kHz)
- Surge (according to EN 61000-4-5):
  AC power = 1kV (Line to Line) / 2kV (Line to GND);
  I/O Signal/Control = 1kV (Line to Line) / 2kV (Line to GND)
- Radio frequency common mode (according to EN 61000-4-6):
  AC Power = 3 V (150kHz to 80 MHz);
  I/O Signal/Control = 3 V (150kHz to 80 MHz)
- Voltage dips/short interruptions (according to EN 61000-4-11):
  0% during 1 cycle; 40% during 12 cycles; 70% during 30 cycles

This equipment is intendent for use in an industrial location. There may be potential difficulties ensuring electromagnetic compatibility in other environmental due to conducted as well as radiated disturbances.

Safety Requirements:
The instrument is compliant with the European Directive 2006/95/CE according to Reference Standard EN 61010-1 for installation category I and pollution degree 2

Installation category CAT I:	Voltage transients on any power connected to the instrument must not exceed 1.5kV.
Pollution degree 2:	Conductive pollution must be excluded from the cabinet in which the instrument is mounted.

2.3 Display Specification

Display: LED technology, custom type.

Upper Digits: Red color, 5 numeric digits, 7 segments with decimal point 13.2mm high.

Lower Digits: Green color, 5 alphanumeric digits (British flag), 14 segments with decimal points, 11.3 mm high.

Bar Graph: Red color, 35 segment with 3% resolution. Displays continuous bar graph to indicate the measured variable of the main input (0-100% full scale). Alarm set point values displayed. Last segment blinks for pressure greater than full scale value.

Indicators (Beacons):
Red LED's annunciations:

- A1: Lit when alarm 1 is in alarm state
- A2: Lit when alarm 2 is in alarm state
- A3: Lit when alarm 3 is in alarm state
- REM: Lit when device is controlled by serial link
- 0-25-50-75-100-%: These six LEDs are always on to improve the bar graph indication.
- SMRT: Flashing when the first step of SMART algorithm is activated. Lit when the second step of SMART algorithm is activated
- MAN: Lit when device is in manual mode
- RSP: Lit when Remote Set Point is selected
- Kg/cm^2, PSI, Bar, MPa: Engineering unit for the pressure input. These four beacons are located within the display window, between the numeric digits and the alarm beacons.

Green LED's annunciations:

- SP: Lit when lower display shows the Set Point
- PEAK: Lit when lower display shows the peak value
- DEV: Lit when lower display shows the deviation (Measured Variable minus Set Point)
- OUT%: Lit when lower display shows the Output Value (absolute value with 0.1% resolution)
- RPM: Lit when lower display shows the Output Value scaled to RPM

2.4 Primary Input Specification

Main Input: Selectable between strain gage and linear by software configuration.

Strain Gage Input: From 340 to 5000Ω, 1-4 mV/V. Excitation 10V +/- 7%. 5 wires connection.

Linear Input: Selectable between 0-5Vdc, 0-10Vdc, 0-20mA, 4-20mA.

Input Signal: -25/125% of full scale (approximately –10 / 50mV).

Shunt Calibration: With or without shunt resistor (value programmable from 40.0 to

100.0%).

Zero Balance: ±25% of full scale (approximately ± 10 mV).

Auxiliary Power Supply: 24Vdc / 1.5W power supply for two or four wire transmitter.

Input Impedance: <10Ω for linear current input;
>165KΩ for linear voltage input

Input Protection: Open circuit detection for strain gage (on signal and excitation wires) and 4-20mA inputs; it is not available for 0-5Vdc, 0-10Vdc and 0-20mA. Up or down scale keyboard programmable.

Sampling time: 50mS typical.

Display Update Time: Selectable: 50, 100, 250 or 400mS.

Engineering Units: Dedicated beacons within the display window.

Calibration Mode: Field calibrations (zero and span) are applicable for both strain gage and linear input. Moreover it is possible to delete the field calibration done by the end user and to restore original factory calibration values.

Input resolution: 4000 counts.

Full scale value	**Resolution**
10/4000	1 count
4002/8000	2 counts
8005/20000	5 counts
20010/40000	10 counts
40020/80000	20 counts
80050/99950	50 counts

Decimal Point: Settable in any position of the display or none at all.

2.5 Secondary Input

Secondary input: Selectable among 0-5Vdc, 0-10Vdc, 0-20mA, 4-20mA or strain gage (optional).

Function: Second sensor for the measurement of a differential pressure (in case of strain gage or linear input); remote set point (only linear inpu).

Input Protection: Open circuit detection for strain gage (on signal and excitation wires) and 4-20mA inputs; not available for 0-10Vdc, 0-5Vdc and 0-20mA inputs. Up or down scale keyboard.

Input Impedance: < 10Ω for linear current input
> 165KΩ

Sampling Time: Remote set point input is selectable among 100, 200, 500 or 1000mSe; differential pressure is 50 mS, typical.

Display update: At each sample.

Input Resolution with Linear Input: 4000 counts.

Low/High Scale Values: Secondary input of a differential pressure: freely settable, but with the same resolution and decimal point position of the primary pressure input. Remote set point: settable from 0 to pressure input full scale value with the same resolution and decimal point position of pressure input.

NOTE: This input is not isolated from main input. A double or reinforced insulation between instrument output and power supply must be guaranteed by the external device.

2.6 Pressure & Remote Set Point Inputs Common

Common Mode Rejection Ratio: >120dB @50/60Hz

Normal Mode Rejection Ratio: >60dB @ 50/60Hz

Strain gage input: From 340 to 5000Ω, 1-4 mV/V. Excitation 10V +/- 7%. 5 wires connection.

Input signal: -25/125% of full scale (approximately -10/50mV).

Shunt calibration: With or without shunt resistor (value programmable from 40.0 to 100.0%), the same setting will be used for both inputs (main and secondary) when the differential pressure measurement is selected.

Zero balance: +/- 25% of full scale (approximately +/- 10mV).

Reference accuracy: +/- 0.1% FSV +/-1 digit @ 25 +/- 1°C and nominal power supply voltage.

Operative accuracy: temperature drift: < 300 ppm/K of full span for current, voltage and strain gage input.

Zero and span calibration: If differential input used, there is no relation between the calibration of the two single sensors; each input is provided with its own zero and span calibration parameters.

2.7 Digital Input

Digital input: One input from contact closure (voltage free). It is marked as “Reset” on rear panel, contacts 23 and 24. It may be keyboard programmable for the following functions:

- alarm reset
- peak reset
- alarm and peak reset
- zero calibration of the primary input
- zero calibration of the primary input, alarm and peak reset

NOTE: This input is not isolated from main input. A double or reinforced insulation between instrument output and power supply must be guaranteed by the external device.

Opto-isolated Digital Input: Four optional digital inputs are provided for control purposes. The interface circuit is opto-isolated with respect to the CPU and analog inputs.

DIG1: This contact acts as an automatic / manual switch, if it is enabled by the proper parameter (closed means manual mode, open means automatic mode).

DIG2: Control output value increase

DIG3: Control output value decrease

These two contacts are used to increase / decrease the output value with a linear, not exponential, rate of change (about 20 seconds for a full scale variation from 0 to 100%).

DIG4: This contact is used to switch the controller from automatic to manual mode setting to zero the control output. When this logic input is closed the transfer from manual to automatic mode by the front panel is inhibited while the user may modify the control output. To return to automatic mode the logic input should be de-activated.

2.8 Alarms

Alarm Outputs: 3 standard alarms (AL1, AL2 and AL3).

AL1 and AL2 Contacts: 1 SPDT 2A max @ 240Vac resistive load.

AL3 Contacts: 1 SPST 2A max @ 240Vac resistive load.

Contact Protection: Varistor for spike protection.

Alarm Type: Each alarm is keyboard programmable for:

- Process / Deviation / Band
- High / Low / Low inhibited on start up

• Auto / Manual reset

Alarm Mask: The alarm mask may be restored using the keyboard parameter (***AL.MSK***). Moreover the alarm mask of deviation and band alarms is restored at set point change and during set point ramp.

Excitation Type: Keyboard configurable for each alarm: relay coil energized in no alarm condition (failsafe) or relay coil energized in alarm condition (non-failsafe). The default condition is failsafe.

Threshold: From 0 to 110% Full Scale (the threshold may be limited due to the selected full scale value).

Hysteresis: Keyboard programmable for each alarm; from 0.1% to 10.0% of span or 1 Least Significant Digit (whichever is greater) for each alarm.

Alarm Filter: Selectable from the following values: OFF, 0.4S, 1S, 2S, 3S, 4S, 5S.

Alarm Update Time: At every input conversion.

2.9 Optional Serial Communication Interface Specification

Serial Interface: RS-485 type. Opto-isolated.

Protocol Type: Modbus/Jbus (RTU mode).

Type of Parameters: Run-time and configuration are available by serial link.

Device Address: From 1 to 255
NOTE: The physical interface can only support up to 31 devices for each segment. Use multiple segments for more than 31 devices.

Baud Rate: 600 up to 19200 baud.

Format: 1 start bit, 8 bits with or without parity, 1 stop bit

Parity: Even/Odd.

2.10 Control Output Specification

Control Output: Opto-isolated from CPU input and output circuits.

Type of Analog Output: Keyboard selectable between:
- + 0/10Vdc min load 5KΩ
- – 10/+10 VDC min load 5KΩ
- + 0/5Vdc min load 5KΩ

- + 0/20mA max load 500KΩ
- – 4/20mA max load 500Ω

Resolution: 0.1% in manual mode, 0.03% in automatic mode.

Scaling: The output control value may be displayed in two modes:
- from 0.0 to 100.0% (0.1% resolution)
- from a low to a high limit selection from -10000 to 10000

2.11 Retransmission Output Specification

Retransmission Output: Opto-isolated from CPU input and output circuits.

Type of Analog Output: Keyboard selectable between:
- + 0/10Vdc min load 5KΩ, with under/overrange capability from -2.5 to 12.5V.
- ± 10Vdc min load 5KΩ, with under/overrange capability from -12.25 to 12.5V.
- + 0/5Vdc min load 5KΩ, with under/overrange capability from -1.25 to 6.25V.
- + 0/20mA max load 500Ω, with under/overrange capability from 0 to 24mA (max. load 400Ω over 20 mA).
- + 4/20mA max load 500Ω, with under/overrange capability from 0 to 24mA (max. load 400Ω over 20mA).

Resolution: 0.1% of output mode

Scaling: The retransmission low and high limits are selectable from 0 to full scale input value. The two scaling values may be freely selectable within the above range. This allows for a direct or reverse output type.

Output Filter: Selectable from the following values: OFF, 0.4S, 1S, 2S, 3S, 4S, 5S

2.12 Control and Retransmission Outputs Common Specification

Reference Accuracy: ±0.1% of output span @ 25 ± 10°C and nominal line voltage.

Linearity Error: <0.1% of output span.

Output Noise: <0.1% of output span.

2.13 Control Algorithm Specification

Control Type: PID plus Integral Preload plus Anti-Reset Windup

Output Value Indication: Selectable between the following Modes:
- Range 0/100.0%
- Selectable with two calibrated values for RPM indication

- In automatic mode either mode is available
- In manual mode, a parameter is provided to select the first or second method of indication.

SMART Algorithm: The **SMART** procedure is activated by setting the **SMART** Parameter to **ON**. In manual mode the controller will start the TUNE algorithm (**SMRT** led flashes), while in automatic mode it will enable the ADAPTIVE function (**SMRT** led lights steady).

The SMART can select two types of procedures:
1. The TUNE algorithm
2. The Adaptive algorithm

TUNE ALGORITHM
To implement the **TUNE** algorithm, set the instrument in manual mode and the select **SMART ON**. **SMART** will switch to **OFF** after the PID parameters (PB, TI, TD) are calculated (during this procedure the LED will be flashing). The basic concepts of the auto-tuning system are based on the open loop step response, for this reason the **TUNE** function may be activated only in the manual mode.

The equivalent mathematical model of the process is characterized by three parameters: the gain, the time constant and the equivalent time delay. The power output of the controller is changed by a small step value. Then, the controller stores the process variable response. From the transient response, the controller estimates the three basic process parameters by means of the area's method. It applies these parameters, and re-runs the step process. When this is done, it calculates the final PID parameters.

The step response is a convenient way to characterize this type of process dynamics because its model is based on the alteration of the behavior of the process and very accurately determining the response. It is capable of estimating the process parameters with high precision.

ADAPTIVE ALGORITHM
In order to implement the adaptive algorithm, the instrument should be in automatic mode. Then change **SMART** to **ON**. In this case the **ON** will be remembered by the instrument even if the instrument was switched off.

In order to deactivate the adaptive processes, return the **SMART** parameter to **OFF**.

The **ADAPTIVE** is an on-line algorithm that "observes" the measured value and looks for oscillation due to a variation of the load or the set point. When a significant pattern is "recognized," the decision procedure starts to recalculate the PID parameters of the controller. While the ADAPTIVE procedure is enabled the PID parameters can only be monitored.

AUTOMATIC STAND-BY: This function avoids overshoot due to temporary process

interruptions (PV goes to zero).

In cases where the main input goes to zero, the controller output quickly reaches the saturation for integral factor effect; when the process restarts, the controlled output will have an excessive and dangerous overshoot, (i.e. it will start at full speed).

When the **Automatic Stand-By** function is activated, the algorithm monitors the controller input and output: when the input value goes lower than a threshold (specified by the **Automatic Stand-By Pressure Low Limit** parameter). When this happens, and the output value reaches the saturation condition and the control output saves the last value stored when the process was stable.

This freezing of the output of the controller will last for the time specified by the **Automatic Stand-By Recovery Time** parameter. If the input does not recover within the specified time, the output value is forced to zero. If the controller input recovers within the specified time, the algorithm waits for two and one half times the integral value; after this time has elapsed, the controller will come back automatically to normal running condition to the output level calculated when the process was stable.

2.14 Opto-isolated Digital Input Specification

The ATC880 Pressure/Process controller has four digital inputs that can switch between Manual and Automatic control (DIG1), increase (DIG2) or decrease (DIG3) the control output value and switch from Automatic to Manual while setting the control output to zero (DIG4).

Digital Input 1 (DIG1) is available at all times. It acts as an Auto/Manual Switch. In the closed position the Manual mode is accessed. In the open position the Automatic mode is accessed.

Digital Input 2 (DIG2) is available only when the Group 1 function ***A/M*** is changed from ***LoCAL*** to ***CnCt***. It will increase the set point in a linear fashion (about 20 seconds from 0 to 100% output).

Digital Input 3 (DIG3) is available only when the Group 1 function ***A/M*** is changed from ***LoCAL*** to ***CnCt***. It will decrease the set point in a linear fashion (about 20 seconds from 100% to 0 output).

Digital Input 4 (DIG4) is available at all times. It switches the controller from Automatic to Manual and sets the control output to zero. It also inhibits keyboard control of switching from Automatic to Manual, but allows keyboard increase of the output value.

Note: A dry contact switch or relay must be fitted between terminal 62 (Common) and terminal 63 (Digital Input 1 Remote AUTO/MAN) to enable the use of Digital Input 2 (DIG2) and Digital Input 3 (DIG3) (Control output value increase and decrease).

3.0 UNPACKING & DIMENSIONAL INFORMATION

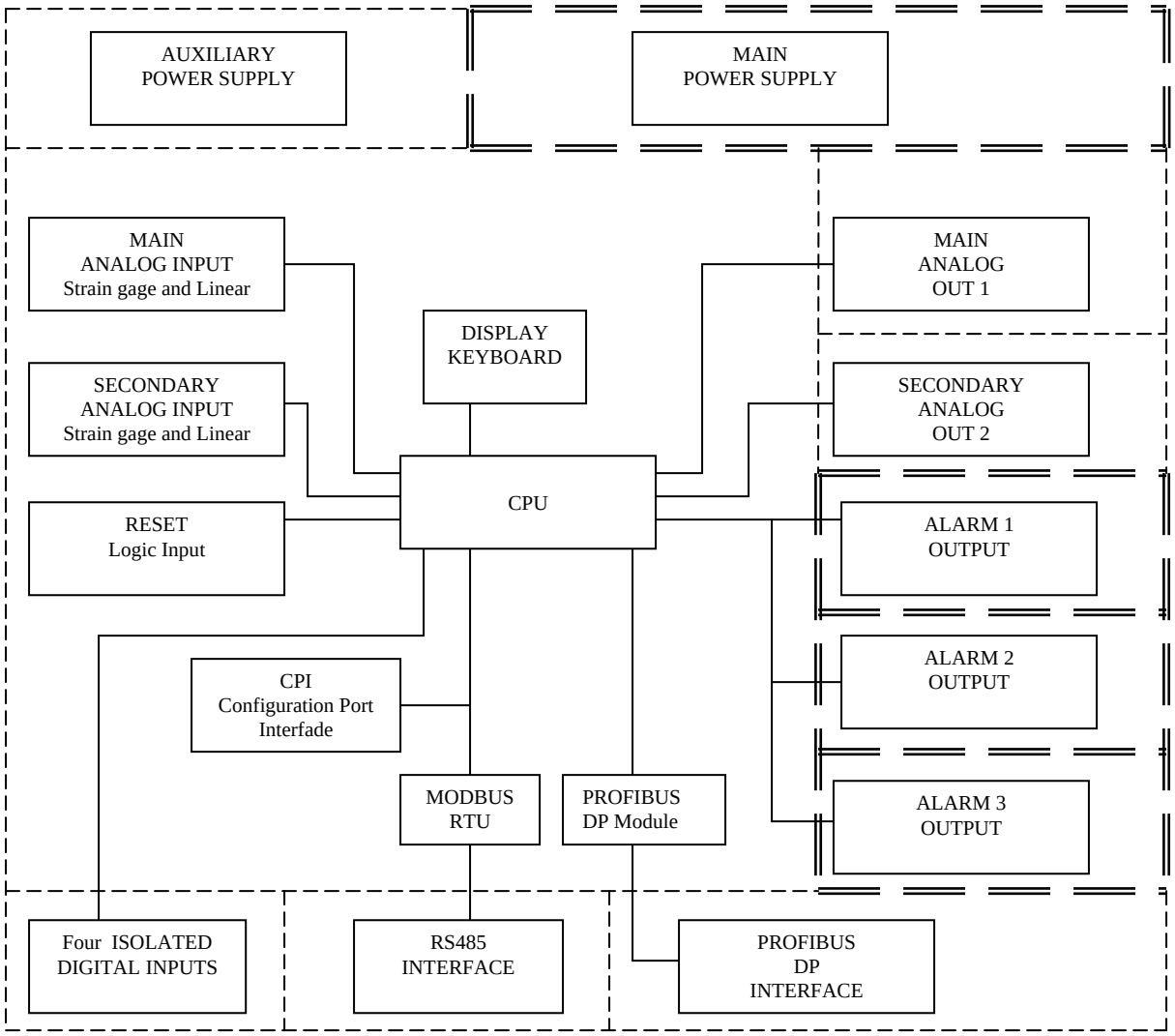
3.1 Unpacking

Upon receipt, examine the package for shipping damage. Notify the carrier immediately in the event of any evidence of damage, and retain the shipping materials for their inspection. The package should contain the instrument, two panel mounting brackets, and a sheet of peel-off labels with a variety of engineering units.

3.2 Dimensional Information

Dimensions:	3.78” X 3.78” X 6.01” overall (96mm X 96mm X 143.5mm)
Cutout:	3.62” X 3.62” (92mm X 92mm)
Depth behind panel:	5.04” (128mm)
Weight:	1.43 lbs. (650g)

3.3 Block Diagram

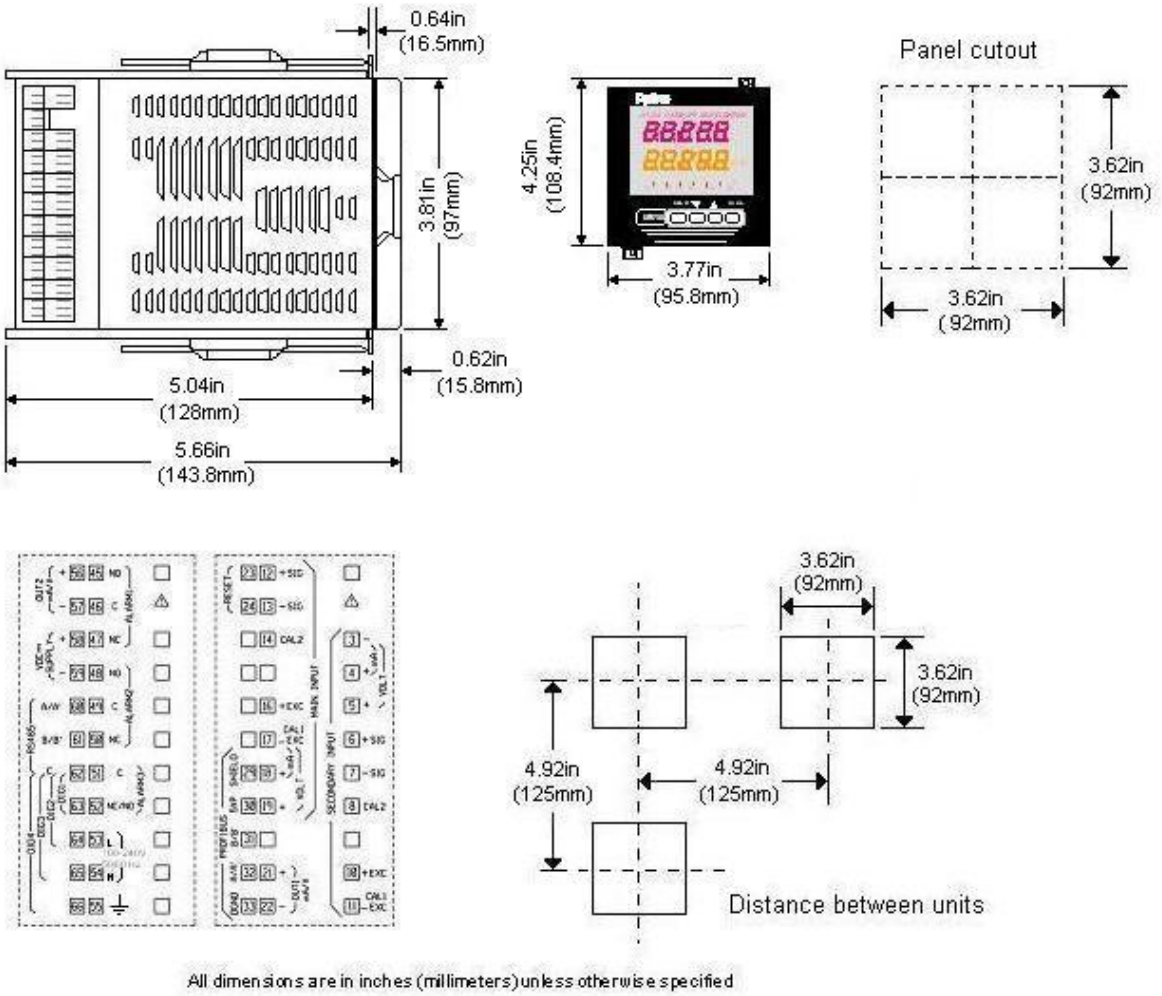


NOTE: Dashed Line represents insulation boundary.
Double Dashed Line represents reinforced insulation boundary.

4.0 MOUNTING AND WIRING

Please refer to the drawing for cutout dimensions and clearance requirements. Locate the two mounting brackets packed with the instrument and have them available.

1. Slide the instrument case into the cutout, being sure that it is right-side-up (terminal 1 at the top). Attach the panel mounting hardware at diagonally opposite sides of the top and bottom of the case, tightening the threaded rod until the case is secure against the panel.
2. Refer to the model number to determine the hardware and options included as part of your unit. Please refer to this manual for terminal assignments. Terminals are accessed by opening the terminal covers from the side with the “OPEN” legend.



NOTE 1: The ATC880 is equipped with screw terminals, and no connectors are necessary when wiring the unit

NOTE 2: When wiring the alarms, wire to the Common and NO (normally open) terminals to maintain a fail-safe configuration. Remember to configure the software for failsafe operation.

Fail-safe denotes a situation where the alarms relay coils are activated in a no-alarm situation. As the relay coil is energized, terminals that are normally open are closed and can cause completion of a circuit when used as an interlock. Should the alarm threshold be exceeded, or should power be lost to the instrument the contacts will open, and the circuit will be broken. If the alarm is a latching alarm, it will require an external reset signal to be activated again.

If the alarm is used to provide a contact to an alarm device (light, buzzer, etc.), when the threshold is exceeded, wiring should be to the Common and NC (normally closed) terminals. Activation of the relay coil will cause the contacts to open in a non-alarm situation, and on alarm, or if power is interrupted to the instrument. If the alarm is a latching alarm, it will require an external reset signal to be activated again.

NOTE 3: Relay outputs The contact rating of all outputs is equal to 2A/240Vac on resistive load.

- To avoid electrical shock, connect power line at the end of the wiring procedure.
- For power connections use No 16AWG or larger wires rated for at least 75°C.
- Use copper conductors only.

NOTE 4: Power line Before connecting the instrument to the power line, make sure that the line voltage corresponds to the description on the identification label.

- To avoid electrical shock, connect power line at the end of the wiring procedure.
- For supply connections use No. 16 AWG or larger wires rated for at least 75°C
- Use copper conductors only
- Don’t run input wires together with power cables
- When a neutral line is present, please connect it to terminal 54.
- For 24Vdc the polarity need not be observed.

The power supply input is fuse protected by a sub miniature fuse rated T, 1A, 250V. When the fuse is damaged, it is advisable to verify the power supply circuit. It may be necessary to send back the instrument to Dynisco for service.

The safety requirements for Permanently Connected Equipment say:
- a switch or circuit-breaker shall be included in the building installation;
- it shall be in close proximity to the equipment and within easy reach of the operator

- it shall be marked as the disconnecting device for the equipment

a single switch or circuit breaker can drive more than one instrument.

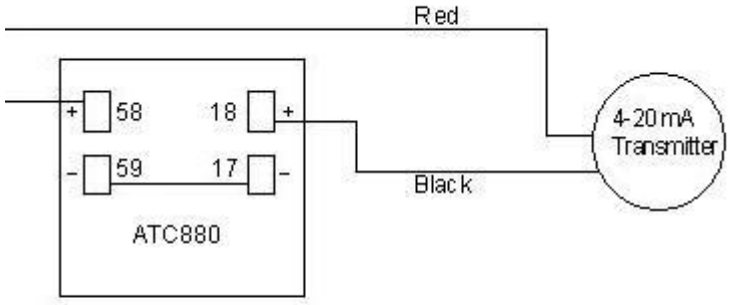


Fig. 3 ATC880 Wiring – 4-20 mA Transmitter Internal 24 VDC Power Supply

4.1 Terminal Assignments and ratings

Terminal	Terminal Assignment - Description	Function category / class	Voltage Rating, V	Current Rating, A	Load type and Rating
3	mA/V -	Secondary Inputs CAT I			
4	mA +			0.020Adc	
5	V +		10Vdc		
6	SIG +	Secondary Input Strain Gage CAT I			From 340Ω to 5000Ω, Excitation 10Vdc ±7% (between EXC + and EXC -)
7	SIG -				
8	CAL2				
10	EXC +				
11	EXC - , CAL1				
12	SIG +	Main Input Strain Gage CAT I			From 340Ω to 5000Ω, Excitation 10Vdc ±7% (between EXC + and EXC -)
13	SIG -				
14	CAL2				
16	EXC +				
17	EXC - , CAL1, mA -, V -				
18	mA +	Main Linear Inputs CAT I		0.020Adc	
19	V +		10Vdc		
21	OUT1 mA/V +	Control Output Class 2			±12.5Vdc min load 5KΩ. -5/+25 mA max load 500Ω (max. load 400Ω over 20 mA).
22	OUT1 mA/V -				
23	RESET	Remote Reset of Alarm and/or eak Class 2			Dry Contact switch (voltage free)
24					
29	SHIELD	Standard ProfiBus Communication Class 2 (not available)			
30	5VP				
31	B/B’				
32	A/A’				
33	DGND				

45	ALARM1 N.O.	Relay contacts used to identify an event (alarm) condition			240Vac, 2A , resistive
46	ALARM1 C				
47	ALARM1 N.C				
48	ALARM2 N.O.				
49	ALARM2 C				
50	ALARM2 N.C.				
51	ALARM3 C				
52	ALARM3 N.C./N.O.				
53	Line	Main Power Supply	100 – 240Vac maximum		27VA
54	Neutral				
55	Earth (Ground)				
56	OUT2 mA/V +	Analog Retransmission Class 2			±12.5Vdc min load 5KΩ. -5/+25 mA max load 500Ω (max. load 400Ω over 20 mA).
57	OUT2 mA/V -				
58	Vdc SUPPLY +	Auxiliary Power Supply Class 2	24Vdc	0.063Adc (1.5W)	
59	Vdc SUPPLY -				
60	A/A’	Serial Communication RS485 Class 2			
61	B/B’				
62	C				
63	DIG1	Digital inputs Class 2			Dry Contact switch (voltage free)
64	DIG2				
65	DIG3				
66	DIG4				
Note: The instrument is not suitable for use with equipment for measurement within measurement categories II, III and IV.					

4.2 Terminal Cross Reference With Former Dynisco Model ATC770

ATC880 Terminal		**ATC770 Terminal**	
Power			
120/240Vac	53	53	
Line Neutral	54	54	
Earth (Ground)	55	55	
Transducer			**Dynisco Cable Color**
Signal + Linear (+)	12	12	Red
Signal - Linear (-)	13	13	Black

ATC880 Terminal		ATC770 Terminal	
Excitation (+)	16	16	White
Excitation (-)	17	17	Green
CAL 1	17	17	Blue
CAL 2	14	14	Orange
mA (+)	18	12	
V (+)	19	12	
mA/V (-)	17	13	
Alarms			
A1 (N.O.)	45	45	
A1 Common	46	46	
A1 (N.C.)	47	47	
A2 (N.O.)	48	48	
A2 Common	49	49	
A2 (N.C.)	50	50	
A3 (N.O. / N.C.)	52	52	
A3 Common	51	51	
Control Output			
Voltage Out +	21	21	
Voltage Out -	22	22	
Current Out +	21	21	
Current Out -	22	22	
Analog Retransmission Output			
mA/V Out (+)	56	56	
mA/V Out (-)	57	57	
24Vdc Transmitter Power Supply			
24 VDC (+)	58	58	
24 VDC (-)	59	59	
External Reset Contacts			
Reset	23	23	
Reset Common	24	24	
Analog Remote Set point (optional)			
mA Input (+)	4	4	
mA Input (-)	3	3	
V Input (+)	5	4	
V Input (-)	3	3	
Serial Communication (RS-485 only) (optional)			
A	60	60	

ATC880 Terminal		ATC770 Terminal	
B	61	61	
COM	62	62	
4 Digital Inputs (optional)			
COM	62	62	
DIG 1	63	63	
DIG 2	64	64	
DIG 3	65	65	
DIG 4	66	66	

5.0 START-UP PROCEDURE

5.1 Configuration

The ATC880 is shipped configured in the following manner:

1. Main Input (Pressure) – Strain Gage
2. Main Output – Voltage
3. Secondary Output (optional) – Voltage

By special order, the ATC880 can be powered from a 24Vac or 24Vdc supply (not to be confused with the on-board 24V power supply used to power transmitters). If operating with a 24V power supply, connect to terminals 53 and 54 as normal.

5.2 Parameters

The ATC880 parameters are grouped in five sections guarded by three security levels. The more common parameters are in the first groups, with the higher Group numbers for those parameters an operator would not normally modify. Each group can be reset to its default value by two keystrokes. This also resets the parameters of any lower numbered group to default. If GROUP 5 is set to default, the entire instrument is reset to its default parameters. Section 5.2.3 explains how to reset to defaults. If a unit does not have a particular option, its parameters will not appear. For example, an instrument that does not have RS-485 communications will skip those parameters related to communications. Likewise, if a particular function is turned off, its other parameters will not appear. For example, if Alarm 2 link (***A2.INK***) is turned to ***OFF*** in Group 3, the hysteresis, reset, filter, type, and threshold functions will not appear on the screen, nor will the alarm appear on the bar graph display.

5.2.1 Getting Ready:

Apply power to the cabinet and allow the system to stabilize for about 30 minutes. When the instrument is turned on, it will go through a self-test during which the front panel will illuminate. The instrument will then be in the normal display mode showing the value of the main input on the upper display, usually near zero, and the Output % on the lower display, usually 0.0%. In the event that no input device is connected or if the transducer is amplified, the upper display will show ***OPEn*** and the bar graph display will be at 100% with the last segment flashing. Turn the power to the instrument off and connect an input device to the appropriate terminals. Upon turning the instrument back on, the displays should have a numeric value, close to zero pressure on the pressure display. Depressing ***FUNC*** will automatically enter into the GROUP 1 parameters.

Successively pressing ***FUNC*** will scroll through all the parameters of GROUP 1. The last two parameters of each group allow the default parameters to be restored and returns to ***GROUP***. If ***nonE*** is chosen in the group access function, the instrument will return to normal operating mode after pressing the ***FUNC*** key.

5.2.2 Keyboard Description:

The keyboard is composed of four push buttons, covered by a silicone protective operator and they are labeled ▼, ▲, FUNC and A/M.

These keys must be pressed and released to move about in the configure screens. Do not press and hold a key unless told to do so; simply press the key and release it to advance to the next screen. The arrow keys, ▼ or ▲ may be held down to advance rapidly through the values.

The ▼ is called the "Down Arrow Key", and is used to decrement or modify the parameter value. In manual mode, it is used to decrement the output value. When pressed for more than 3 seconds in automatic mode, it used to access and decrease the set point parameter.

The ▲ is called the "Up Arrow Key", and is used to increment or modify the parameter value. In manual mode, it is used to increment the output value. When pressed for more than 3 seconds in automatic mode, it is used to access and decrease the set point parameter. When pressed for less than 3 seconds in automatic mode, it used to switch the lower display from set point value, deviation value, output value (%), output value (RPM) and peak value if enabled.

The FUNC ("function") key is used to access the parameter to view, to serve as an "Enter key" when a value has been modified, and to enter the "Operating Mode Switching" procedure when pressed for more than seven seconds.

The A/M key is used to switch the controller from automatic to manual mode (and back again) when depressed for more than 1 second. When monitoring / modifying control parameters, it is used to return to the normal display mode without storing the parameter changes. It also serves as a reset function.

Pressing ▼ and FUNC together may be used to reset the stored peak value and to reset the alarms. This function is disabled when the device is controlled by serial link.

Pressing ▼ and A/M together or the ▲ and A/M may be used to jump to maximum or minimum parameter values when the instrument is in function mode.

Pressing ▲ and ▼ together or FUNC and A/M together, may be used on power-up when the instrument detects a parameter error; the upper display shows ***Err*** and the lower display shows the parameter name.

If the wrong parameter is a run-time parameter (i.e. from ***SP*** to ***RO.TYP***), pressing the ▲ and ▼ push-buttons will have the instrument load the default parameters for all groups of parameters.

Note: All of the actions explained above that require two or more keystrokes must follow the button pushing sequence exactly.

5.2.3 Operating Mode Description:

The FUNC key is used to access the parameters organized in seven groups. Use the FUNC pushbutton to access the Group 1 parameters; the last entry (showing ***Group*** and ***nonE***) is intended to access the other groups of parameters, or pressing FUNC again returns to the normal display mode. Each group has its own family of parameters, loosely grouped around the decreasing possible need to change the parameters. Each group (except Group 9) also has the ability to load its own default parameters and the default values of the lower number groups.

To reset a specific group (and lower numbered groups) to the default factory settings, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until the appropriate group number appears in the upper display. Press the FUNC key to enter the appropriate group. Press the FUNC key until ***DEFLT*** shows on the lower display and ***OFF*** shows on the upper display. Press the ▼ or ▲ key until ***ON*** # (where # is the Group number). Press the FUNC key to load the factory parameters for that group and lower numbered groups; for example, selecting Group 5 resets groups 1, 2, 3, 4 and 5.

5.3 Setting the Instrument's Basic Configuration

The example below shows those parameters by group, which will permit an ATC880 to control a motor. A modification of any other default parameter is most likely not needed. Please note in the Choices column, the final values used in your process for future set-up use.

GROUP #	FUNCTION	MNEMONIC	CHOICES	DEFAULT
Group 5	Primary Input Selection	PI.TYP	Str, 0-20, 4-20, 0-5, 0-10	Str
Group 5	Control Output Selection	CO.TYP	0-20, 4-20, 0-5 0-10, -10-10	0-10
Group 4	Shunt Calibration	SHUNT	OFF, On	On
Group 4	Shunt Value	SHNT%	40.0 TO 100.0%	80.0%
Group 4	Line Frequency	LINE.F	50, 60, Auto	50
Group 3	Input Full Scale Value	PI.FSV	10 TO 99950	10000
Group 3	Input Low Scale	PI.LSV	0 ± 25% OF FSV	0
Group 3	Input Decimal Point Position	PI.DP	None, 1,2,3,4 places	None
Group 2	Zero Calibration	ZERO.C	OFF, On, CLEAr	OFF
Group 2	Span Calibration	SPAN.C	OFF, On, CLEAr	OFF
Group 2	Type of Automatic Tuning	AT.TYP	PID, PI	PI
Group 2	Self-Tuning	SMART	OFF, On	On
Group 1	Set point	SP	Any value within range defined with	LSV

			PI.FSV and PI.LSV	

5.3.1 Setting the Shunt Calibration:

For transducers and transmitters with a shunt calibration function (internal or external), the various values must be set and the shunt capability enabled. The Shunt Calibration value is a percentage of the full scale transducer range. If the Shunt Value is supplied as a pressure, it must be converted to percent.

To enter the Shunt Calibration value, the shunt should first be enabled by pressing the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***4*** shows in the upper display. Press the FUNC key until the lower display shows ***SHUNT***. Press the ▼ or ▲ key until the upper display shows the ***ON***. Press the FUNC key to enable the shunt and move to the next parameter, Shunt % (***SHNT.%***). Press the ▼ or ▲ key until the upper display shows the appropriate percentage for the shunt value (normally 80%). Once the percentage value is set, press the FUNC key to set the value and press the A/M key to go back to the active display.

5.3.2 Setting the Logic Input Configuration (optiona):

If the unit does not have the logic input option, skip to Section 5.3.4.

NOTE: Alarm and peak reset is only available when A/M in Group 1 is set to Local.

The Logic Input can be off, can be set to a function such as an alarm reset, a peak reset, or it can reset both. To verify this parameter or to change it, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***4*** shows in the upper display. Press the FUNC key until the lower display shows ***LI.TYP***. Press the ▼ or ▲ key until the upper display shows the correct selection: ***OFF***, ***AL*** - Alarms reset, ***P*** - Peak reset,***AL-P – Alarm and Peak reset, CAL.0 – Zero Calibration of the Primary Input, ALL – Zero Calibration of the Primary Input, Peak reset, and Alarm Reset***). Press the FUNC key to set the value and move to the next parameter, or press the A/M key to go back to the active display.

5.3.3 Setting the Logic Input Status (optional)

The Logic Input Status can be set to Open or Closed as the active state. To verify this parameter or to change it, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***4*** shows in the upper display. Press the FUNC key until the lower display shows ***LI.STS***. Press the ▼ or ▲ key until the upper display shows the correct selection: ***CLOSE***, or ***OPEn***. Press the FUNC key to set the value and move to the next parameter, or press the A/M key to go back to the active display.

5.3.4 Setting the Status of Auto/Manual Selection (optional)

If the unit does not have the Digital Input option, skip to Section 5.3.5.

NOTE: Remote Auto/Manual is only available when Auto/Manual in Group 1 is set to CNCT.

The ATC880 Pressure/Process controller has four digital inputs that can switch between Manual and Automatic control (DIG 1), increase (DIG2) or decrease (DIG3) the control output value and switch from Automatic to Manual setting the control output to zero (DIG4). The Auto/Manual Selection parameter determines the status of the communication protocol. Select ***LoCAL*** to use the front push buttons or RS-485 to control switching from manual to automatic, or Select ***CnCt*** to use external means to control switching from manual to automatic.

Note: A dry contact switch or relay must be fitted between terminal 62 (Common) and terminal 63 (Digital Input 1 Remote AUTO/MAN (DIG1)) to enable the use of Digital Input 2 (DIG2) and 3 (DIG3) (Control output value increase and decrease).
To verify this parameter or to change it, press the FUNC key until the lower display shows ***A/M***. Press the ▼ or ▲ key until the upper display shows the correct value (***LoCAL*** or ***CnCt***). Press the FUNC key to set the value and move to the next parameter, or press the A/M key to go back to the active display.

5.3.5 Setting Peak Detection

The Peak Detection can be either set to OFF, the default value of HIGH, or to LOW. To verify or change this parameter, press the FUNC key until ***nonE*** and ***GROUP*** show on the display. Press the ▲ key until ***4*** shows in the upper display. Press the FUNC key until the lower display shows ***PEAK***. Press the ▼ or ▲ key until the display shows the correct value (***OFF***, ***HI***, or ***LO***). Press the FUNC key to set the value and move to the next parameter or press the A/M key to go back to the active display.

5.3.6 Setting the Line Frequency

The Line Frequency default value is 50 Hz. To verify this parameter or to change to 60 Hz, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***4*** shows in the upper display. Press the FUNC key until the lower display shows ***LINE.F***. Press the ▼ or ▲ key until the upper display shows the correct frequency. Press the FUNC key to set the value. Press the FUNC key to set the value and move to the next parameter or press the A/M key to go back to the active display.

5.3.7 Setting the Display Filter

Filtering is an electrical method of averaging the displayed values over a period of time to arrive at a more legible display. Filtering helps to eliminate short duration transients and spikes that may cause false or spurious readings.

To change or view the Display and Controller input Filter, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***2*** shows in the upper display. Press the FUNC key until the lower display changes to ***AT.FL***. Using the ▼ or ▲ keys, select the amount of filtering desired, from none (***OFF***) to five seconds. When finished, press the FUNC key to lock in the value and advance to the next parameter or press the A/M key to go back to the active display.

5.4 Setting the Remote Set Point Input/Seconday Input (Optional)

The Remote Set Point allows the user to control the set point from a remote voltage or current source (0-5Vdc, 0-10Vdc, 0-20mA or 4-20mA sources). The Secondary Input allows another input to be compared to the primary input and the differential of the two to be used as the process variable. The two inputs can be of a different type and still be used in a differential mode. The secondary input types are (0-5Vdc, 0-10Vdc, Strain, 0-20mA or 4-20mA sources

5.4.1 Setting the Remote Set Point/Secondary Input Voltage or Current

To change or view the Remote Set Point selection parameter, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***5*** shows in the upper display. Press the FUNC key until the lower display changes to ***SI.TYP***. Using the ▼ or ▲ keys, select the voltage or current input desired: (0-5Vdc, 0-10Vdc, Strain, 0-20mA or 4-20mA sources or ***OFF***). When finished, press the FUNC key to lock in the value.

5.4.2 Setting the Remote Set Point (RSP) Input Failsafe Mode

The Remote Set Point Failsafe parameter sets the value of the control signal in the event of a failure of the Remote Set Point signal. The Default value is ***Low*** *meaning the setpoint will automatically go to the lowest point of the Remote Set Point range; usually zero*. Setting the value to high will force the RSP to highest point of the range.

To change or view the Remote Set Point Failsafe Mode, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***4*** shows in the upper display. Press the FUNC key until the lower display changes to ***RI.IFS***. Using the ▼ or ▲ keys, select the desired setting: ***LO*** or ***HI***. When finished, press the FUNC key to lock in the value.

5.4.3 Setting the Remote Set Point Limits

The Remote Set Point can be limited to a specific output both on the low and the high side. Either value can be set to the Primary Input Full Scale Value (**PI.FSV)**.

To set the Remote Set Point Low parameter, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***3*** shows in the upper display. Press the FUNC key until the lower display shows ***RI.LO***. Using the ▼ or ▲ keys, select the desired value from the default ***0*** to the Primary Input Full Scale Value (***PI.FSV***). When finished, press the FUNC key to lock in the value and advance to the next variable, the Remote Set Point High parameter ***RI.HI***.

To set the Remote Set Point High parameter, press the ▼ or ▲ keys, select the desired value from the default ***PI.SFV*** to the value selected in ***RI.LO***. When finished, press the FUNC key to lock in the value and advance to the next parameter or press the A/M key to go back to the active display.

5.4.4 Setting the Local Remote Set Point Selection

Either the Remote Set Point or local control can be used to start the process. To select the start mode, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***2*** shows in the upper display. Press the FUNC key until the lower display shows ***LR.SP***. Using the ▼ or ▲ keys, select the desired value from the default ***LOC*** (local) to ***rEn*** (remote). When finished, press the FUNC key to lock in the value. Press the A/M key to go back to the active display. The selection of ***LR.SP*** is stored in nonvolatile memory, and this selection will be saved even if the instrument has been totally shut down. On start-up, the ***LR.SP*** status will be restored as set.

6.0 CONFIGURATION

6.1 Primary Input Setup

6.1.1 Setting the Primary Input Type for a Strain Gage Transducer

If you have an amplified transducer, or other amplified input, skip to Section 6.1.2, otherwise, if using a ***Dynisco*** transducer, the model number of the transducer will designate its own electrical output. For example, in plastic melt applications, the PT462E-5M-6/18 or TPT432A-10M-6/18 have a strain gage (0-3.33mV/V full scale) signal output. Amplified units have a number where the strain gage units have a letter (E or A). The PT4624-5M-6/18 has a 4-20 mA signal output; the PT4625-5M-6/18 has a 0-5Vdc signal output, while PT4626-5M-6/18 has a 0-10Vdc signal output. In Industrial applications, amplified units have a middle or end number of 4, 5, or 6. The S840-000-1C has a 4-20mA signal output; the PT150-7.5M has a 0-5Vdc signal output, while the PT276-5M has a 0-10Vdc signal output.

The ATC880's default setting is strain gage input. To verify that the input is set for strain gage, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until **5** shows in the upper display. Press the FUNC key and the upper display should show ***Str*** while the lower display shows ***PI.TYP***. If not, press the ▼ or ▲ key until the upper display changes to ***Str*** (for strain gage). Press the FUNC key to set the value. Press the A/M key to return to the active display.

6.1.2 Setting the Shunt Calibration for Strain Gage Transducers and Amplified Transmitters

The Dynisco strain gage transducers and amplified transmitters (if so equipped) have an internal shunt to allow the ATC880 to set the internal scaling for correct display. To Access the Shunt Calibration parameter, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until **4** shows in the upper display. Press the FUNC key and the upper display will show ***OFF*** while the lower display shows ***SHUNT***. Press the ▼ or ▲ key until the upper display changes to the ***ON***. Press the FUNC key to set the value and move to the next Shunt parameter.

The upper display will show ***80.0*** while the lower display shows ***SHNT%***. In most cases, the Dynisco transducers have an 80% shunt value so no changes need be made. However, some transducers and strain gages have shunt values that may range from 40% to 100%. If so, press the ▼ or ▲ key until the upper display changes to the correct values. Press the FUNC key to set the value. Press the A/M key to go back to the active display.

6.1.3 Setting the Primary Input Type for an Amplified Transmitter

If using a voltage or current output transducer, the model number of the transducer will designate its own electrical output. For example, a PT4624-7.5M-6/18 or an S840-000-10M has an amplified signal output. In plastic melt applications, amplified units have a number where the strain gage units have a letter (E or A). The PT4624-7.5M-6/18 has a 4-20mA signal output; the PT4625-7.5M-6/18 has a 0-5Vdc signal output, while PT4626-

7.5M-6/18 has a 0-10Vdc signal output. In Industrial applications, amplified units have a middle or end number of 4, 5, or 6. The S840-000-1C has a 4-20mA signal output; the PT150-7.5M has a 0-5Vdc signal output, while PT276-5M has a 0-10Vdc signal output.

The Instrument's default setting is strain gage input. To select another input for a transmitter or to use another process instrument, such as humidity sensors, position sensors, etc., press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until **5** shows in the upper display. Press the FUNC key and the lower display will show ***PI.TYP***. Press the ▼ or ▲ key until the upper display changes to the correct value (***0-20*** for 0-20 mA linear input, ***4-20*** for 4-20mA current loop input, ***0-5*** for 0-5Vdc linear input, and ***0-10*** for 0-10Vdc linear input). Press the FUNC key to set the value. Press the A/M key to go back to the active display.

6.1.4 Setting the Primary Input Full-Scale Value

The model number of the transducer or transmitter will designate the full-scale pressure capability. For example, model number TPT432A-5M-6/18 indicates that the full-scale pressure is 5,000 (5M), while the PT150-5C indicates that the full-scale pressure is 500 (5C). Since the default value in the instrument is 10,000 full scale, the input full scale value must be changed to 5,000 (or 500). Note that there are no units here, it can be psi, bar, mPa, kg/cm^2 or any engineering unit; the magnitude is all that is important.

To set the full-scale value, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until **3** shows in the upper display. Press the FUNC key and the upper display will show **10000** while the lower display shows ***PI.FSV***. Hold the ▼ or ▲ key until the upper display changes to **5000** (or whatever the full-scale value of the primary input may be). Press the FUNC key to set the value. Check that the next display reads **0** in the upper display and ***PI.LSV*** in the lower display; if not, set to zero with the arrow keys and press FUNC to lock in the value. Finally, press the A/M key to go back to the active display. Similarly, if the full-scale pressure is 350 Bar (3.5CB), set ***PI.FSV*** to 350.

6.1.5 Setting the Primary Input Low-Scale Value

For applications where a low scale value is non-zero, the Instrument can provide a low scale value of ±25% of the full scale value.

To set the low-scale value, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***3*** shows in the upper display. Press the FUNC key and the upper display will show a value while the lower display shows ***PI.FSV***. Press the FUNC key and the upper display will show ***0*** while the lower display shows ***PI.LSV***. Hold the ▼ or ▲ key until the upper display changes to whatever the low-scale value of the primary input may be. Press the FUNC key to set the value. Finally, press the A/M key to go back to the active display.

6.1.6 Setting the Primary Input Decimal Place

To set the decimal place, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***3*** shows in the upper display. Press the FUNC key until the lower display shows ***PI.DP***. Press the ▼ or ▲ key until the upper display shows the correct decimal place location. For example, a 350 Bar unit may show 350.0 for decimal place setting. Press the FUNC key to set the value. Finally, press the A/M key to go back to the active display.

6.1.7 Setting the Primary Input Failsafe Mode

The Primary Input Failsafe Mode is nothing more than a safety mechanism that tells the instrument what to do in the event of a loss of the primary signal. If the system is set up to shut down the process in a high alarm condition, the Primary Input Failsafe parameter can set the value of the primary input to full scale if it loses the primary signal. If the system is set up to shut down the process in a low alarm condition, the Primary Input Failsafe parameter may set the value of the primary input to low scale if it loses the primary signal. The default Primary Input Failsafe Mode sets the value to full scale high.

To set the Primary Input Failsafe Mode, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***4*** shows in the upper display. Press the FUNC key until the lower display shows ***PI.IFS***. Press the ▼ or ▲ key until the upper display shows the correct mode, either ***HI*** or ***Lo***. Press the FUNC key to set the value. Finally, press the A/M key to go back to the active display.

6.2 Setting the Alarms:

All Alarms supplied with the Instrument can be linked to the actual pressure value, a pre-selected band about that pressure value, deviation from set point, or turned off. The alarms are capable of being set as High Level Alarms or Low Level Alarms, and may operate in either *Failsafe* or *Direct* condition.

Failsafe means that in the event of power failure to the Instrument, the Alarm will activate. Use this feature on a shutdown alarm. Please note that in a proper operating condition in Failsafe mode, the Normally Closed Contact is held OPEN, while the Normally Open contacts are held CLOSED. On power failure, they are released.

On start-up, a Low Alarm may cause the unit to go into an undesired alarm condition prior to reaching running conditions. This Alarm can be masked so that the Low Alarm will be deactivated until it has gone above the alarm value for the first time. It will then operate as a normal low alarm. This is referred to as Low Alarm Inhibit.

The default values for **Alarm 1** are: an inhibited low alarm set at 5% of full scale, linked to the primary process input, 0.4 second filtering, 1% hysteresis, automatic reset and failsafe mode. Each alarm may be set to 110% of full scale.

The default values for **Alarm 2** are: high alarm at 60% of full scale, linked to the primary process input, 0.4 second filtering, 1% hysteresis, automatic reset, and failsafe mode.

The default values for **Alarm 3** are: high alarm at 80% of full scale, linked to the primary process input, 0.4 second filtering, 1% hysteresis, automatic reset, and failsafe mode.

Set the Alarm parameters before setting the alarm value.

6.2.1 Setting What the Alarm will Monitor (Alarm Input Channel Link):

The Alarm 1 Input Channel Link defaults to the primary process input. To check or change this value press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***3*** shows in the upper display. Press the FUNC key until ***A1.LNK*** shows in the lower display. Select the choice desired by pressing the ▼ or ▲ keys. The choices are: ***OFF***, (disabled), a process alarm (on reaching a specific pressure over/under) ***Proc***, a band alarm around a specific pressure range ***bAnd***(%), or a deviation alarm from a specific pressure ***dEu***(number). Press the FUNC key to lock in the value and advance to the next parameter. Similarly, you may configure Alarm 2 (***A2.LNK***) and Alarm 3 (***A3.LNK***) in the same manner.

6.2.2 Setting Alarm Type:

A high alarm will activate when a set point is exceeded. A low alarm will activate whenever the value falls below a set point (including startup). An inhibited low alarm must exceed the low alarm set point before it is enabled, then it will work like a low alarm. This is ideal on startup.

The default alarm type for Alarm 1 is high. To check or change this value press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***3*** shows in the upper display. Press the FUNC key until ***A1.TYP*** shows in the lower display. Using the ▼ or ▲ keys, select ***HI*** for high level alarm, ***LO*** for low level alarm or ***Inhib*** for a low level alarm with mask at start-up. Press the FUNC key to lock in the value and advance to the next parameter. If finished, press A/M to return to the operating screen. Similarly, you may configure Alarm 2 (***A2.TYP***) and Alarm 3 (***A3.TYP***) in the same manner.

6.2.3 Setting the Filtering for Alarms:

Filtering is an electrical method of averaging the input values over a period of time to arrive at a smoother curve. This helps to eliminate short duration transients and spikes which can cause alarms and may cause false or spurious readings.

The Alarm filter default is 0.4 seconds of filtering. To change this value, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until **2** shows in the upper display. Press the FUNC key until the lower display changes to ***A1.FL***. Using the ▼ or ▲ keys, select the amount of filtering desired, from none (***OFF***) to five seconds. When finished, press the FUNC key to lock in the value and advance to the next parameter. If finished, press A/M to return to the operating screen. Similarly, you may configure Alarm 2 (***A2.FL***) and Alarm 3 (***A3.FL***) in the same manner.

6.2.4 Setting the Hysteresis for Alarms:

Hysteresis is used to describe the amount that the reading must drop below the alarm point (in a high alarm) or must rise above the alarm point (in a low alarm) to clear the alarm condition. This helps to eliminate short duration alarms when operating near the alarm condition. To change or view this value, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***4*** shows in the upper display. Press the FUNC key until the lower display changes to ***A1.HYS***. The values for hysteresis can range from .1% to 10.0%. Press the ▼ or ▲ keys until the upper display changes to the desired value. Press the FUNC key to lock in the value and advance to the next parameter or press A/M to return to the operating screen. Similarly, you may configure Alarm 2 (***A2.HYS***) and Alarm 3 (***A3.HYS***) in the same manner.

6.2.5 Setting the Reset Mode for Alarms:

The Alarm Reset Mode determines if the alarm resets itself once the alarm condition is been corrected or whether the operator must press buttons (▼ and FUNC to reset the alarm or use an external trigger to reset. The Alarm Reset Mode default is automatic reset once the alarm has cleared. To change or view this value, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***4*** shows in the upper display. Press the FUNC key until the lower display changes to ***A1.RES***. The value for reset mode is either ***Auto*** for automatic reset or ***LAtCH*** for manual reset. Press the ▼ or ▲ keys until the upper display changes to the desired value.

Press the FUNC key to lock in the value and advance to the next parameter or press A/M to return to the operating screen. Similarly, you may configure Alarm 2 (***A2.RES***) and Alarm 3 (***A3.RES***) in the same manner.

6.2.6 Setting the Failsafe Mode for Alarms:

The Alarm Failsafe Mode determines how the alarms react in the event of a power failure to the ATC880. In the failsafe mode, the alarms will activate in the event of power loss. In non-failsafe mode they **cannot** activate on power loss. The Alarm Failsafe default is failsafe mode. To change this value, press the FUNC key until ***nonE*** and ***GROUP*** show on the display. Press the ▲ key until ***4*** shows in the upper display. Press the FUNC key until the lower display changes to ***A1.FSM***. The options for failsafe mode are either ***FS*** for failsafe mode, or ***nFS*** for non-failsafe mode. Press the ▼ or ▲ keys until the upper display changes to the desired value. Press the FUNC key to lock in the value and advance to the next parameter. Similarly, you may configure Alarm 2 (***A2.FSM***) and Alarm 3 (***A3.FSM***) in the same manner.

Carefully consider the Alarm wiring: For failsafe operation, the alarm contacts must be wired differently to have operation as expected. The ATC880 energizes the contact relay during failsafe operation. This means the NO contact will be held CLOSED during normal operation. In the event of an alarm or the loss of power to the ATC880, the relay will be de-energized and will then open. The same holds true for a NC contact. It will be held OPEN during normal operation. In the event of an alarm condition or the loss of

power to the ATC880, the relay will be de-energized and will then close. In non-failsafe operation the reverse is true such that a NO acts as a NO and a NC acts as a NC.

6.2.7 Setting the Alarms Threshold Values:

The Alarm 1Threshold Value, is the value beyond which the Alarm will activate (i.e. the threshold). Alarm 1 is set in the same engineering units that the Full Scale Value uses. To change or view this value when in the operating screen, press the FUNC key until the lower display changes to ***AL1*** with the threshold value in the upper display. Press the ▼ or ▲ keys until the upper display changes to the desired value. Press the FUNC key to lock in the value and advance to the next parameter, or press A/M to return to the operating screen. Similarly, you may configure Alarm 2 (***AL2***) and Alarm 3 (***AL3***) in the same manner.

6.2.8 Setting the Alarms Mask Reset Type:

The Alarm 1 Mask Reset may only be used on alarms configured as inhibited low alarms on startup. It prevents the alarm from activating (masks the alarm) until the value of the primary input exceeds the alarm value. To change or view this value when in the operating screen, press the FUNC key until the lower display changes to ***AL.MSK*** with ***OFF*** in the upper display. Press the ▼ or ▲ keys until the upper display changes to ***rESEt***. Press the FUNC key to lock in the value and advance to the next parameter, or press A/M to return to the operating screen. You may similarly configure Alarm 2 or 3 in the same manner.

6.3 Retransmission Output Setup

This ATC880 has a retransmission output which can send a signal to a recorder or some other device that can accept a voltage or current signal.

6.3.1 Selection of the Retransmission Output

The Retransmission Output Type sets the output to specific voltages or currents. The available outputs are 0-20mA, 4-20mA, 0-10Vdc, -10 to +10Vdc, and 0-5Vdc. To change or view this value, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***5*** shows in the upper display. Press the FUNC key until the lower display changes to ***RO.TYP*** and the upper display shows the selected type. Press the ▼ or ▲ keys until the upper display changes to the desired value. Then press the FUNC key to lock in the value. Press A/M to return to the operating screen.

6.3.2 Setting the Retransmission Output Range

To change or view the Retransmission Output Range Low, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***3*** shows in the upper display. Press the FUNC key until the lower display changes to ***RO.LO***. Press the ▼ or ▲ keys until the upper display changes to the desired value. The value may be anything from 0 to the primary input full scale value, ***PI.FSV.*** This can act as a scale expander; i.e. if the system has a 10,000 psi transducer but usually runs from 3,000 to 6,500, the ***RO.LO*** can be set to 2,500 so that the output at 2,500 psi is 0. Once the desired value is

set, press the FUNC key to lock in the value and advance to the next parameter the Retransmission Output Range High ***RO.HI***.

6.3.3 Setting the Retransmission Output Range High

If ***RO.HI*** does not appear from the previous step, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***3*** shows in the upper display. Press the FUNC key until the lower display changes to ***RO.HI***.

Once ***RO.HI*** appears, press the ▼ or ▲ keys until the upper display changes to the desired value. The value may be anything from 0 to the primary input full scale value, ***PI.FSV.*** This can act as a scale expander; i.e. if the system has a 10,000 psi transducer but usually runs from 3,000 to 6,500, the ***RO.HI*** can be set to 7,500 so that the output at 7,500 psi is full scale voltage or current. Once the desired value is set, press the FUNC key to lock in the value and advance to the next parameter, or press A/M to return to the operating screen.

6.3.4 Setting the Retransmission Output Filter

Filtering is an electrical method of averaging the output values over a period of time to arrive at a smoother curve. This helps to eliminate short duration transients and spikes that may cause false or spurious readings.

To change or view the Retransmission Output Filter, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***2*** shows in the upper display. Press the FUNC key until the lower display changes to ***RO.FL***. Using the ▼ or ▲ keys, select the amount of filtering desired, from none (***OFF***) to five seconds. When finished, press the FUNC key to lock in the value. Press A/M to return to the operating screen.

6.4 Setting the Control Output:

The control output is opto-isolated from the CPU input and output circuits. The types of Control Outputs available are keyboard selectable between various voltages and currents.

6.4.1 Setting the Control Output Voltage or Current:

The control output can have a 0-5Vdc, a 0-10Vdc, a –10 to +10Vdc, a 4-20mA or a 0-20mA output. The range of output is selected from the keyboard. To select the voltage or amperage range, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***5*** shows in the upper display. Press the FUNC key until the lower display shows ***CO.TYP***. Using the ▼ or ▲ keys, select the desired value: ***0-5*** (Vdc), ***0-20*** (mA), ***4-20*** (mA), ***0-10*** (Vdc), or ***–10.10*** (Vdc). When finished, press the FUNC key to lock in the value and A/M to return to the main screen.

6.4.2 Making the Control Output Direct/Reverse Selection:

The input signal can cause the control output to either increase or decrease with an increasing or decreasing input signal. The table below shows the value of Direct/Reverse Control Output selection (***CO.D/R***). The first digit shows the relationship

between the input signal and the displayed output value (***OUT%***). The last digit shows the relationship between the displayed output signal and the output value voltage or current.

Value	Input Signal	Displayed Output	Control Output
r d	0-100 (increase)	100-0 (decrease)	100-0 (decrease)
r r	0-100 (increase)	100-0 (decrease)	0-100 (increase)
d d	0-100 (increase)	0-100 (increase)	0-100 (increase)
d r	0-100 (increase)	0-100 (increase)	100-0 (decrease)

The default value is ***r d*** (Reverse-Direct), or decreasing the Displayed and Control outputs with increasing signal.

6.4.3 Setting the Control Output Limit:

The Control Output Signal can be limited to a specific percentage value to prevent downstream problems. To set the Control Output Limiter parameter (***CO.MAX***), , press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***4*** shows in the upper display. Press the FUNC key until the lower display shows ***CO.MAX***. Using the ▼ or ▲ keys, select the desired value from 10.0 to 100.0%. When finished, press the FUNC key to lock in the value and A/M to return to the main screen.

6.4.4 Setting the Control Output Manual Mode Indication:

This parameter is used to select how the controller shows the output value in manual mode: either in the range of 0-100%, or scaled with the ***CO.HI*** and ***CO.LO*** parameters. The default value is 0-100%. To confirm or change this value, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***4*** shows in the upper display. Press the FUNC key until the lower display shows ***CO.MMI***. Using the ▼ or ▲ keys, select either ***100.0%*** or ***rPn*** (for RPM indication). When finished, press the FUNC key to lock in the value, and A/M to return to the main screen.

6.4.5 Setting the Control Output Display:

The Control Output Display can be changed to reflect RPM or some other external parameter. However, since this is arbitrary and will be tuned to a specific device, it is recommended to skip this section and use the defaults.

To change the Control Output Range Low (***CO.LO***) from the standard ***0*** value, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***3*** shows in the upper display. Press the FUNC key until the lower display shows ***CO.LO***. Using the ▼ or ▲ keys, select the desired value from -10000 to the ***CO.HI*** value. (if no ***CO.HI*** value has been set, you may need to return to this step. When finished, press the FUNC

key to lock in the value. The lower display will show ***CO.HI***, and the upper display will show the default value (100.0). Using the ▼ or ▲ keys, select the desired value from 0 to 10000 for the ***CO.HI*** value. When finished, press the FUNC key to lock in the value. The lower display will show ***CO.DP***, for the decimal point position, and the upper display will show the default value (100.0). Using the ▼ or ▲ keys, select the desired decimal point position. When finished, press the FUNC key to lock in the value, and A/M to return to the main screen.

6.5 Setting the Security Codes:

The security code setting is configured by software (front key board or remotely). There are three Security levels. When each level has been assigned a code access to the parameters will be available as follows:

- Level A: Allows access to parameters in Group 1 Only
- Level B: Allows access to parameters in Groups 1 and 2 Only
- Level C: Allows access to parameters to all Groups 1 - 5

6.5.1 Setting the Security Code for Level A

To view or change the security code, press the FUNC key and the lower display changes to ***CODE.A***. The upper display shows ***0,*** which indicates no security, and 1 means all parameters related to levels A, B, and C are always locked. Press the ▼ or ▲ keys until the desired security code number (from 2 to 250) appears in the upper display. Press the FUNC key to lock in the value. The upper display changes to ***1***, and the lower display changes to ***CODE.B***. This means that ONLY Levels B and C are locked, NOT Level A.

6.5.2 Setting the Security Code for Level B

If you first set ***CODE.A***, the lower display will read ***CODE.B***; if not, press the FUNC key to move to ***CODE.B***. The upper display shows ***0,*** which indicates no security; or it may show ***1***, which means all parameters related to levels A, B, and C are always locked). Press the ▼ or ▲ keys until the desired security code number (from 251 to 500) appears in the upper display. Press the FUNC key to lock in the value. The lower display changes to ***CODE.C***, and the Upper display shows ***1***. This means that all levels are locked and cannot be changed.

6.5.3 Setting the Security Code for Level C

If you first set ***CODE.A*** and ***CODE.B***, the lower display will read ***CODE.C***. If not, press the FUNC key to move to ***CODE.C***. The upper display shows ***0,*** which indicates no security; a 1 means all parameters related to levels A, B, and C are always locked). Press the ▼ or ▲ keys until the desired security code number (from 501 to 1000) appears in the upper display. Press the FUNC key to lock in the value. The upper display changes to ***CodE*** and the lower display changes to ***ATC***.

Once the security codes are selected, they CANNOT be displayed. If the codes are forgotten, new values must be entered using the above procedure. It is recommended that a code be set for each security level. Note that unlocking the Level C code also unlocks Levels A, B, and C. To relock a code, simply enter any incorrect number and all

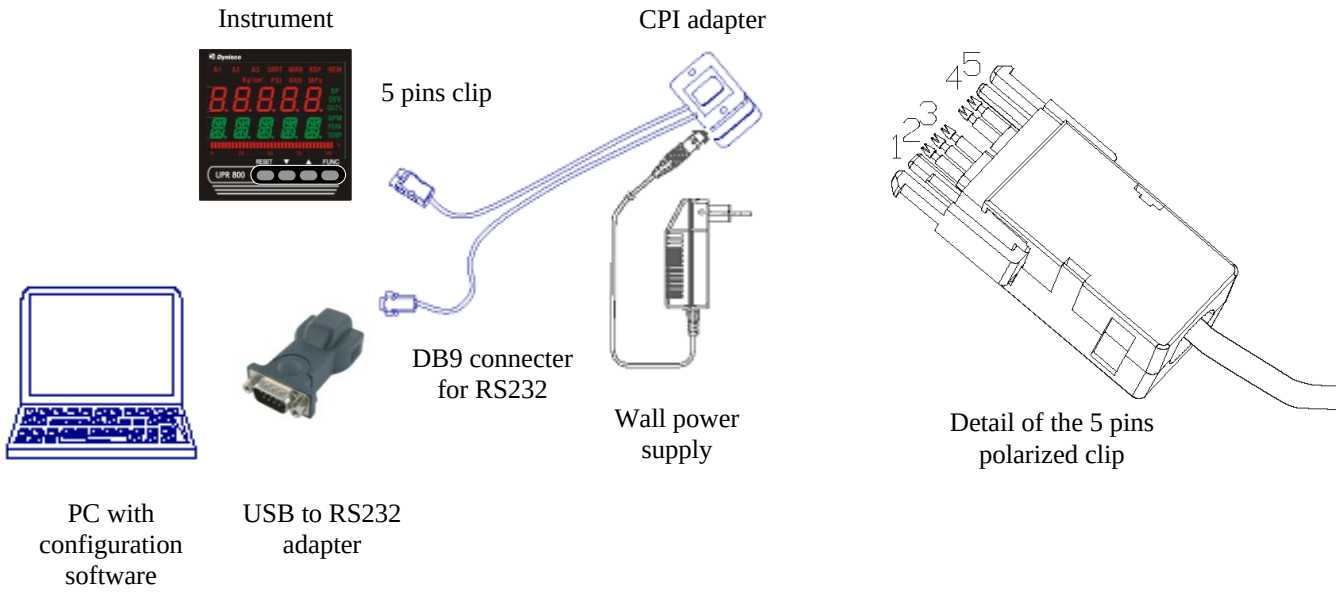
the locked levels will relock. Unlocking the Level B code, unlocks Levels A and B. Unlocking Level A unlocks only Level A. When the ***SECUR*** functions are accessed in Group 1, the levels that are locked will be followed by a decimal point

6.6 Configure by Remote PC (Configuration Port Interface or CPI)

The instrument provides an optional method to communicate with a PC host system to access each single operative and configuration parameter or to upload/download the complete instrument parameter set. The optional system consists of:

- Dedicated adapter that interfaces the instrument to a RS-232 line.
- External wall power supply, to avoid powering the instrument through the main line.
- Receptacle for the five pins clip, located on the side of the instrument package; a mechanical polarization prevents incorrect insertion.
- PC configuration software.

When the Configuration Port Interface (CPI) is connected, all instrument functions are disabled. While connected, the device is in 'remote' mode for all parameter configuration, no matter the local security code settings. The CPI connection is performed using a Modbus RTU protocol with fixed communication parameters (device address 255, data format 8 bit without parity and 9600 baud). The wall power supply for the CPI adapter has three different interchangeable plugs to accommodate US/Japanese, European and UK sockets. The CPI can also be used also for field upgrades of the instrument firmware. A USB/RS-232 converter is compatible with the CPI.

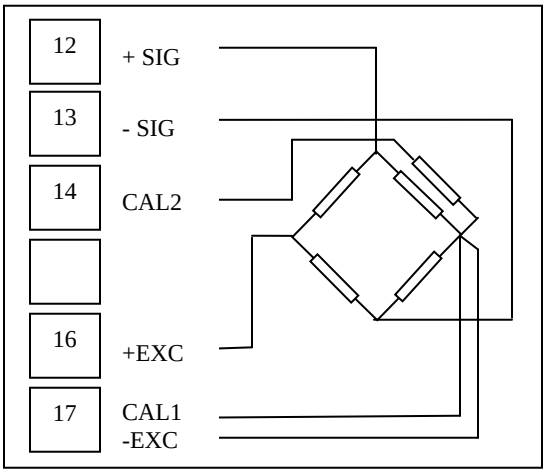


6.7 Configure Differential Control

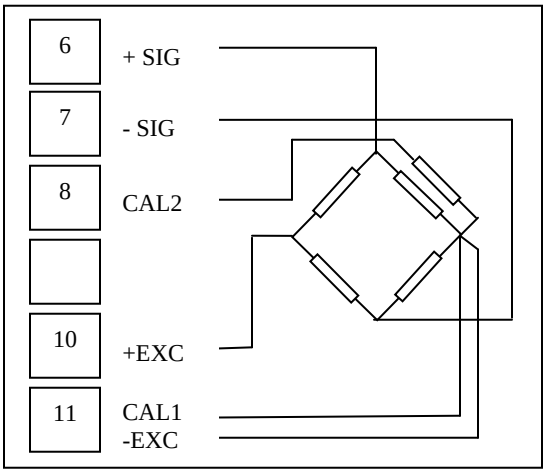
Autotuning is available on the dual inputs to control a differential pressure setpoint or other process variable that requires a Delta (PT1-PT2) input and closed loop control output. Primary and secondary inputs can be either strain gage, 0-5Vdc, 0-10Vdc, 0-20mA or 4-20mA. Primary and secondary input types need not be matched types. By default the ATC880-1-X-X with secondary input option ships setup to function as Remote Setpoint. To execute the differential control function Group 5 parameter SI.FNC needs to be set from RSP to Differential Pressure. Wire either a mV/V strain gauge transducer, Volt, or Milliamp transmitter to terminals as show in Figures.

Strain Gage Transmitter Wiring Diagram

For Primary Input (PT1)



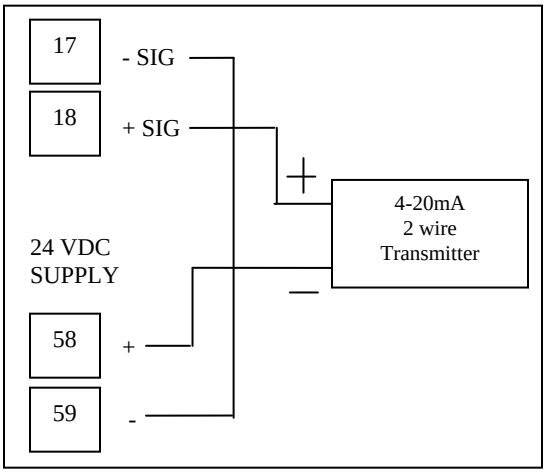
For Secondary Input (PT2)



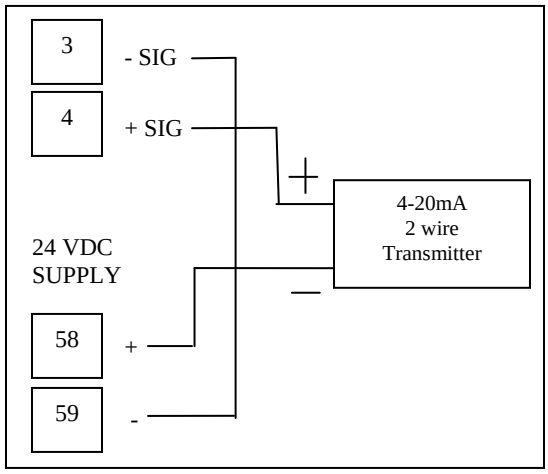
Note: If no internal Rcal is used, Cal1 and Cal2 may be omitted. For transducers with External cal resistors, refer to the manufacturer's recommended wiring instructions.

4-20mA Transmitter Wiring Diagram

For Primary Input (PT1)

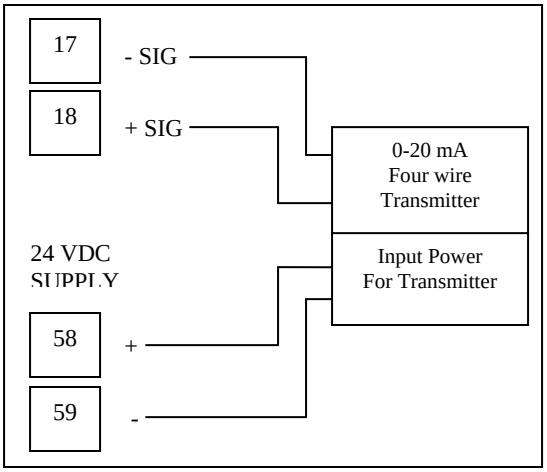


For Secondary Input (PT2)

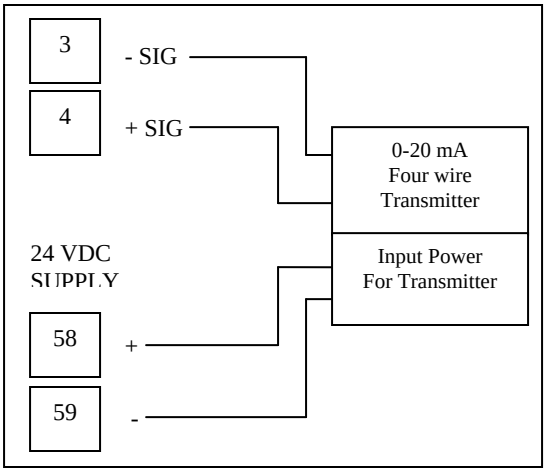


0-20mA Transmitter Wiring Diagram

For Primary Input (PT1)

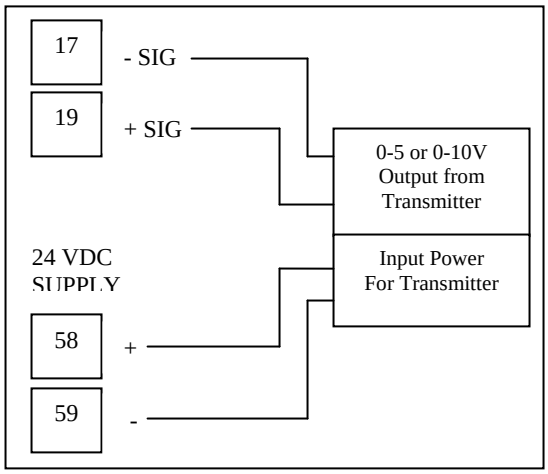


For Secondary Input (PT2)

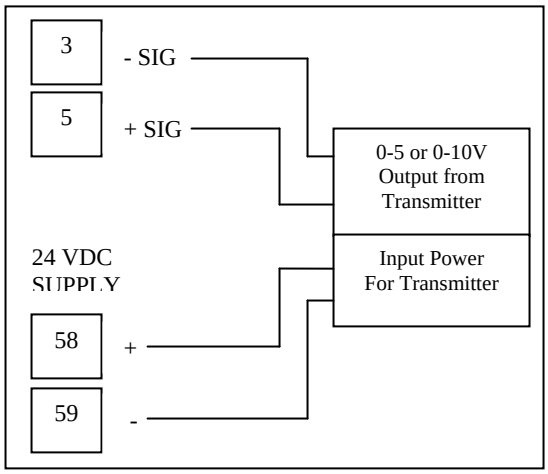


0-5 or 0-10Vdc Transmitter Wiring Diagram

For Primary Input (PT1)



For Secondary Input (PT2)



Configuration

Parameters are arranged in Groups 5 through 1 and are in order of frequent use. A general rule of thumb Group 5 parameters are modified once during setup of the controller and gradually increase in frequency of use to Group 1 which includes Control Setpoint and Alarm thresholds that may be changed on a regular basis.

Parameters that are used only during differential operation are:
Group 1 PI.VAL – Used to display process value on Primary (Main) input
Group 1 SI.VAL – Used to display process value on Secondary input
Group 2 ZER.2.C – Used to zero calibrate secondary analog input
Group 2 SPN.2.C – Used to Span calibrate the secondary analog input
Group 3 SI.FSV – Used to scale secondary input full scale value
Group 3 SI.LSV – Used to scale secondary input lower scale value

Group 4 SI.IFS – Used to set secondary input Failsafe value
Group 5 SI.TYP (Str) – When set to Strain gage, controller sets SI.FNC to diff P
Group 5 SI.FNC – Used to toggle between Remote SP or Differential mode

Group 5 – Input Output types

1. Proceed to Group 5 parameters by pressing the FUNC button until Group is shown on lower display and None is shown on upper display. Press the ▲ arrow until Group 5 is displayed.
2. Press FUNC button once to display PI.TYP
3. Press ▲ or ▼ arrow until the desired Primary Input type is selected. Str for Strain gage, 0-20 for 0-20 mA, 4-20 for 4-20 mA, 0-5 for 0-5VDC, 0-10 for 0-10 VDC.
4. Press FUNC button to save and move on to the next parameter.
5. SI.TYP should now be displayed. Press ▲ or ▼ arrow until the desired Secondary Input type is selected. Str for Strain gage, 0-20 for 0-20 mA, 4-20 for 4-20 mA, 0-5 for 0-5VDC, 0-10 for 0-10 VDC. Note: OFF will turn off differential mode.
6. Press FUNC button to save and move to the next parameter. SI.FNC will now be displayed. If Strain gage was selected for SI.TYP, then the SI.FNC will automatically be set to diFF.P for Differential Pressure otherwise press the ▲ arrow to select diFF.P
7. Press the FUNC button to save and move to the next parameter. CO.TYP will be displayed on the lower display. Press the ▲ arrow to select the appropriate Control Output Type. Analog outputs available are 0-10 for 0-10VDC, -10.10 for -10V to +10VDC, 0-5 for 0-5VDC, 0-20 for 0-20 mA, 4-20 for 4-20 mA. This selection should match the motor drive requirements of the equipment the ATC880 will be controlling.
8. Press FUNC to save and move to the next parameter. RO.TYP will be displayed on the lower display. Press the ▲ arrow to select the appropriate Retransmission Output Type. Retransmission outputs available are 0-10 for 0-10VDC, -10.10 for -10V to +10VDC, 0-5 for 0-5VDC, 0-20 for 0-20 mA, 4-20 for 4-20 mA or OFF if the Retransmission output is not used. This selection should match the remote device analog input type used to remotely display the Delta Pressure.
9. Press the FUNC button to save and move to the next parameter.
10. DEFLT will be displayed. This is only used to default the Group 5 parameters back to Factory Defaults. This is performed by pressing the ▲ arrow until ON 5 is displayed and then press the FUNC button to default otherwise press FUNC again to return to the GROUP display.

Group 4 – Shunt and Failsafe Settings

1. Pressure FUNC until Group is shown on lower display. Press the ▲ arrow to select Group 4.
2. Press FUNC again to move to SHUNT parameter. Depending on type of sensor connected to the primary and secondary inputs Shunt Calibration may or may not be used. Generally Shunt Cal is used on Strain gage transducers with millivolt output because calibration is performed at the Process indicator or controller. Shunt should be set to OFF when using Transmitters with milliamp or volt outputs

because the calibration is generally perfomed on the transmitter itself using zero and Span adjustments.
Note: Setting the SHUNT to off, the controller will assume the span calibration will be the full scale of the sensor connected to the input.

3. Press FUNC to save and move to the next parameter. SHNT.% will be displayed on the lower display (If previous operation set SHUNT to ON). Using the ▲ or ▼ arrows, the % can be adjusted from 40.0 to 100.0 % of full scale. Dynisco Melt Pressure Transducers utilize 80% Shunt Cal output. Consult the manufacturer's documentation for recommended Shunt Calibration setting if using the controller with other sensors.
4. Press FUNC to save and move to the next parameter. PI.IFS will be displayed. Primary Input Failsafe can be set to HI or LO depending on the desired action if there is a sensor break. If set to HI, the process input will go high and cause any actions to react as if the process variable has increased to maximum. This includes any alarms and control output. Setting PI.IFS to LO will cause the process input to go to minimum if there is a sensor break.
5. Press FUNC to save and move to the next parameter. SI.IFS will be displayed. This setting is for the Secondary Input Failsafe and reacts the same as the Primary Input if there is a sensor break on the secondary input. Press FUNC to save the SI.IFS setting.
6. The remaining parameters in Group 4 relating to Alarm and control action are outlined in section 6.

Group 3 – Display scaling and indication

1. Proceed to Group 3 parameters by pressing the FUNC button until Group is shown on lower display and None is shown on upper display. Press the ▲ arrow until Group 3 is displayed.
2. Press the FUNC button until PI.FSV is displayed. Using the ▲ and ▼ arrows, set the Primary Input full scale value to match the full range of the sensor connect to the Main input.
3. Press FUNC to save and move to the next parameter. PI.LSV will be displayed. Using the ▲ and ▼ arrows, set the Primary Input Low scale value to the minimum value, typically zero for Melt Pressure sensors.
4. Press FUNC to save and move to the next parameter. PI.DP will be displayed. USE the ▲ arrow to step through the decimal point position for the Primary input display.
5. Press FUNC to save and move to the next parameter. PI.EU will be displayed. Use the ▲ or ▼ arrows to step through the Primary Input Engineering Units. Available settings are PSI, Bar, Mpa, Kg/cm2 or OFF if no Engineering unit is desired.
6. Press FUNC to save and move to the next parameter. SI.FSV will be displayed. Using the ▲ and ▼ arrows, set the Secondary Input full scale value to match the full range of the sensor connect to the Secondary input.

7. Press FUNC to save and move to the next parameter. SI.LSV will be displayed. Using the ▲ and ▼ arrows, set the Secondary Input Low scale value to the minimum value, typically zero for Melt Pressure sensors.
8. Press FUNC to save the SI.LSV parameter setting.
9. The remaining parameters in Group 3 relating to Alarm linking, Output and Setpoint scaling and communications addressing is outlined in Section 6.

Group 2 – Calibration of Sensors

1. Proceed to Group 2 parameters by pressing the FUNC button until Group is shown on lower display and None is shown on upper display. Press the ▲ arrow until Group 2 is displayed.
2. Press the FUNC button until ZERO.C is displayed on the lower display. Be sure zero pressure is applied to the primary input and press the ▲ arrow to turn upper display to ON. Press FUNC button to initiate Zero Calibration on the Primary Input. Note: CLEAr can be used to clear a zero calibration back to Factory setting of 0(mV/v/mA)
3. ZER.2.C should now be displayed on the lower display. Be sure zero pressure is applied to the secondary input and press the ▲ arrow to turn upper display to ON. Press FUNC button to initiate Zero Calibration on the Secondary Input.
4. SPAN.C should now be displayed on the lower display. If a Strain Gage transducer is used and Group 4 SHUNT is set to on, be sure zero is applied to the primary input and press the ▲ arrow to turn upper display to ON. The controller will use the simulated 80% (or other cal point set in Group 4 Span %) as the full scale pressure and span the Primary Input.
   Note: CLEAr can be used to clear a Span calibrations back to Factory setting of 33.3mV, or 10V, 20mA depending on which input type is selected.
5. SPN.2.C should now be displayed on the lower display. If a Strain Gage transducer is used and Group 4 SHUNT is set to on, be sure zero is applied to the secondary input and press the ▲ arrow to turn upper display to ON. The controller will use the simulated rcal of 80% (or other cal point set in Group 4 Span %) as the full scale pressure and span the Secondary Input.
6. If using a 0-5/0-10V or 0-20/4-20 transmitter, it is recommended to rely on either the factory span or perform the zero and span calibration on the transmitter itself using a deadweight pressure calibrator or other calibrated source.
7. Press FUNC button until Process Variable is displayed or Press the A/M button ot exit Group 2.
   The remaining parameters in Group 2 relating to PID tuning, Alarm and Retransmission Filters is outlined in Section 7.2.

Group 1 – Displaying Individual PT1 and PT2 values

1. Press the FUNC button until PI.VAL is displayed in the lower display, this is the upstream or PT1 Primary Input pressure value.
2. Press the FUNC button once and SI.VAL is displayed in the lower display, this is the downstream or PT2 Secondary Input pressure value.

3. If no buttons are pressed within 10 seconds, the display times out and returns to display PT1-PT2 Delta pressure.

7.0 OPERATION

7.1 Primary Input Calibration

NOTE: In this section the word *Calibration* means to match the Instrument to the input device, so that a specific signal from the input device is equated to a specific pressure and no other, (to the capabilities of its input resolution)

Apply power to the cabinet and allow the system to stabilize for about 30 minutes. Allow the transducer or other input device to come up to operating conditions (i.e. temerature and zero pressure).

7.1.1 Calibration of Pressure Transducers with Internal Shunt Resistor

Be sure that the full scale and low scale values (***PI.FSV*** and ***PI.LSV***) have been set to match the range of the transducer and that the ***SHUNT*** function is ***ON*** and set to the correct percentage (80% for a typical Dynisco transducer).

To calibrate the transducer to the instrument, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until **2** shows in the upper display. Press the FUNC key and the lower display changes to ***ZERO.C***. The upper display shows ***OFF***. Press the ▼ or ▲ keys until the upper display changes to ***ON***. Press the FUNC key to calibrate the zero value. The lower display changes to ***SPAN.C***. The upper display shows ***OFF***. Press the ▼ or ▲ keys until the upper display changes to ***ON***. Press the FUNC key to calibrate the span value. When the legend ***DSP.FL*** appears in the lower display, calibration is complete. Press A/M to return to the operating screen.

7.1.2 Calibration of Amplified Pressure Transmitters with Internal Shunt Resistor

Be sure that the full scale and low scale values (***PI.FSV*** and ***PI.LSV***) have been set to match the range of the transducer and that the ***SHUNT*** function is turned ***OFF***.

To calibrate the transducer to the instrument, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until **2** shows in the upper display. Press the FUNC key and the lower display changes to ***ZERO.C***. The upper display shows ***OFF***. Press the ▼ or ▲ keys until the upper display changes to ***ON***. Press the FUNC key to calibrate the zero value. The lower display changes to ***SPAN.C***. The upper display shows ***OFF***. Press the ▼ or ▲ keys until the upper display changes to ***CLEAr***. Press the FUNC key to calibrate the span value. When the legend ***DSP.FL*** appears in the lower display, calibration is complete. Press A/M to return to the operating screen.

7.1.3 Calibration of Pressure Transducers equipped with External Shunt Resistors

Install the external shunt resistor across terminals 13 (signal -) and 14 (Cal 2) for primary input or 7 (signal -) and 8 (Cal 2) for secondary input. Be sure that the full scale and low scale values (***PI.FSV*** and ***PI.LSV***) have been set to match the range of the transducer and that the ***SHUNT*** function is ***ON*** and set to the correct percentage (as supplied by the transducer manufacturer. If the value supplied is a different percentage value, or an

actual pressure value, convert to a percentage and enter in ***SHNT.%***). (See Section 5.3.1)

To calibrate the transducer to the instrument, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until **2** shows in the upper display. Press the FUNC key and the lower display changes to ***ZERO.C***. The upper display shows ***OFF***. Press the ▼ or ▲ keys until the upper display changes to ***ON***. Press the FUNC key to calibrate the zero value. The lower display changes to ***SPAN.C***. The upper display shows ***OFF***. Press the ▼ or ▲ keys until the upper display changes to ***ON***. Press the FUNC key to calibrate the span value. When the legend ***DSP.FL*** appears in the lower display, calibration is complete. Press A/M to return to the operating screen.

7.1.4 Calibration of Analog Inputs Using a Pressure Calibration Source

Be sure that full scale and low scale values have been set to the range of the process sensor. Press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***4*** shows in the upper display. Press the FUNC key and the upper display should show ***OFF*** while the lower display shows ***SHUNT***. If the upper display does not show ***OFF***, press the ▼ or ▲ key until the upper display changes to ***OFF***. Press the FUNC key to set the value and press A/M to return to the operating screen.

Press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until **2** shows in the upper display. Press the FUNC key and the lower display changes to ***ZERO.C***. The upper display shows ***OFF***. With low scale equivalent signal applied from an appropriate calibration source, press the ▼ or ▲ keys until the upper display changes to ***ON***. Press the FUNC key to calibrate the zero value. When the lower display changes to ***SPAN.C***, zero calibration is complete. With signal applied equivalent to full scale value from an appropriate calibration source, press the ▼ or ▲ keys until the upper display changes to ***ON***. Press the FUNC key to calibrate the span value. When the legend ***DSP.FL*** appears in the lower display, calibration is complete. Press A/M to return to the operating screen.

These inputs are factory pre-calibrated for the following ranges, and require no further calibration.

Voltage:	0-10Vdc
Current	4-20mA; 0-20mA.

7.1.5 Calibration of the ATC880 to Calibrated Linear Analog Input

Be sure that full scale and low scale values have been set to the range of the process sensor. Press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***4*** shows in the upper display. Press the FUNC key and the upper display should show ***OFF*** while the lower display shows ***SHUNT***. If the upper display does not show ***OFF***, press the ▼ or ▲ key until the upper display changes to ***OFF***. Press the FUNC key to set the value and press A/M to return to the operating screen.

Press the FUNC key until ***nonE*** and ***GROUP*** show on the display. Press the ▲ key until **2** shows in the upper display. Press the FUNC key and the lower display changes to ***ZERO.C***. The upper display shows ***OFF***. With the input at the low scale value, press the ▼ or ▲ keys until the upper display changes to ***ON***. Press the FUNC key to calibrate the zero value. When the lower display changes to ***SPAN.C***, zero calibration is complete. Press the ▼ or ▲ keys until the upper display changes to ***CLEAr***. Press the FUNC key to restore the linear factory calibration of the span value. When the legend ***DSP.FL*** appears in the lower display, calibration is complete. Press A/M to return to the operating screen.

7.2 Start-Up and Engaging SMART

After Calibration of the Transducer to the Instrument, return to the main display. Press the FUNC key until ***0*** shows in the upper display, and ***SP*** shows on the lower display. This is the pressure set point.

7.2.1 Setting the Process Set Point

Press the ▲ key until the process set point pressure shows on the upper display. Ensure that the process is at operating temperature. Turn on the motor drive, and press the ▲ key to increase the Output % until the drive system engages and begins running. Press the ▲ key to slowly approach the set point pressure until the pressure stabilizes around the set point pressure.

7.2.2 Engaging SMART

Press the FUNC key until ***nonE*** and ***GROUP*** show on the display. Press the ▲ key until **2** shows in the upper display. Press the FUNC key and the lower display changes to ***ZERO.C***. Press the FUNC key until ***SMART*** shows on the lower display and ***OFF*** shows on the upper display. Press the ▲ key to turn the upper display to ***ON***, and enter with the FUNC key.

NOTE: Under NO circumstances should the SMART be engaged with the motor drive shut off. The PID or PI loops will "wind up" until they are at the maximum value, and if the drive is started in this condition, the drive will start at 100% speed. Damage to the drive and peripheral equipment will result.

The SMART LED will flash and a countdown will begin as the controller determines its initial P and I values. Return to the main screen and observe that the value in the upper display is the actual value you wish to control.

7.2.3 Engaging Automatic Control

When the Smart LED has stopped flashing, press and hold the A/M key until the lighted legend ***MAN*** goes out. The ATC880 is now in the Control Mode.

7.3 The Tuning Mode

When the SMART Tuning Algorithm is active, a series of computations takes place to calculate the PID parameters. There are two tuning modes: The Tuning Algorithm and

the Adaptive Tuning Algorithm. Each works on a different concept that will be explained in their related sections.

7.3.1 Selecting the Type of Control

There are two types of control mechanisms that the ATC880 can use, either ***PID*** (Proportional, Integral, and Derivative), or ***PI*** (Proportional and Integral). The default value is ***PI***, since a majority of the applications are extrusion motor control. To verify the Control Type, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***2*** shows in the upper display. Press the FUNC key until the lower display shows ***AT.TYP***. The upper display will show ***PI.*** If desired, press the ▼ or ▲ key until the upper display changes to ***Pid***. Press the FUNC key to set the value.

7.3.2 Engaging the Tuning Algorithm (ATC880 in Manual Mode)

Ensure that the **MAN** LED on the face of the ATC880 is illuminated. If so, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***2*** shows in the upper display. Press the FUNC key until the upper display shows ***OFF*** and the lower display shows ***SMART***. Press the ▼ or ▲ key until the upper display changes to ***ON***. Press the FUNC key to set the value. This will activate the Tuning Algorithm and will switch the ***SMART*** function to ***OFF*** after the PID parameters are calculated. As the calculations occur, the SMRT LED will be flashing.

Mathematically, the model of the process can be characterized using three parameters: the gain, the time constant, and the equivalent time delay. To determine these parameters, the power output of the controller is changed by a small step value. Then, the controller stores the process variable response. From this response, the controller estimates the three process parameters. It then applies these parameters, and re-runs the step process. When this is done, it calculates the final PID parameters.

During the tuning process, the calculated parameters can be viewed as they are determined and the system's response to the parameters evaluated. The parameters available to view are the Time of Smart Function, (***RLTM***), the Step for Smart Function, (***AT.STP***), the Proportional Band (***PB***), the Integral Time (***TI***), and the Derivative Time (***TD***)

7.3.3 Viewing the Tuning Algorithm Parameters

Press the FUNC key until **nonE** and **GROUP** appears. Press the ▲ key until ***2*** shows in the upper display. Press the FUNC key until the lower display shows ***RLTM***. The upper display shows the filter time constant selected by the algorithm. During the process analysis, the upper display shows the elapsed time from the step change in *mmm.ss* format (minutes and seconds). The maximum value is 500 minutes. More than that will disable the SMART function.

The value of the step change used by the SMART (TUNE) process is displayed after the ***RLTM*** parameter. After viewing the ***RLTM*** parameter, press the FUNC key to see the

AT.STP parameter value. The expected range is from –25.0% to 25.0% of full scale. The default value is 10.0%.

Also available are the following parameters:

- The proportional band parameter (***PB***) follows the ***AT.STP*** parameter. Its range is 1 to 10000% and changes to this parameter are inhibited during Adaptive Tune.
- The Integral Time parameter (***TI***) follows the ***PB*** parameter. Its range is 0.1 to 99.9 seconds and OFF. Changes to this parameter are inhibited during Adaptive Tune. Above 99.9 seconds the display blanks and integral action is excluded.
- The Derivative Time parameter (***DT***) follows the ***TI*** parameter. Its range is 0.0 to 99.9 seconds and changes to this parameter are inhibited during Adaptive Tune.

After the above values are calculated the controller will switch the ***SMART*** function to ***OFF.*** At this point the Automatic Selection of Integral Pre-Load Value (***AT.IP***) will be available. Actually it is available always, but will be unreliable (random) until after a SMART trial.
Note: It is advisable to avoid changing this value and let the Auto Tuning function select the value.

After a SMART trial, setting ***AT.IP*** to ***Auto*** will cause the controller to calculate the integral pre-load value using the previously determined set point and process gain variables. (If they have not been pre-determined random numbers may be assigned, and the integral pre-load value determined will be useless.) When this parameter is set to ***Auto***, the value may be read, but not changed by the front push-buttons.

Setting this parameter to Manual (***nAn***) causes the controller to reload the former keyboard selected integral pre-load value.

If the operator wishes to skip this step and manually enter a value for Integral Pre-Load, he may do so by pressing the FUNC key until **nonE** and **GROUP** appears. Press the ▲ key until ***2*** shows in the upper display. Press the FUNC key until the lower display shows ***IP***. The upper display shows the Integral Pre-Load default value of 50.0% or the previously selected value. The operator can change this value from a range of 0.0% to 100.0%, except that the value cannot be changed if the automatic Selection of Integral Pre-Load (***AT.IP***) has been set to ***AUTO***.

Although the Filter Time Constant (***AT.FL***) is preset at 1 second, the Automatic Selection of Filter Time Constant (***AT.AFL***) can be engaged to find the most appropriate filter for the process.

Setting this to Auto will cause the SMART (TUNE) function to search for the best filter time constant before applying a power change. During this process, the ***SMRT*** LED will flash at a fast rate. The default value for (***AT.AFL***) is manual mode (***nAn***).

7.3.4 Engaging the Adaptive Tuning Algorithm (ATC880 in Automatic Mode)

The Adaptive Tuning Algorithm is an on-line algorithm that "observes" the measured value and looks for oscillation due to a variation of the load or the set point. When a significant pattern is "recognized," the decision procedure starts to recalculate the PID or PI parameters of the controller. While the ADAPTIVE procedure is enabled these parameters can only be monitored.

To enable this mode, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***2*** shows in the upper display. Press the FUNC key until the upper display shows ***OFF*** and the lower display shows ***SMART***. Press the ▼ or ▲ key until the upper display changes to ***ON***. Press the FUNC key to set the value. This will activate the Adaptive Tuner Algorithm, and will maintain the correct PID or PI parameters for the process. It will remain on until manually turned off. It will also come on anytime that the ATC880 is in Automatic mode.

As the tuning process progresses, press A/M to return to the operating screen, and observe the process. The set point (***SP***) can be touched up in the automatic mode in the main screen. The operator may alternately display the Output %, Set Point, Peak Value, or RPM by pressing the up arrow key.

NOTE: It may be advisable when tuning the system to first run the SMART/Manual tuning feature followed by engaging the Adaptive/Automatic tuning. The SMART/Manual tuning should be run with the system running at a normal operational condition and the system will tune with a small step change as defined by the *AT.STP* parameter. This will tune your system for good steady state response (i.e. no error) and will tune your system for small transients (i.e. disturbances and change in set point) but may not wholly cover the system tuning needs (i.e. large disturbances, large set point changes or system startup). For this reason, it is recommended to run the system in both tuning modes to get initial good steady state tuning followed by good transient tuning. During the Adaptive/Automatic tuning, if possible, the system should be given a few large set point changes both positive and negative to allow the system to further tune for over and undershoot along with small settling time. Once the system is tuned with the desired response, disengage the Adaptive/Automatic tuning.

7.3.5 Automatic Stand-By in the event of a Process Upset.

The Automatic Stand-By function avoids overshoot due to temporary process interruptions (i.e. if the pressure goes to zero). If this happens, the controller output quickly reaches saturation for integral factor; when the process restarts, the controlled output will have an excessive and dangerous overshoot, (i.e. it will start at full speed).

When the Automatic Stand-By (***ASB***) function is activated, the algorithm monitors the controller input and output: when the input value goes lower than a threshold (specified by the Automatic Stand-By Pressure Low Limit parameter ***ASB.PL***). When this happens, and the output value reaches the saturation condition, the control output saves the last value stored when the process was stable.

This freezing of the output of the controller will last for the time specified by the Automatic Stand-By Recovery Time (***ASB.RT***) parameter. If the input does not recover within the specified time, the output value is forced to zero.

If the controller input recovers within the specified time, the algorithm waits for 2-½ times the integral value; after this time has elapsed, the controller will come back automatically to normal running condition to the output level calculated when the process was stable.

To set the Automatic Stand-By (***ASB***), the Automatic Stand-By Pressure Low Limit parameter (***ASB.PL***), and the Automatic Stand-By Recovery Time (***ASB.RT***), press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***2*** shows in the upper display. Press the FUNC key until the lower display shows ***ASB***. Press the ▼ or ▲ key until the upper display changes to ***ON***. Press the FUNC key to set the value. The lower display will show ***ASB.PL***, and the upper display will show a percentage from 0 to15% of the full scale value. Press the ▼ or ▲ key until the upper display changes to the desired value.

Press the FUNC key to set the value. The lower display will show ***ASB.RT***, and the upper display will show ***OFF,*** or a time from 0 to 60 seconds. Press the ▼ or ▲ key until the upper display changes to the desired time. Press the FUNC key to set the value. OFF means that no recovery time is applied and the frozen output value is held indefinitely.

7.3.6 Automatic or Manual Start-Up

The ATC880 will allow for manual start-up and ramp to set point prior to controlling the process, or it can go directly to Automatic Start-Up which controls the set point based on the previous data. This is generally a bad idea in motor control processes and is discouraged.

WARNING: Automatic Start-Up is generally a bad idea in motor control processes and is discouraged.

However, in some non-motor control applications, Automatic Start-Up is desirable. To change the Manual/Auto Start-Up parameter, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***3*** shows in the upper display. Press the FUNC key until the lower display shows ***MA.STP***. The default will be manual (***nAn***). To change to automatic start-up, press the ▼ or ▲ key until the upper display changes to ***AUTO***. Press the FUNC key to set the value. Press the A/M key to return to the main screen.

7.3.7 Manual/Automatic Transfer

When transferring from manual control to Automatic control there are two methods: Bumpless Mode (without modification of set point) and Set Point mode (where the current Set Point is modified from the set point and PID parameters in memory).

To change the Manual/Automatic Transfer parameter, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until ***4*** shows in the upper display. Press the FUNC key until the lower display shows ***MA.TRF***. The default will be bumpless (***bunPL***). To change to Set Point modification, press the ▼ or ▲ key until the upper display changes to ***SP***. Press the FUNC key to set the value and move to the next parameter, Set Point Ramp (***SP.RMP***).

Set Point Ramp determines how fast the manual set point is changed to the stored set point. It is active during the change from local to remote set point and vice versa. This parameter is used to limit the rate of change of the set point to minimize process irregularities. When the ramp value reaches the remote or stored set point value, the function is disabled to allow for controller set point to match the analog input.

After setting the ***MA.TRF*** parameter, the Set Point Ramp parameter will appear. The lower display will show ***SP.RMP***. The default will be ***OFF***. To change to Set Point Ramp, press the ▼ or ▲ key until the upper display changes to the appropriate rate of change of pressure units per second, from 1 to 999/second. Press the FUNC key to set the value. Press the A/M key to return to the main screen.

7.3.8 Tuned Parameters, After SMART "tuning"

After the ATC880 has run the SMART (TUNE) function, the following Read-only values in Group 9 will change from their defaults:

Process Time Delay: (***AT.TO***) will display the Process Time Delay value as estimated by the SMART (TUNE) function in hundredths of a second. The display will show zero until the first Smart trial.

Process Time Constant: (***AT.TAU***) will display the Process Time Constant value as estimated by the SMART (TUNE) function in hundredths of a second. The display will show zero until the first Smart trial.

Process Gain: (***AT.KP***) will display the Process Gain value as estimated by the SMART (TUNE) function in hundredths of units. The display will show 1.00 until the first Smart trial. The computed value after the First Smart trial will be stored in non-volatile memory because it is used in automatic computation of the Integral Pre Load Value.

Start Time of Smart Function: (***AT.T1***) will display the time the SMART (TUNE) function started to collect data for transient response analysis in hundredths of seconds. The display will show zero until the first Smart trial.

Stop Time of Smart Function: (***AT.T2***) will display the time the SMART (TUNE) function finished collecting data for transient response analysis in hundredths of seconds. The display will show zero until the first Smart trial.

Adaptive Step: (***AT.ADS***) will display the integral step number used by the adaptive algorithm (the range is 0 to 8). The display will show zero until the first Smart trial.

8.0 INSTRUMENT CALIBRATION

8.1 General Calibration Procedure

1) Use the ▼ or ▲ keys to show to following functions:
- Firmware revision
- Pressure input counts
    - Zero, for the strain gage input (P.ST.ZE)
    - Span, for the strain gage input (P.ST.SP)
    - Pressure (P.STR)
    - Zero, for the linear inputs (P.LN.ZE)
    - Span, for the linear inputs (P.LN.SP)
    - Current (P.020)
    - Voltage, 0-10V (P.010)
- Secondary input counts
    - Zero, for the strain gage input (S.ST.ZE)
    - Span, for the strain gage input (S.ST.SP)
    - Pressure (S.STR)
    - Zero, for the linear inputs (S.LN.ZE)
    - Span, for the linear inputs (S.LN.SP)
    - Current (S.020)
    - Voltage, 0-10V (S.010)
    - Thermocouple and RTD (S.TC.PT)
    - Reference junction (S.RJ)
    - Line resistance for RTD (S.RL)
- Line frequency (FREQ)
- Digital inputs status (DIG.IN)
- Maximum power consumption
- Minimum power consumption

2) The display values for analog inputs are scaled from 0 to 25000 counts; the read-out is linear also for the RTD inputs.

3) Use the ▼ or ▲ keys to select a display value from 0 to 10 and to check the linearity of output circuit at 0%, 10%, .. 90% and 100% of full scale value +/- 0.05% of full scale value.

4) If the values do not correspond with the values in the Calibration Parameters Summary Table below, use the ▼ or ▲ keys to correct the value displayed.

5) When all the appropriate values are correct, depress the FUNC key.

6) If the values CANNOT be made to correspond with the values in the Calibration Parameters Summary Table, the instrument must be sent to Dynisco for repair or re-calibration

See the following Calibration Parameter Summary.

CALIBRATION PARAMETERS SUMMARY					
PARAMETER	**CIRCUIT**	**INPUT TYPE**	**RANGE**	**VALUE**	**NOTE**
PL.020	Primary Input	Current	Zero	0mA	
PH.020	Primary Input	Current	Full scale	20mA	
P.020	Primary Input	Current	Verify		2)
PL.05	Primary Input	Voltage 0-5V	Zero	0V	
PH.05	Primary Input	Voltage 0-5V	Full scale	5V	
P.05	Primary Input	Voltage 0-5V	Verify		2)
PL.010	Primary Input	Voltage 0-10V	Zero	0V	
PH.010	Primary Input	Voltage 0-10V	Full scale	10V	
P.010	Primary Input	Voltage 0-10V	Verify		2)
SL.020	Secondary Input	Current	Zero	0mA	
SH.020	Secondary Input	Current	Full scale	20mA	
S.020	Secondary Input	Current	Verify		2)
SL.05	Secondary Input	Voltage	Zero		
SH.05	Secondary Input	Voltage	Full scale		
S.05	Secondary Input	Voltage	Verify		2)
SL.010	Secondary Input	Voltage	Zero	0V	
SH.010	Secondary Input	Voltage	Full scale	10V	
S.010	Secondary Input	Voltage	Verify		2)
SL.TC	Secondary Input	Thermocouple	Zero	0mV	
SH.TC	Secondary Input	Thermocouple	Full scale	50mV	
S.TC	Secondary Input	Thermocouple	Verify		2)
S*RJ	Secondary Input	Thermocouple	Ref. junct.	Ambient	
S.RJ	Secondary Input	Thermocouple	Verify	Ambient	
SL.RTD	Secondary Input	RTD100	Zero	0Ω	2)
SH.RTD	Secondary Input	RTD100	Full scale	320Ω	
S.RTD	Secondary Input	RTD100	Verify		2)
SL.PT5	Secondary Input	RTD500	Zero	0Ω	
SH.PT5	Secondary Input	RTD500	Full scale	1600Ω	
S.PT5	Secondary Input	RTD500	Verify		2)
ML.CUR	Main analog output	Current	Zero	-5 mA	
MH.CUR	Main analog output	Current	Full Scale	25 mA	
M.CUR	Main analog output	Current	Verify		3)
ML.VOL	Main analog output	Voltage	Zero	-12.5V	
MH.VOL	Main analog output	Voltage	Full scale	12.5V	
M.VOL	Main analog output	Voltage	Verify		3)
SL.CUR	Second analog output	Current	Zero	-5 mA	
SH.CUR	Second analog output	Current	Full scale	25 mA	
S.CUR	Second analog output	Current	Verify		3)
SL.VOL	Second analog output	Voltage	Zero	-12.5V	
SH.VOL	Second analog output	Voltage	Full scale	12.5V	
S.VOL	Second analog output	Voltage	Verify		3)
DEFLT	Load default calibration and code	DO NOT ATTEMPT TO MODIFY UNDER ANY CIRCUMSTANCES			

8.2 RS-485 (Optional)

The ATC880 is available with an RS485 Digital communications port. The configuration parameters for this option are found in the Group 3 parameters only if this option is included. The ATC880, when equipped with this option, is compatible with Modbus and J-Bus protocols, the choice of which is made in the Configuration/Setup menu.

8.2.1 Serial Communication Interface Address

This function is used to set the serial Communication Interface Address. To view or access this function, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until **3** shows in the upper display. Press the FUNC key and the lower display changes to ***SC.ADR***. The upper display shows ***OFF***. Press the ▼ or ▲ keys until the upper display changes to the appropriate address, from 1 to 255. Press the FUNC key to store the value, and to view the next parameter. If finished, press A/M to return to the operating screen.

8.2.2 Protocol Type

This function is used to select the Protocol Type. To view or access this function, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until **3** shows in the upper display. Press the FUNC key and the lower display changes to ***SC.BUS***. The upper display shows ***nodbS***. Press the ▼ or ▲ keys until the upper display changes to the appropriate protocol, either Modbus (***nodbS***) or Jbus (***JbuS***). Press the FUNC key to store the value, and to view the next parameter. If finished, press A/M to return to the operating screen.

8.2.3 Communication Type

This function is used to select the number and format of the serial bits used in communication. To view or access this function, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until **3** shows in the upper display. Press the FUNC key and the lower display changes to ***SC.FRM***. The upper display shows ***8***. Press the ▼ or ▲ keys until the upper display changes to the appropriate bit format, 8 bit without parity (***8***), 8 bit with even parity (***8 E***), or 8 bit with odd parity (***8 O***). Press the FUNC key to store the value, and to view the next parameter. If finished, press A/M to return to the operating screen.

8.2.4 Communication Baud Rate

This function is used to select the Communication Baud Rate. To view or access this function, press the FUNC key until **nonE** and **GROUP** show on the display. Press the ▲ key until **3** shows in the upper display. Press the FUNC key and the lower display changes to ***SC.BDR***. The upper display shows ***19200***. Press the ▼ or ▲ keys until the upper display changes to the appropriate Baud rate: 600, 1200, 2400, 4800, 9600, or 19200. Press the FUNC key to store the value, and to view the next parameter. If finished, press A/M to return to the operating screen.

8.2.5 Setting the Status of Auto/Manual Selection (optional)

Available only if the unit has the Digital Input option.

The ATC880 Pressure/Process controller has four digital inputs that can switch between Manual and Automatic control (DIG 1), increase (DIG2) or decrease (DIG3) the control output value and switch from Automatic to Manual setting the control output to zero (DIG4). The Auto/Manual Selection parameter determines the status of the communication protocol. Select ***LoCAL*** to use the front push buttons or RS-485 to control switching from manual to automatic, or Select ***CnCt*** to use external means to control switching from manual to automatic.

Note: A dry contact switch or relay must be fitted between terminal 62 (Common) and terminal 63 (Digital Input 1 Remote AUTO/MAN (DIG1)) to enable the use of Digital Input 2 (DIG2) and 3 (DIG3) (Control output value increase and decrease).

To verify this parameter or to change it, press the FUNC key until the lower display shows ***A/M***. Press the ▼ or ▲ key until the upper display shows the correct value (***LoCAL*** or ***CnCt***). Press the FUNC key to set the value and move to the next parameter, or press the A/M key to go back to the active display.

This function is used to select the Communication Baud Rate. To view or access this function, press the FUNC key until ***nonE*** and ***GROUP***

Further documentation is available in Dynisco's publication #974089 *Modbus/J-Bus Protocol for Dynisco UPR800/ATC880*. Please contact Dynisco at 800-221-2201 for a copy of this manual.

9.0 ERROR CODES

On power up, the ATC880 will enter a self-test mode to evaluate the condition of the equipment. If an error is detected, the screen will show an error code number in the upper display and the mnemonic ***Err***, in the lower display.

9.1 Error Codes and Troubleshooting

The errors codes and their possible causes and solutions are as follows:

TI Parameter Error during self-test.
Correction: The instrument detected a parameter error. If it is a run-time parameter (i.e. from ***SP*** to ***RO.TYP***), press the ▲ and ▼ push-buttons together to have the instrument load the default parameters for all groups of parameters. However, if it is a calibration or code parameter, press FUNC and A/M together to access to these parameters. This function is only intended to restore a misplaced parameter's value, and the performance of the instrument may be unstable and will not be guaranteed. The user is advised to check and re-enter the stated calibration or code parameters.

1 Error during EEPROM access.
Correction: De-power the instrument and wait for 60 seconds. On power-on the situation should clear itself. If it does not correct itself de-power again. If the error still remains, send the instrument to Dynisco for repair (See Section 11.)

2 The SMART function is not able to apply the step change because the manual output value plus the step value is over / under the output limits.
Correction: Check that the step change is correct; if it appears to be so, lower the change to a minimal value and try again. If the error still remains, send the instrument to Dynisco for repair (See Section 11.)

3 Wrong zero measure.
Correction: Check that the wiring is correct. Check that there is NO pressure applied on the transducer. If there is no pressure on the transducer, and the wiring is correct, contact Dynisco Technical Assistance at 800-221-2201.

4 SMART function aborted due to an over / under range of the input measure.
Correction: Check that transducer for correct operation, and check the wiring. If both are working correctly, contact Dynisco Technical Assistance at 800-221-2201.

5 Input calibration error.
Correction: Check that there is no pressure applied to the transducer. If the transducer is at zero pressure, verify that the wiring is correct. Substitute a known good transducer to determine if the transducer is damaged. If the good transducer shows the same error, send the instrument to Dynisco for repair (See Section 11.)

7 SMART function aborted due to a high delay time over constant time ratio.
Correction: Check that the Time Constants (either ***AT.TO*** or ***AT.TAU***) are not too large. If so, it is necessary to run SMART tuning again, or manually tune the system.

8 Error during the automatic compute of the filter time constant.
Correction: Check that the Filter Time Constants (***AT.AFL, AT.FL, A1.FL, A2.FL, A3.FL,*** or ***RO.FL***). If they seem correct, change them to a different value and reset the

instrument. If the error cannot be cleared, contact Dynisco Technical Assistance at 800-221-2201, or send the instrument to Dynisco for repair (See Section 11.)

9 Too many attempts during process estimation.

Correction: The SMART tuning system has reached its limit of tuning attempts, and cannot calculate a stable parameter set. Try changing the type of tuning, (from PID to PI or vice versa). If the error cannot be cleared, contact Dynisco Technical Assistance at 800-221-2201, or send the instrument to Dynisco for repair (See Section 11.)

10 SMART function aborted due to a negative time or a negative process gain.

Correction: The SMART tuning system has inadvertently tuned a negative parameter, and has stopped. Check either ***AT.TO, AT.TAU,*** or ***AT.KP*** and make greater than zero and try again. If this error persists try changing the type of tuning, (from PID to PI or vice versa). If the error cannot be cleared, contact Dynisco Technical Assistance at 800-221-2201, or send the instrument to Dynisco for repair (See Section 11.)

11 Overload or short-circuit on primary strain gage input, or unconnected “+EXC” or “-EXC” wire.

Correction: An instrument set for primary strain gage input with NO transducer connected will display this error. Connect a transducer to the instrument to remedy this condition. If there is a transducer connected, disconnect it from the wiring, and either replace the wire, or check the continuity of EACH wire, and that there is no short between any of the wires. If the cable is good, substitute a known good transducer to determine if the transducer is damaged. If the good transducer shows the same error, send the instrument to Dynisco for repair.

13 Incorrect span value

14 Internal I2C bus communication error with eeproms

15 Internal I2C bus communication error with I/O expanders

RAM Failure of RAM circuit. There is no correction; the device needs to be sent to Dynisco for repair.

If differential pressure input is used, the error message in the “Normal Display Mode” will indicate the type failure. Review the Group 1 list and look at the “PI.VAL” or “SI.VAL” parameters to identify the faulty channel.

When the upper display shows "Err" and the lower display shows a parameter mnemonic code this means that the related parameter is in error status. In this situation three options are available:

1) If the wrong parameter is a run-time parameter (i.e. from SP to RO.TYP for ATC800), press the ▼ or ▲ keys and the instrument will load the default values for all groups of parameters.
2) If the wrong parameter is a calibration or code parameter press the "FUNC" + "A/M" keys to enable the instrument to access the run-time parameters; this function is intended only to restore a misplaced parameter's value. The user is advised to check the stated calibration or code parameter.
3) If the wrong parameter is a calibration or code parameter pressing the "FUNC" push-button for one second the instrument enters the operating mode switching procedure. This allows the user to select the calibration or code operating mode to recalibrate or to fix the wrong parameter.

9.2 "OPEN" Error Code and Troubleshooting

The display will show "OPEN" under one or more of the following conditions:

- Input current lower than 0.8 mA (for 4-20 mA inputs)
- Pressure input lower than -25% or higher than 125% of full scale value.
- "SIG +" or "SIG -" wire unconnected for strain gage input
- Remote set point input lower than -1% or higher than 101% of full scale value
- Connection cable wire broken or two wires shorted together
- The Orange (CAL2) and Blue (CAL1) wires are on the wrong terminals for a strain gage transducer. The Orange (CAL2) wire connects to terminal 17 (EXC-) together with the Green wire. The Blue (CAL1) wire connects to terminal 14. If the transducer is wired to DHF or (WRSG) Western Regional Strain Gage standards, contact Dynisco Technical Service at 800-221-2201

9.3 Instrument Maintenance

1. REMOVE POWER FROM THE POWER SUPPLY TERMINALS AND FROM RELAY OUTPUT TERMINALS BEFORE REMOVING THE INSTRUMENT FROM CASE
2. Remove instrument from case. To accomplish this, twist off the lateral screw located on the right side of the front panel and spread the two locking tabs located on either side of the case with a tool such as coins or keys used to aid the mechanical function . The instrument will move forward past the locked position. Grasp the bezel and slide the instrument from the case. Depending on the options chosen, you may find that one or two boards appear to be loosely mounted. This patent-pending design allows the instrument to be removed from the case without having to overcome the friction of all terminals on all boards at one time. Initially the CPU board and alarm board will be released, followed by the I/O and digital communication boards.
3. Using a vacuum cleaner or a compressed air jet (max. 42PSI) remove all deposits of dust and dirt which may be present on the louvers and on the internal circuits trying to be careful not to damage the electronic components.
4. To clean external plastic or rubber parts use only a cloth moistened with:
   - Ethyl Alcohol—pure or denatured (C_2H_5OH) or
   - Isopropyl Alcohol—pure or denatured ($(CH_3)_2CHOH$) or
   - Water (H_2O)
   - Always use the mildest means available
5. Verify that there are no loose terminals
6. Before re-inserting the instrument in its case, be sure that it is perfectly dry
7. Carefully slide the instrument back into its case, until the locking tabs have engaged. An audible click will be heard as each tab engages. Screw in the screw located on the right side of the front panel.
8. Turn the instrument ON.

10.0 NORMATIVE REFERENCES

UL 94	Tests for flammability of plastic materials for parts in devices and appliances
EN 60529	Degrees of protection provided by enclosures (IP Code).
Nema 250:1991	Enclosures for electrical equipment (1000 Volts maximum).
DIN 43700	Measurements and control instruments for panel mounting; Nominal front and cut-out dimensions.
EN 61010-1	Safety requirements for electrical equipment for measurements, control and laboratory use. Part 1: General requirements
EN 61326-1	Electrical equipment for measurement, control and laboratory use - EMC requirements
EN 55011	Industrial, scientific and medical (ISM) radio-frequency equipment Radio disturbance characteristics Limit and method of measurement
EN 61000-4-2	Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques Section 2: Electrostatic discharge immunity test
EN 61000-4-3	Electromagnetic compatibility - Basic immunity standard - Radiated radio-frequency electromagnetic field - Immunity test
EN 61000-4-4	Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques Section 4: Electrical fast transient/burst immunity test
EN 61000-4-5	Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques Section 5: Surge immunity test
EN 61000-4-6	Electromagnetic compatibility-Basic immunity standard- Conducted disturbances induced by radio-frequency fields Immunity test
EN 61000-4-11	Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques

	Section 11: Voltage dips, short interruptions and voltage variations immunity test
IEC 751:1995	Thermometers - References table
DIN 43710:1977	Thermocouples - References table
IEC 584-1:1995	Thermocouples - References table

11.0 PARAMETER GROUP MENUS

Group I	**Function**	**As Set**
SP	Set Point	
AL.MSK	Alarms Mask Reset	
SECUR	Security	
A/M	Auto / Manual	
AL1	Alarm 1 Threshold	
AL2	Alarm 2 Threshold	
AL3	Alarm 3 Threshold	
PI.VAL	Primary Pressure Input Value	
SI.VAL	Secondary Pressure Input Value	
DEFLT	Loading Default Data	
GROUP	Group Access Number	
Group 2	**Function**	**As Set**
ZERO.C	Zero Calibration	
ZER.2.C	Zero Calibration for Secondary Input	
SPAN.C	Span Calibration	
SPN.2.C	Span Calibration for Secondary Input	
SMART	Display Filter	
RLTM	Time of Smart Function	
AT.STP	Step for Smart Function	
PB	Proportional Band	
TI	Integral Time	
TD	Derivative Time	
AT.IP	Automatic Selection of the Integral Pre Load Value	
IP	Integral Pre Load	
AT.TYP	Type of Control	
AT.AFL	Automatic Selection of the Filter Time Constant	
AT.FL	Filter for Display and Controller	
ASB	Automatic Stand-By	
ASB.PL	Automatic Stand-By Pressure Low Limit	
ASB.RT	Automatic Stand-By Recovery Time	
LR.SP	Local / Remote Set Point Selection	
A1.FL	Alarm 1 Filter	
A2.FL	Alarm 2 Filter	
A3.FL	Alarm 3 Filter	
RO.FL	Retransmission Output Filter	
DEFLT	Loading Default Data	
Group 3	**Function**	**As Set**
PI.FSV	Primary Input Full Scale Value	
PI.LSV	Primary Input Low Scale Value	
PI.DP	Primary Input Decimal Point Position	
PI.EU	Primary Input Engineering Unit	

RI.LO	Remote Set Point Input Range Low	
RI.HI	Remote Set Point Input Range High	
SI.FSV	Secondary Input Full Scale Value	
SI.LSV	Secondary Input Low Scale Value	
A1.LNK	Alarm 1 Input Channel Link	
A1.TYP	Alarm 1 Type	
A2.LNK	Alarm 2 Input Channel Link	
A2.TYP	Alarm 2 Type	
A3.LNK	Alarm 3 Input Channel Link	
A3.TYP	Alarm 3 Type	
CO.LO	Control Output Range Low	
CO.HI	Control Output Range High	
CO.DP	Control Output Decimal Point Position	
RO.LO	Retransmission Range Low	
RO.HI	Retransmission Range High	
SP.LO	Set Point Limit Low	
SP.HI	Set Point Limit High	
MA.STP	Manual / Auto Start-Up	
SC.ADR	Serial Communication Interface Address	
SC.BUS	Protocol Type	
SC.FRM	Communication Type	
SC.BDR	Communication Baud Rate	
DEFLT	Loading Default Data	
Group 4	**Function**	**As Set**
SHUNT	Shunt Calibration	
SHNT.%	Shunt Value	
PI.IFS	Primary Input Fail Safe	
SI.IFS	Secondary Input Fail Safe	
A1.HYS	Alarm 1 Hysteresis	
A1.RES	Alarm 1 Reset Mode	
A1.FSM	Alarm 1 Failsafe Mode	
A2.HYS	Alarm 2 Hysteresis	
A2.RES	Alarm 2 Reset Mode	
A2.FSM	Alarm 2 Failsafe Mode	
A3.HYS	Alarm 3 Hysteresis	
A3.RES	Alarm 3 Reset Mode	
A3.FSM	Alarm 3 Failsafe Mode	
LI.TYP	Logic Input Configuration	
LI.STS	Logic Input Status	
PEAK	Peak Detection	
MA.TRF	Manual / Auto Transfer	
SP.RMP	Set Point Ramp	
CO.MAX	Control Output Limiter	
CO.MMI	Control Output Manual Mode Indication	

CO.D/R	Direct/Reverse Selection for Control Output	
PI.DUT	Primary Display Update Time	
SI.ST	Secondary Input Sample Time (Remote Set Point)	
LINE.F	Line Frequency	
LINE.R	Line Frequency Readout	
DEFLT	Loading Default Data	
Group 5	**Function**	**As Set**
PI.TYP	Primary Input Selection	
SI.TYP	Secondary Input Selection	
SI.FNC	Secondary Input Function	
CO.TYP	Control Output Selection	
RO.TYP	Retransmission Output Selection	
DEFLT	Loading Default Data	
Group 6	**Function**	**As Set**
PB.LOC	Pointer Location Selector	
IN. 0	Pointer Value	
DEFLT	Loading Default Data	
Group 9	**Function**	**As Set**
AT.TO	Process Time Delay	
AT.TAU	Process Time Constant	
AT.KP	Process Gain	
AT.TI	Start Time of Start Function	
AT.T2	Stop Time of Start Function	
AT.ADS	Adaptive Step	

For your convenience, use **As Set** column to enter your individual settings.

11.1 Group 1 Parameters

SET POINT - Group 1
Available: Always
Upper display: Set point value
Lower display: SP
Range: From SP.LO to SP. HI

ALARMS MASK RESET - Group 1
Available: Only if one or more alarms are configured with mask at start-up
Upper display: OFF
Lower display: AL.MSK
Range: Use the ▲ and ▼ keys to switch the upper display from OFF to RESET, then press the FUNC key to restore the alarm mask.
Default value: not applicable

SECURITY - Group 1
Available: Only if CODE.A or CODE.B or CODE.C are On.

Upper display: A b C or A b C. or A b. C or A. B. C. One or more digits followed by a decimal point means that the access to modification of the parameters of the related security level is inhibited.
Lower display: SECUR
Range: Use ▲ and ▼ keys to input the security code; if the selected code matches the programmed code the parameters of the related security level are unlocked. The unlock operation also unlocks the parameters of the lower groups, while the lock operation locks all the parameters. To choose new security codes enter the "Security Code Setting" operating mode. In order to re-lock the different groups insert any number with the exception of the selected codes.

AUTO/MANUAL SELECTION - Group 1
Available: Only if the external keyboard circuit is fitted.
Upper display: Status for automatic/manual selection.
Lower display: A/M
Range: LoCAL, CnCt. Select "LoCAL" to control the auto/manual function from the front push-button "A/M" or serial communication interface. Select "CnCt" to activate the external control of auto/man mode.
Default value: LoCAL

ALARM 1 THRESHOLD - Group 1
Available: Only if A1.LNK is different than OFF
Upper display: Alarm 1 threshold value
Lower display: AL1
Range: From 0 to pressure input full scale value for process and band alarm. From - pressure input full scale to + pressure input full scale for deviation alarm. The high limit may be expanded to 110% of span if display capability allows it.
Default value: 5% of range

ALARM 2 THRESHOLD - Group 1
Available: Only if A2.LNK is different than OFF. Upper display: Alarm 2 threshold value
Lower display: AL2
Range: From 0 to pressure input full scale value for process and band alarm. From - pressure input full scale to + pressure input full scale for deviation alarm. The high limit may be expanded to 110% of span if display capability allows it.
Default value: 60% of range.

ALARM 3 THRESHOLD - Group 1
Available: Only if A3.LNK is different than OFF
Upper display: Alarm 3 threshold value
Lower display: AL3

Range: From 0 to pressure input full scale value for process and band alarm. From - pressure input full scale to + pressure input full scale for deviation alarm. The high limit may be expanded to 110% of span if display capability allows it.
Default value: 80% of range

PRIMARY PRESSURE INPUT VALUE - Group 1
Available: Only if SI.TYP is different from 'OFF' and SI.FNC is equal to 'diff.P'.
Upper display: Primary pressure input value
Lower display: PI.VAL
Range: Read-only parameter.
Default value: Not applicable.

SECONARY PRESSURE INPUT VALUE - Group 1
Available: Only if SI.TYP is different from 'OFF' and SI.FNC is equal to 'diff.P'.
Upper display: Secondary pressure input value
Lower display: SI.VAL
Range: Read-only parameter.
Default value: Not applicable.

LOADING DEFAULT DATA - Group 1
Available: Only if access to level A is allowed
Upper display: OFF
Lower display: DEFLT
Range: Use ▲ and ▼ keys to switch the upper display from OFF to On 1, then press FUNC key to load the default data of the parameters belonging to group1.

GROUP ACCESS NUMBER - Group 1
Available: Always
Upper display: OFF
Lower display: GROUP
Range: Use ▲ and ▼ keys to switch the upper display from "NONE" to 1, 2, 3, 4, 5 or 9 and press the FUNC key to gain access to the parameters of the selected group

11.2 Group 2 Parameters

ZERO CALIBRATION - Group 2
Available: Always
Upper display: OFF
Lower display: ZERO.C
Range: Use ▲ and ▼ keys to switch the upper display from OFF to On then press FUNC key to start the zero calibration. It is also possible to

select the “CLEAR” value to delete the field calibration and restore factory calibration.
Default value: Zero

ZERO CALIBRATION FOR SECONDARY INPUT - Group 2
Available: Only if SI.TYP is different from ‘OFF’ and SI.FNC is equal to ‘diff.P’.
Upper display: OFF
Lower display: ZER.2.C
Range: Use ▼ ▲ keys to switch the upper display from OFF to On then press FUNC key to start the zero calibration.
It is also possible to select the 'CLEAr' value to delete the field calibration and then restore factory calibration.
Default value: Zero

SPAN CALIBRATION - Group 2
Available: Always
Upper display: OFF
Lower display: SPAN.C
Range: Use ▲ and ▼ keys to switch the upper display from OFF to On then press FUNC key to start the span calibration. It is also possible to select the “CLEAR” value to delete the field calibration and restore factory calibration
Default value: Full scale for linear input, 33.3 mV for strain gage input

SPAN CALIBRATION FOR SECONDARY INPUT - Group 2
Available: Only if SI.TYP is different from ‘OFF’ and SI.FNC is equal to ‘diff.P’.
Upper display: OFF
Lower display: SPN.2.C
Range: Use ▼ ▲ keys to switch the upper display from OFF to On then press FUNC key to start the zero calibration. It is also possible to select the 'CLEAr' value to delete the field calibration and then restore factory calibration.
Default value: Full scale for linear input, 33.3mV for strain gage input

SMART - Group 2
Available: Always
Upper display: Status of Smart (enabled/disabled). In manual mode this parameter is used to start the TUNE algorithm, while in automatic mode it enables the ADAPTIVE function
Lower display: SMART
Range: On/OFF
Default value: OFF

TIME OF SMART FUNCTION - Group 2
Available: Only when SMART (TUNE) function is active.

Upper display: During the automatic computation of the filter time constant the upper display shows the time constant selected by the algorithm. During the process analysis the upper display shows the elapsed time from the step change; the time format is mmm.ss (minutes and seconds). The maximum is 500 minutes, after this period the SMART will be disabled.
Lower display: RLTM
Default value: Not applicable

STEP FOR SMART FUNCTION - Group 2
Available: Always
Upper display: Value of the step change used by the SMART (TUNE) function to estimate the process parameters.
Lower display: AT.STP
Range: From -25.0 to 25.0%
Default value: 10.0%

PROPORTIONAL BAND - Group 2
Available: Always
Upper display: Proportional band value. Changes to this parameter are inhibited when ADAPTIVE algorithm is active.
Lower display: PB
Range: From 1 to 10000%
Default value: 100

INTEGRAL TIME - Group 2
Available: Always
Upper display: Integral time value. Changes to this parameter are inhibited when ADAPTIVE algorithm is active
Lower display: TI
Range: From 0.1 to 99.9 s.; above this value the display blanks and integral action is excluded
Default value: 5.0

DERIVATIVE TIME - Group 2
Available: Always
Upper display: Derivative time value. Changes to this parameter are inhibited when ADAPTIVE algorithm is active.
Lower display: TD
Range: From 0.0 to 99.9 s
Default value: 0.0

AUTOMATIC SELECTION OF THE INTEGRAL PRE-LOAD VALUE - Group 2
Available: Always
Upper display: Setting this parameter to Auto causes the controller to calculate the integral pre-load value using the set point and process gain values.

The process gain value is estimated during the SMART (TUNE) function. The automatic computation of the integral pre load value is reliable after a SMART trial. When this parameter is set to Auto the integral preload value may be read but not modified by the front push-buttons. Setting this parameter to manual causes the controller to reload the former keyboard selected integral pre load value

Lower display: AT.IP
Range: nAn (manual)/Auto (automatic)
Default value: nan

INTEGRAL PRE LOAD - Group 2

Available: Always
Upper display: Integral pre load value. The value may not be changed if the automatic computation of integral pre load value is selected.
Lower display: IP
Range: From 0.0 to 100.0%
Default value: 50.0

TYPE OF CONTROL - Group 2

Available: Always
Upper display: Type of control (proportional plus integral or proportional plus integral plus derivative)
Lower display: AT.TYP
Range: PI/Pid
Default value: PI

AUTOMATIC SELECTION OF THE FILTER TIME CONSTANT - Group 2

Available: Always
Upper display: Setting this parameter to Auto causes the SMART (TUNE) function to perform a search for the best filter time constant before applying the power change. The SMRT led will flash at a fast rate while the device is searching for the best time constant.
Lower display: AT.AFL
Range: nAn (manual)/Auto (automatic)
Default value: nan

FILTER FOR DISPLAY AND CONTROLLER - Group 2

Available: Always
Upper display: Time constant for the sixth order filter acting on the display and on the controller. This filter is intended to remove the noise from input signal
Lower display: AT.FL
Range: OFF, 0.5, 1, 2, 4, 8, 16 sec
Default value: 1 sec

AUTOMATIC STAND-BY - Group 2

Available: Always
Upper display: Status of Automatic Stand-by function
Lower display: ASB
Range: On (function enabled/OFF (function disabled)
Default value: OFF

AUTOMATIC STAND-BY PRESSURE LOW LIMIT - Group 2
Available: Only if ASB is equal to On
Upper display: Pressure low limit threshold in percentage of full scale value.
Lower display: ASB.PL
Range: From 0 to 15% of full scale value
Default value: 5%

AUTOMATIC STAND-BY RECOVERY TIME - Group 2
Available: Only if ASB is equal to On
Upper display: Recovery time in seconds
Lower display: ASB.RT
Range: From 0 to 60 the OFF. OFF means that no recovery time is applied, that is the frozen output value is held indefinitely.
Default value: OFF

LOCAL/REMOTE SET POINT SELECTION - Group 2
Available: Only if SI.FNC is equal to 'rSP'
Upper display: Status of local/remote set point selection
Lower display: LR.SP
Range: LOC/rEn. The selection is stored in nonvolatile memory; at power-on the last selection is restored.
Default value: LOC

ALARM 1 FILTER - Group 2
Available: Only if A1.LNK is different than OFF
Upper display: Time constant of the alarm 1 filter
Lower display: A1.FL
Range: OFF, 0.4, 1, 2, 3, 4, 5 sec.
Default value: 0.4 sec.

ALARM 2 FILTER - Group 2
Available: Only if A2.LNK is different than OFF
Upper display: Time constant of the alarm 2 filter
Lower display: A2.FL
Range: OFF, 0.4, 1, 2, 3, 4, 5 sec.
Default value: 0.4 sec.

ALARM 3 FILTER - Group 2
Available: Only if A3.LNK is different than OFF
Upper display: Time constant of the alarm 3 filter

Lower display: A3.FL
Range: OFF, 0.4, 1, 2, 3, 4, 5 sec.
Default value: 0.4 sec.

RETRANSMISSION OUTPUT FILTER - Group 2
Available: Only if RO.TYP is different than OFF.
Upper display: Time constant of the retransmission output filter.
Lower display: RO.FL
Range: OFF, 0.4, 1, 2, 3, 4, 5 sec.
Default value: 0.4 sec.

LOADING DEFAULT DATA - Group 2
Available: Only if access to level B is allowed
Upper display: OFF
Lower display: DEFLT
Range: Use ▲ and ▼ keys to switch the upper display from OFF to On 2, then press FUNC key to load the default data of the parameters belonging to group 1 and group 2

11.3 Group 3 Parameters

PRESSURE INPUT FULL SCALE VALUE - Group 3
Available: Always
Upper display: Full scale value
Lower display: PI.FSV
Range: from 10 to 99950. Changes to this value affect the values for the pressure input low scale, the alarm set point limits, the set point limits, the secondary input values, the set point and the retransmission limits.
Default value: 10000

PRESSURE INPUT LOW SCALE VALUE - Group 3
Available: Always
Upper display: Low scale value
Lower display: PI.LSV
Range: from ± 25% of Full scale value
Default value: 0

PRESSURE INPUT DECIMAL POINT POSITION - Group 3
Available: Always
Upper display: Full scale value
Lower display: PI.DP
Range: Use ▲ and ▼ keys to select the position of the decimal point.
Default value: None

PRESSURE INPUT ENGINEERING UNIT - Group 3

Available: Always.
Upper display: Engineering unit beacon to lit up.
Lower display: PI.EU
Range: OFF, PSI, bAr, hGcn2, nPa, where: OFF is all beacons are turned off; PSI is first beacon (PSI) lit; bAr is second beacon (Bar) lit; hGcn2 is third beacon (kg/cm^2) lit; nPafourth beacon (MPa) lit
Default value: PSI.

REMOTE SET POINT INPUT RANGE LOW - Group 3

Available: Only if SI.TYP is different from 'OFF' and SI.FNC is equal to 'rSP'
Upper display: Remote set point input range low
Lower display: RI.Lo
Range: from 0 to PI.FSV.
Default value: 0

REMOTE SET POINT INPUT RANGE HIGH - Group 3

Available: Only if SI.TYP is different from 'OFF' and SI.FNC is equal to 'rSP'
Upper display: Remote set point input range high
Lower display: RI.HI
Range: from 0 to PI.FSV
Default value: PI.FSV

SECONDARY INPUT FULL SCALE VALUE - Group 3

Available: Only if SI.TYP is different from 'OFF' and SI.FNC is equal to 'diff.P'.
Upper display: Secondary input full scale value.
Lower display: SI.FSV
Range: From 0 to the full scale value (4000, 8000, 20000, 40000, 80000 or 99950, according to the pressure input full scale value).
Default value: 10000.

SECONDARY INPUT LOW SCALE VALUE - Group 3

Available: Only if SI.TYP is different from 'OFF' and SI.FNC is equal to 'diff.P'.
Upper display: Secondary input low scale value.
Lower display: SI.LSV
Range: From -/+ 25% of the 'Secondary input full scale value' parameter (SI.FSV).
Default value: 0.

ALARM 1 INPUT CHANNEL LINK - Group 3

Available: Always
Upper display: Configuration of alarm 1 selection
Lower display: A1.LNK
Range: OFF, ProC, band, deu. Disabled, process alarm, band alarm, deviation alarm.
Default value: Process alarm

ALARM 1 TYPE - Group 3

Available: Only if A1.LNK is different than OFF
Upper display: Selection of alarm 1 type
Lower display: A1.TYP
Range: HI, LO, InhIb. High, low, low with mask at start-up. For band alarm high means outside band alarm, while low means inside band alarm.
Default value: Low with mask at start-up

ALARM 2 INPUT CHANNEL LINK - Group 3

Available: Always
Upper display: Configuration for alarm 2 selection
Lower display: A2.LNK
Range: OFF, ProC, band, deu. Disabled, process alarm, band alarm, deviation alarm.
Default value: Process alarm

ALARM 2 TYPE - Group 3

Available: Only if A2.LNK is different from OFF
Upper display: Selection of alarm 2 type
Lower display: A2.TYP
Range: HI, LO, InhIb. High, low, low with mask at start-up. For band alarm high means outside band alarm, while low means inside band alarm.
Default value: High

ALARM 3 INPUT CHANNEL LINK - Group 3

Available: Only if Alarm 3 output is fitted
Upper display: Configuration for alarm 3 selection
Lower display: A3.LNK
Range: OFF, ProC, band, deu. Disabled, process alarm, band alarm, deviation alarm
Default value: Process alarm

ALARM 3 TYPE - Group 3

Available: Only if A3.LNK is different than OFF
Upper display: Selection of alarm 3 type
Lower display: A3.TYP
Range: HI, LO, InhIb. High, low, low with mask start-up. For band alarm high means outside band alarm, while low means inside band alarm
Default value: High

CONTROL OUTPUT RANGE LOW - Group 3

Available: Always
Upper display: Range low for control output (for RPM scaling).
Lower display: CO.LO
Range: from -10000 to CO.HI

Default value: 0

CONTROL OUTPUT RANGE HIGH - Group 3
Available: Always
Upper display: Range high for control output (for RPM scaling).
Lower display: CO.HI
Range: from CO.LO to 10000
Default value: 100.0

CONTROL OUTPUT DECIMAL POINT POSITION - Group 3
Available: Always
Upper display: Range high for control output
Lower display: CO.DP
Range: Use ▲ and ▼ keys to select the position of the decimal point
Default value: One decimal digit

RETRANSMISSION OUTPUT RANGE LOW - Group 3
Available: Only if RO.TYP is different than OFF
Upper display: Range low for retransmission output
Lower display: RO.LO
Range: from 0 to PI.FSV
Default value: 0

RETRANSMISSION OUTPUT RANGE HIGH - Group 3
Available: Only if RO.TYP is different than OFF
Upper display: Range high for retransmission output
Lower display: RO.HI
Range: from 0 to PI.FSV
Default value: PI.FSV

SET POINT LIMIT LOW - Group 3
Available: Always
Upper display: Low limit for set point
Lower display: SP.LO
Range: From 0 to SP.HI
Default value: 0

SET POINT LIMIT HIGH - Group 3
Available: Always
Upper display: High limit for set point
Lower display: SP.HI
Range: From SP.LO to PI.FSV
Default value: PI.FSV

MANUAL/AUTO START-UP - Group 3
Available: Always

Upper display: Controller status at power on
Lower display: MA.STP
Range: Auto, nAn. Automatic/Manual mode
Default value: nAn

SERIAL COMMUNICATION INTERFACE ADDRESS - Group 3
Available: Only if serial communication interface is fitted
Upper display: Serial communication interface address.
Lower display: SC.ADR
Range: OFF, 1, 2, Ö, 255. OFF means disabled serial interface
Default value: OFF

PROTOCOL TYPE - Group 3
Available: Only if SC.ADR is different than OFF
Upper display: Protocol type
Lower display: SC.BUS
Range: nodbS, JbuS. Modbus/Jbus selection
Default value: Modbus

COMMUNICATION TYPE - Group 3
Available: Only if SC.ADR is different than OFF.
Upper display: Number of bits.
Lower display: SC.FRM
Range: 8, 8 E, 8 O. 8 bit without parity, 8 bit + even parity, 8 bit + odd parity
Default value: 8 bit without parity

COMMUNICATION BAUD RATE - Group 3
Available: Only if SC.ADR is different than OFF
Upper display: Baud rate
Lower display: SC.BDR
Range: 600, 1200, 2400, 4800, 9600, 19200
Default value: 19200

LOADING DEFAULT DATA - Group 3
Available: Only if access to level C is allowed.
Upper display: OFF
Lower display: DEFLT
Range: Use ▲ and ▼ keys to switch the upper display from OFF to On 3, then press FUNC key to load the default data of the parameters belonging to group 1, group 2 and group 3

11.4 Group 4 Parameters

SHUNT CALIBRATION - Group 4
Available: Always
Upper display: OFF if shunt calibration disabled, On if shunt calibration enabled

Lower display: SHUNT
Range: OFF, On
Default value: On

SHUNT VALUE - Group 4
Available: Only if SHUNT parameter is On
Upper display: Shunt value
Lower display: SHNT.%
Range: From 40.0 to 100.0%
Default value: 80.0%

PRESSURE INPUT FAIL SAFE - Group 4
Available: Always
Upper display: Pressure input fail safe condition.
Lower display: PI.IFS
Range: HI, LO
Default value: High

SECONDARY INPUT FAIL SAFE - Group 4
Available: Always
Upper display: Pressure input fail safe condition.
Lower display: SI.IFS
Range: HI, LO
Default value: High

REMOTE SET POINT INPUT FAIL SAFE - Group 4
Available: Only if RI.TYP is different than OFF
Upper display: Remote set point input fail safe condition
Lower display: RI.IFS
Range: HI, LO
Default value: Low

ALARM 1 HYSTERESIS - Group 4
Available: Only if A1.LNK is different than OFF
Upper display: Alarm 1 hysteresis
Lower display: A1.HYS
Range: From 0.1 to 10.0% of the range
Default value: 1.0%

ALARM 1 RESET MODE - Group 4
Available: Only if A1.LNK is different than OFF.
Upper display: Selected reset mode for alarm 1.
Lower display: A1.RES
Range: auto, LAtCh. Automatic reset, manual reset
Default value: Auto.

ALARM 1 FAILSAFE MODE - Group 4
Available: Only if A1.LNK is different than OFF
Upper display: Selected failsafe mode for alarm 1
Lower display: A1.FSM
Range: FS, nFS. Failsafe mode, non-failsafe mode
Default value: Failsafe mode

ALARM 2 HYSTERESIS - Group 4
Available: Only if A2.LNK is different than OFF
Upper display: Alarm 2 hysteresis
Lower display: A2. HYS
Range: From 0.1 to 10.0% of the range
Default value: 1.0%

ALARM 2 RESET MODE - Group 4
Available: Only if A2.LNK is different than OFF
Upper display: Selected reset mode for alarm 2
Lower display: A2. RES
Range: Auto, LAtCh. Automatic reset, manual reset
Default value: Auto

ALARM 2 FAILSAFE MODE - Group 4
Available: Only if A2.LNK is different than OFF
Upper display: Selected failsafe mode for alarm 2
Lower display: A2.FSM
Range: FS, nFS. Failsafe mode, non-failsafe mode
Default value: Failsafe mode

ALARM 3 HYSTERESIS - Group 4
Available: Only if A3.LNK is different than OFF
Upper display: Alarm 3 hysteresis
Lower display: A3.HYS
Range: From 0.1 to 10.0% of the range.
Default value: 1.0%

ALARM 3 RESET MODE - Group 4
Available: Only if A3.LNK is different than OFF
Upper display: Selected reset mode for alarm 3
Lower display: A3.RES
Range: Auto, LAtCh
Default value: Auto

ALARM 3 FAILSAFE MODE - Group 4
Available: Only if A3.LNK is different than OFF
Upper display: Selected failsafe mode for alarm 3
Lower display: A3.FSM

Range: FS, nFS. Failsafe mode, non-failsafe mode
Default value: Failsafe mode

LOGIC INPUT CONFIGURATION - Group 4
Available: Always
Upper display: Configuration of logic input
Lower display: LI.TYP
Range: OFF, AL, P, AL-P Disabled, alarm reset, peak reset, alarm and peak reset
Default value: Alarm and peak reset

LOGIC INPUT STATUS - Group 4
Available: Only if LI.TYP is different than OFF
Upper display: Status of logic input
Lower display: LI.STS
Range: CLOSE, OPEn. The logic input is determined to be active when the contact is closed or open.
Default value: Closed

PEAK DETECTION - Group 4
Available: Always
Upper display: Polarity of peak detector
Lower display: PEAK
Range: OFF, HI, LO. Disabled, maximum peak, minimum peak.
Default value: Maximum peak

MANUAL/AUTO TRANSFER - Group 4
Available: Always
Upper display: Selection for transfer from manual to automatic mode.
Lower display: MA.TRF
Range: Bunpl, SP. Bumpless mode (without modification of set point) or set point modification mode
Default value: Bumpless

NOTE: The bumpless mode returns to the previously entered set point. The set point modification mode changes the set point to the value of the process variable.

SET POINT RAMP - Group 4
Available: Always
Upper display: Set point rate of change value in engineering units per second.
Lower display: SP.RMP
Range: From 1 to 999 and then OFF (step change). This parameter is used to limit the rate of change of the local set point; it is active also during switching from local to remote set point and vice versa. When the ramp value meets the remote set point input signal, the ramp

function is disabled to allow the controller set point to match the analog input.
Default value: OFF

CONTROL OUTPUT LIMITER - Group 4
Available: Always
Upper display: Control output limiter.
Lower display: CO.MAX
Range: From 10.0 to 100.0%. This limit is active in manual and automatic mode.
Default value: 100.0

CONTROL OUTPUT MANUAL MODE INDICATION - Group 4
Available: Always
Upper display: Control output manual mode indication.
Lower display: CO.MMI
Range: 100.0 / rPn Use this parameter to select how the controller shows the output value in manual mode; in the range 0-100.0%, or scaled with CO.RH and CO.RL parameters (RPM indication).
Default value: 100.0

DIRECT/REVERSE SELECTION FOR CONTROL OUTPUT - Group 4
Available: Always
Upper display: Direct/reverse selection for control output
Lower display: CO.D/R
Range: r d, r r, d d, d r. The first digit shows the relationship between input signal and displayed output value. The last digit shows the relationship between displayed output signal and output value.
Default value: r d.
Example:

Value Signal	Input Output	Displayed Output	Control
r d	0 – 100 (increase)	100 – 0 (decrease)	100 – 0 (decrease)
r r	0 – 100 (increase)	100 – 0 (decrease)	0 – 100 (increase)
d d	0 – 100 (increase)	0 – 100 (increase)	0 – 100 (increase)
d r	0 – 100 (increase)	0 – 100 (increase)	100 – 0 (decrease)

PRESSURE INPUT DISPLAY UPDATE TIME - Group 4
Available: Always
Upper display: Display update time for the pressure input
Lower display: PI.DUT
Range: 0.050, 0.100, 0.250, 0.400 sec.
Default value: 0.400 sec.

REMOTE SET POINT (SECONDARY) INPUT SAMPLE TIME - Group 4
Available: Only if SI.FNC is equal to ‘rSP’

Upper display: Sample time for the secondary input
Lower display: SI.ST
Range: 0.100, 0.200, 0.500, 1.000 sec.
Default value: 0.500 sec.

LINE FREQUENCY - Group 4
Available: Always.
Upper display: Line frequency rejection.
Lower display: LINE.F
Range: 50, 60, Auto
50 Hz, 60 Hz, automatic detection of the line frequency (except 24Vdc power supply).
Default value: Auto.

LINE FREQUENCY READOUT - Group 4
Available: Only when the LINE.F parameter is set to Auto.
Upper display: Read-only value of the detected line frequency.
Lower display: LINE.R
Range: 50, 60, und.60
50, 60: when the device is able to detect correctly 50 or 60 Hz line frequency. und.60: automatic detection of the line frequency doesn't work (e.g. 24V DC power supply); a 60 Hz rejection is assumed.
Default value: Not applicable.

LOADING DEFAULT DATA - Group 4
Available: Only if access to level c is allowed
Upper display: OFF
Lower display: DEFLT
Range: Use ▲ and ▼ keys to switch the upper display from OFF to On 4, then press FUNC key to load the default data of the parameters belonging to group 1, group 2, group 3 and group 4.

11.5 Group 5 Parameters

PRESSURE INPUT SELECTION - Group 5
Available: Always
Upper display: Type of pressure input selection
Lower display: PI.TYP
Range: Str, 0-20, 4-20, 0-5, 0-10. Strain gage, 0-20mA, 4-20mA, 0-5V, 0-10V
Default value: Strain gage
Note: Proper terminal block wiring required

SECONDARY INPUT SELECTION - Group 5
Available: Only is secondary input circuit is fitted
Upper display: Type of secondary input selection

Lower display: SI.TYP
Range: OFF, tc, rtd, 0-20, 4-20, 0-10. Disabled thermocouple, RTD, 0-20 mA, 4-20mA, 0-10V
Default value: Thermocouple
Note: Proper terminal block wiring required

SECONDARY INPUT FUNCTION - Group 5
Available: Only if SI.TYP is different from OFF.
Alterable: Only if SI.TYP is equal to 0-20, 4-20, 0-5, 0-10; otherwise it is forced according to the SI.TYP value.
Upper display: Function of secondary input.
Lower display: SI.FNC
Range: tenp, diff.P., where tenp input acts as a temperature input and diff.P input acts as the second sensor for differential pressure measurement
Default value: tenp.

REMOTE SET POINT INPUT SELECTION - Group 5
Available: Only if remote set point input circuit is fitted
Upper display: Type of remote set point input circuit is fitted
Lower display: RI.TYP
Range: OFF, 0-20, 4-20, 0-10. Disabled, 0-20mA, 4-20mA, 0-10V.
Default value: 4-20mA

CONTROL OUTPUT SELECTION - Group 5
Available: Always
Upper display: Type of control output selection.
Lower display: CO.TYP
Range: 0-20, 4-20, 0-10, -10-10, 0-5. 0-2mA, 4-2mA, 0-10V, -10-10V, 0-5V
Default value: 0-10V
Note: Proper terminal block wiring required

RETRANSMISSION OUTPUT SELECTION - Group 5
Available: Only if retransmission output circuit is fitted
Upper display: Type of retransmission output selection
Lower display: OFF, 0-20, 4-20, 0-10, -10-10, 0-5. Disabled, 0-20mA, 4-20mA, 0-10V, -10-10V, 0-5V
Default value: 0-10V
Note: Proper terminal block wiring required

LOADING DEFAULT DATA - Group 5
Available: Only if access to level C is allowed
Upper display: OFF
Lower display: DEFLT

Range: Use ▲ and ▼ keys to switch the upper display from OFF to On 5, the press FUNC key to load the default data of the parameters belonging to group 1, group 2, group 3, group 4 and group 5.

11.6 Group 6 Parameters

SECURITY CODE - LEVEL A - Group 6

Available: Always
Upper display: 0, 1, On
Lower display: CODE.A
Range: Use ▼ ▲ keys to input the security codes. 0 means no security code (all parameters related to level A are always unlocked). 1 means no security code (all parameters related to level A, level B and level C are always locked). A number from 2 to 250 is the code for level A protection

SECURITY CODE - LEVEL B - Group 6

Available: Only if CODE.A is 0 or On
Upper display: 0, 1, On
Lower display: CODE.B
Range: Use ▼ ▲ keys to input the security codes. 0 means no security code (the parameters related to level A and level B are always unlocked). 1 means no security code (all parameters related to level B and level C are always locked). A number from 251 to 500 is the code for level B protection

SECURITY CODE - LEVEL C - Group 6

Available: Only if CODE.B is 0 or On
Upper display: 0, 1, On
Lower display: CODE.C
Range: Use ▼ ▲ keys to input security codes. 0 means no security code (the parameters related to level A, level B and level C are always unlocked)

1 means no security code (all parameters related to level C are always locked). A number from 501 to 1000 is the code for level C protection.

NOTE: Once security codes are selected, their values cannot be displayed again but the display shows On. If the codes are forgotten, new values should be chosen, using the above procedure. It is recommended that a code be set for each security level. Note that unlocking the Level C code unlocks Levels A, B and C. Unlocking Level B unlocks Levels B and A. Unlocking Level A only Unlocks Level A. When the SECUR functions are accessed in Group 1, the levels that are locked will be followed by a decimal point. E.g. A.b.C. indicates that all the levels are locked.

11.7 Group 9 Parameters

PROCESS TIME DELAY - Group 9

Available: Always
Upper display: Read-only value of the process time delay as estimated by SMART (TUNE) function
Lower display: AT.TO
Range: The time resolution is hundredths of second
Default value: Not applicable. The display shows zero until the first SMART trial.

PROCESS TIME CONSTANT - Group 9

Available: Always
Upper display: Read-only value of the process time constant as estimated by SMART (TUNE) function
Lower display: AT.TAU
Range: The time resolution is hundredths of second.
Default value: Not applicable. The display shows zero until the first SMART trial.

PROCESS GAIN - Group 9

Available: Always
Upper display: Read-only value of the process gain as estimated by SMART (TUNE) function. The value is stored in non-volatile memory because it is used in automatic computation of integral pre load value.
Lower display: AT.KP
Range: The gain resolution is hundredths of units
Default value: 1.00.

START TIME OF SMART FUNCTION - Group 9

Available: Always
Upper display: This read-only value shows when the SMART (TUNE) function started to collect data for transient response analysis.
Lower display: AT.T1
Range: The time resolution is hundredths of second.
Default value: Not applicable. The display shows zero until the first SMART trial.

STOP TIME OF SMART FUNCTION - Group 9

Available: Always
Upper display: This read-only value shows when the SMART (TUNE) function finished collecting data for transient response analysis.
Lower display: AT.T2
Range: The time resolution is hundredths of second
Default value: Not applicable. The display shows zero until the first SMART trial.

ADAPTIVE STEP - Group 9

Available: Always

Upper display:	This read-only value shows the internal step number used by adaptive algorithm
Lower display:	AT.ADS
Range:	From 0 to 8
Default value:	Not applicable

12.0 PID CONTROLLER DEFINITIONS

Proportional Band – The value shown on the controller is expressed as a percentage of span. The smaller the number, the tighter the control and greater the response of the controller for a certain error. However, selecting a value that is too small tends to make the process unstable (cycling) while too large a value results in a loose response.

Integral Time – Aids the controller in returning the process to set point. This response is only concerned with the amount of error that exists between the actual pressure and set point, and how long (time) the error has existed. The integral response ONLY functions when an error exists. Reducing the value of the integral setting (Ti) increases the amount of the integral response. A numerical setting that is too large (40) results in process which will not return to set point, while a value which is too small (0.1) will result in an unstable process.

Derivative Time – Aids the controller in responding to fast changes in the process. This response is concerned only with the rate of error taking place. The more QUICKLY the actual pressure begins varying from set point, the more quickly this function forces the controller to respond. Note that derivative only functions when the error is changing and will not correct for large errors which are stable. Increasing the numerical value of Td increases the amount of derivative response, and decreasing the value decreases the response. While a derivative value that is too small, will result in sluggish response to quickly changing errors, a value that is too large, will quickly cause an unstable process as the controller attempts to correct for every little variation. This is especially true in extrusion processes.

Integral Preload – Assists the controller in recovering from a system upset. To properly adjust, observe the % of power out during steady state control. The % shown in the lower display is the value that should be programmed into Ip.

Control Output Limiter – This function reduces the risk of over-ranging the extruder during start up by limiting the full output of the controller to a certain percentage (i.e. an output limit of 75% on a 4 – 20 mA output will limit the full output to 16mA.

Low/High Limit for SP – These values restrict or set boundaries to where the set point can be adjusted. This prevents operators from inadvertently altering the set point to high or too low.

Direct Action (Control Output) – The mA output decreases as pressure decreases, and increases as pressure increases.

Reverse Action (Control Output) – The mA output increases as pressure decreases, and decreases as pressure increases.

Direct/Reverse Action Examples:

Direct Action:	LED on – Relay Energized LED off – Relay De-Energized
Reverse Action/Failsafe:	LED on – Relay De-Energized LED off – Relay Energized

NOTE: Reverse Action works only on the relay's status.

13.0 WARRANTY AND SERVICE

This equipment is subject to the mutual agreement that it is warranted to be free from defects of material and construction but our liability in connection with it shall be limited to repairing or replacing without charge at our factory any material or construction defects which become apparent within one year from the data on which the equipment is shipped, that we have no liability for damages of any kind arising from the installation or use of this apparatus by anyone and that the purchaser by the acceptance of this equipment will assume all liability for any damages which may result from its use or misuse by the purchaser, his or its employees or by others. There is no guarantee or warranty or liability except as here stated.

Should the equipment require service or repair, please call for a Return Material Authorization Number, and return it, along with a brief description of any problem(s) encountered, freight prepaid to:

Dynisco Instruments
38 Forge Parkway
Franklin, MA 02038
Attn: Repair Dept. **RMA# (Include RMA#)**

Please call for a Return Material Authorization Number before returning product to Dynisco.

Questions concerning warranty, repair cost, and delivery should be directed to the Dynisco Repair Department, telephone number 508-541-9400 or E-mail: repair@mc.dynisco.com.

For further technical assistance, call 800-221-2201