

5 3 1



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## PLC, DCS, PC CONTROL BACKUP STATION

- ▶ Auto/Manual Station
- ▶ Hot PID Backup Station

 **MOORE  
INDUSTRIES**

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## PURPOSE AND OPERATION

The 531 provides automatic PID control backup for critical loops controlled by PLC, DCS or PC systems. Unlike a single loop controller configured to sense and retransmit a control signal, which adds liability and complexity; the 531 has a simple operator interface, special parameters for control states upon host transfer or failure, and a special pass-through circuit that provides redundancy in the control loop. In HOST mode, the control signal (4-20mA) is hard wired to pass through the 531 without degradation. In LOCAL mode, the 531 generates the CV (control) signal in AUTO or MANUAL mode. Host CV tracking enables a bumpless transfer to LOCAL mode in either LOCAL AUTO or LOCAL MANUAL mode. A special CV line sense function triggers HOST to LOCAL transfer automatically if host CV signal fails. LOCAL/HOST transfer may also be initiated by a dedicated front panel key or a contact input. The 531's setpoint may be set locally or remotely from the host, ensuring bumpless changeover to LOCAL AUTO mode. The 531 may also be operated as a manual loading station in the LOCAL MANUAL mode.

## FEATURES

- Optically isolated inputs and outputs to avoid ground loop problems.
- Unique, bolted "clamshell" front panel provides NEMA 4X watertight rating.
- Sturdy illuminated rubber keys yield much longer life than common dome-type keys, provide excellent tactile feel, and are easily read in the dark.
- Bright vacuum fluorescent three line display has two lines of alpha-numerics for simplified configuration and operation messages.
- Compact 6" deep case enables installation in shallow cabinet.
- Available alarm output in LOCAL mode for status flag to host.
- Optional RS-485 serial communications with baud rates up to 19,200 will allow you to monitor your process from a personal computer or other host.

## FUNCTIONS

|                                    |  |
|------------------------------------|--|
| <b>Loss of Host Control Signal</b> | CVline sense function triggers "Lost Host" message, automatic transfer to LOCAL mode; bumpless transfer with RSP tracking available. Automatic transfer to HOST mode upon host CV return is configurable (CV must be 4-20mA signal). |
| <b>Local/Host Transfer</b>         | Dedicated "Host" key toggles between states and lights in HOST mode. Bumpless transfer to either LOCAL AUTO or LOCAL MANUAL mode is available by using RSP tracking and output ramp. Transfer also initiatable by rear contact.      |
| <b>Control Signal Integrity</b>    | "Hard Wired" pass-through circuit does not rely on local station (531) to generate control signal in HOST mode.  |
| <b>Control Signal Integrity</b>    | Special "By-Pass" circuit allows host control signal to pass through even when 531 chassis is removed from case.   |
| <b>Ease of Configuration</b>       | Special menus and parameters dedicated to back-up function enable configuration of output and setpoint states upon "Host" failure or operator initiated transfer.  |
| <b>Simplicity of Operation</b>     | Clearly labeled keys and displays enable operators to easily see control loop status: HOST/LOCAL mode, AUTO/MANUAL mode, PV, CV, host and local SP.  |
| <b>Universal Process Input</b>     | PV signal may be retransmitted from host or in series with host. Thermocouple, RTD, volt and mV signals may be direct wired to 531.  |
| <b>Security</b>                    | Our unique security system lets you decide exactly which function groups have restricted access.   |

# SPECIFICATIONS

## ACCURACY

|                     | TYPICAL             | MAXIMUM             |
|---------------------|---------------------|---------------------|
| <b>LINEAR</b>       |                     |                     |
| (Voltage)           | ± 0.025% full scale | ± 0.100% full scale |
| (Current)           | ± 0.050% full scale | ± 0.150% full scale |
| <b>RTD</b>          |                     |                     |
| 1°                  | ± 0.050% of span    | ± 0.150% of span    |
| 0.1°                | ± 0.095% of span    | ± 0.225% of span    |
| <b>THERMOCOUPLE</b> |                     |                     |
| J, K, N, E (> 0°C)  | ± 0.060% of span    | ± 0.150% of span    |
| J, K, N, E (< 0°C)  | ± 0.150% of span    | ± 0.375% of span    |
| T (> 0°C)           | ± 0.100% of span    | ± 0.250% of span    |
| T (< 0°C)           | ± 0.250% of span    | ± 0.625% of span    |
| R, S (> 500°C)      | ± 0.150% of span    | ± 0.375% of span    |
| R, S (< 500°C)      | ± 0.375% of span    | ± 0.925% of span    |
| B (>500°C)          | ± 0.150% of span    | ± 0.375% of span    |
| B (<500°C)          | ± 0.500% of span    | ± 1.000% of span    |
| W, W5 & Platinel II | ± 0.125% of span    | ± 0.325% of span    |

Display accuracy is ± 1 digit. These accuracy specifications are at reference conditions (25°C) and only apply for NIST ranges. Detailed accuracy information is available upon request.

## CONTROL ALGORITHM

PID, P with manual reset, PI, and PD with manual reset.

## TUNING PARAMETERS

Proportional Band: 0.1 to 999% of input range  
 Integral: 1 to 9999 seconds/repeat  
 Derivative: 0-600 seconds  
 Manual Reset: 0-100% output

## ISOLATION

Inputs and outputs are grouped into the following blocks:

- Block 1** — process variable indication
- Block 2** — outputs 1, 2, and 4
- Block 3** — communications, set of 3 digital inputs, output 3
- Block 4** — setpoint and indicator

Each block is electrically isolated from the other blocks to withstand a HIPOT potential of 500Vac for 1 minute or 600Vac for 1 second, with the exception of blocks 1 and 4, which are isolated to withstand a HIPOT potential of 50 volts peak for 1 minute between each other. Inputs and outputs are not isolated from other inputs and outputs within the same block.

## PROCESS VARIABLE INPUTS

Universal input type. Any input type may be selected in the field. Selection of input type (thermocouple, RTD, voltage or current) via jumper. Selection of particular sensor or range is via front panel.

| THERMOCOUPLES | RANGE °F     | RANGE °C     |
|---------------|--------------|--------------|
| B             | 104 to 3301  | 40 to 1816   |
| E             | -454 to 1832 | -270 to 1000 |
| J             | -346 to 1832 | -210 to 1000 |
| K             | -418 to 2500 | -250 to 1371 |
| N             | -328 to 2372 | -200 to 1300 |
| R             | 32 to 3182   | 0 to 1750    |
| S             | 32 to 3182   | 0 to 1750    |
| T             | -328 to 752  | -200 to 400  |
| W             | 32 to 4172   | 0 to 2300    |
| W5            | 32 to 4172   | 0 to 2300    |
| Platinel II   | -148 to 2550 | -100 to 1399 |

| RTD'S              | RANGE °F        | RANGE °C        |
|--------------------|-----------------|-----------------|
| 100 ohm Pt. (DIN)  | -328 to 1562    | -200 to 850     |
|                    | -328.0 to 545.0 | -200.0 to 285.0 |
| 100 ohm Pt. (JIS)  | -328 to 1202    | -200 to 650     |
|                    | -328.0 to 545.0 | -200.0 to 285.0 |
| 100 ohm Pt. (SAMA) | -328 to 1202    | -200 to 650     |
|                    | -328.0 to 545.0 | -200.0 to 285.0 |

| TRANSMITTER SIGNALS | INPUT RANGE |
|---------------------|-------------|
| Milliamps DC        | 4 to 20     |
|                     | 0 to 20     |
| Voltage DC          | 1 to 5      |
|                     | 0 to 5      |
| Millivolts DC       | 0 to 10     |
|                     | 0 to 30     |
|                     | 0 to 60     |
|                     | 0 to 100    |
|                     | -25 to 25   |

## LINEARIZATION

Thermocouple and RTD inputs are automatically linearized. Transmitter inputs may be linearized with a square root function or user-defineable 15-point straight line linearization function.

## TRANSITION TIME

CV signal is restored 250msec. after the HOST signal break is detected. CV signal is considered lost when it falls below 3.2mA.

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## INPUT IMPEDANCE

Current Input: 250 ohms      Thermocouples: 10 Mohms  
Voltage Input: 1 Mohm      RTDs: 10 Mohms

## UPDATE RATE

Input is sampled and output updated 5 times per second. Display is updated 5 times per second. Passage of the HOST signal through the 531 is continuous.

## INPUT FILTER

Single pole lowpass digital filter with selectable time constant from 0 to 120 seconds.

## CALIBRATION

The station comes fully calibrated from the factory and continuously calibrates itself for component aging due to temperature and time, except for reference voltage. Field calibration can be performed easily with a precision multimeter and thermocouple simulator. Process variable offset and gain factors are provided to correct for sensor errors.

## OUTPUT MODULES

One analog output (CV), 4–20mA into a load up to 1000 ohm. Also available is an additional mechanical relay module that can be tied to an alarm.

## CONTROL OUTPUTS

4–20mA into a load up to 1000 ohms.

## ALARMS

The 531 has two powerful software alarms. The 531 provides a LOCAL alarm that indicates when the 531 is in LOCAL mode. When tied to an available output, the HOST device can be flagged as to the change in status. Alternately, a PV High, PV Low, PV Rate, SP Band or SP Deviation alarm may be configured. A 9-character custom alarm message is available for each alarm.

## DIGITAL INPUTS

A set of five external dry contacts or open collector driven transistor inputs are available. Each can be configured to perform one of the following functions:

- Select LOCAL control with LAST-OUT or 1 of 2 preset values
- Acknowledge alarms
- Addressable through serial communications only
- ▲/▼ Key Emulation
- HOST "watchdog" timer input

## SERIAL COMMUNICATIONS

Isolated serial communications is available using an RS-485 interface. Baud rates of up to 19,200 are selectable. The protocol supports CRC data checking.

## DIGITAL DISPLAYS

Displayed information depends upon chosen options.

**Upper display:** five-digit, seven-segment. Used exclusively to display PV. Height is 15mm (0.6 in.).

**2nd display:** nine-character, 14-segment alphanumeric. Selectable SP or CV indication. During set up, displays configuration information. Height is 6mm (0.25 in.).

**3rd display:** nine-character, 14-segment alphanumeric. When no alarm messages are queued, indicates a user-selectable "station" name. During set up, displays configuration information. Height is 6mm (0.25 in.).

All displays are vacuum fluorescent. Color is blue-green.

## STATUS INDICATORS

**ALM 1 icon illuminated:** alarm status

**HOST key illuminated:** CV signal from HOST is present

**MANUAL key illuminated:** 531 is in LOCAL MANUAL mode

**ACK key illuminated:** alarm is acknowledged

**MENU key illuminated:** 531 is in configuration mode

## DIMENSIONS

Meets 1/4 DIN designation as specified in DIN standard number 43 700. See diagram on page 5 for details.

## MOUNTING

Panel-mounted. See diagram on page 5 for details.

## WIRING CONNECTIONS

30 screw terminals in the rear of the instrument.

## POWER CONSUMPTION

15VA at 120VAC, 60Hz (typical).

## WEIGHT

Approximately 1 kg (2.2 lbs.).

## AMBIENT TEMPERATURE

Operative Limits: 0 to 50°C (32 to 122°F).

Storage Limits: –40 to 70°C (–40 to 158°F).

## RELATIVE HUMIDITY

10 to 90%, non-condensing.

## VOLTAGE AND FREQUENCY

Universal power supply: 90 to 250VAC, 48 to 62Hz.

## NOISE IMMUNITY

Common mode rejection (process input): >120 dB.

Normal mode rejection (process input): >80 dB.

AC line is double filtered and transient protected. Internal snubbers are provided for each relay output.

## CONSTRUCTION

Case: extruded, non-perforated black anodized aluminum with ABS plastic sleeve.  
 Bezel: black plastic ABS.  
 Chassis assembly: plug-in type.  
 Keys: silicone rubber with diffusion printed graphics.  
 NEMA rating: front panel conforms to NEMA 4X when instrument is properly installed.

## MEMORY RETENTION

Lithium battery maintains all programming for approximately ten years.

## SECURITY

There are two levels of access: restricted and full. A configurable code is used to enter the full access level. Functions not available in the restricted level are configurable.

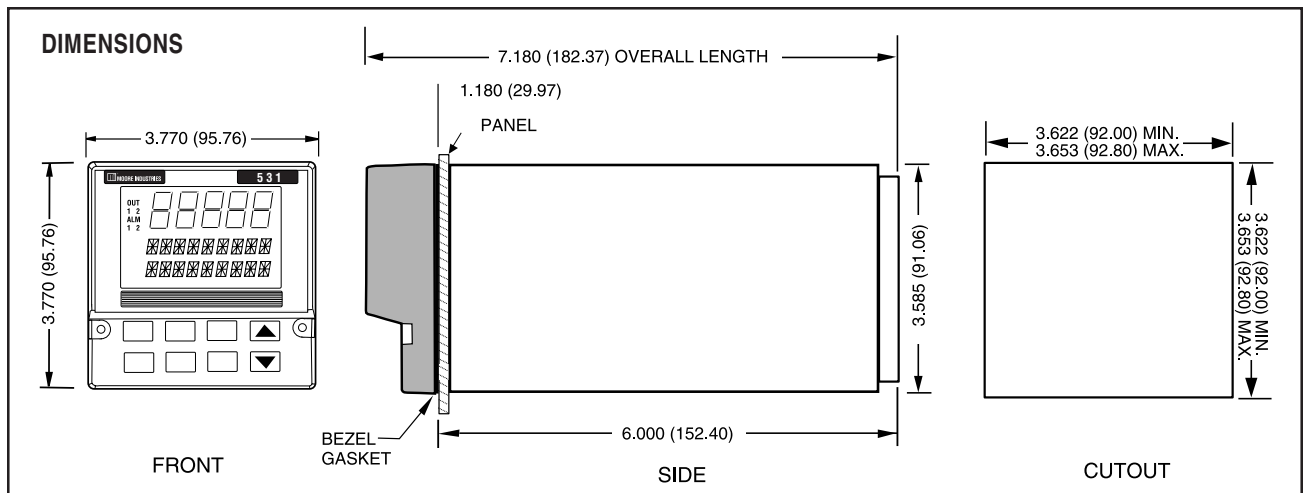
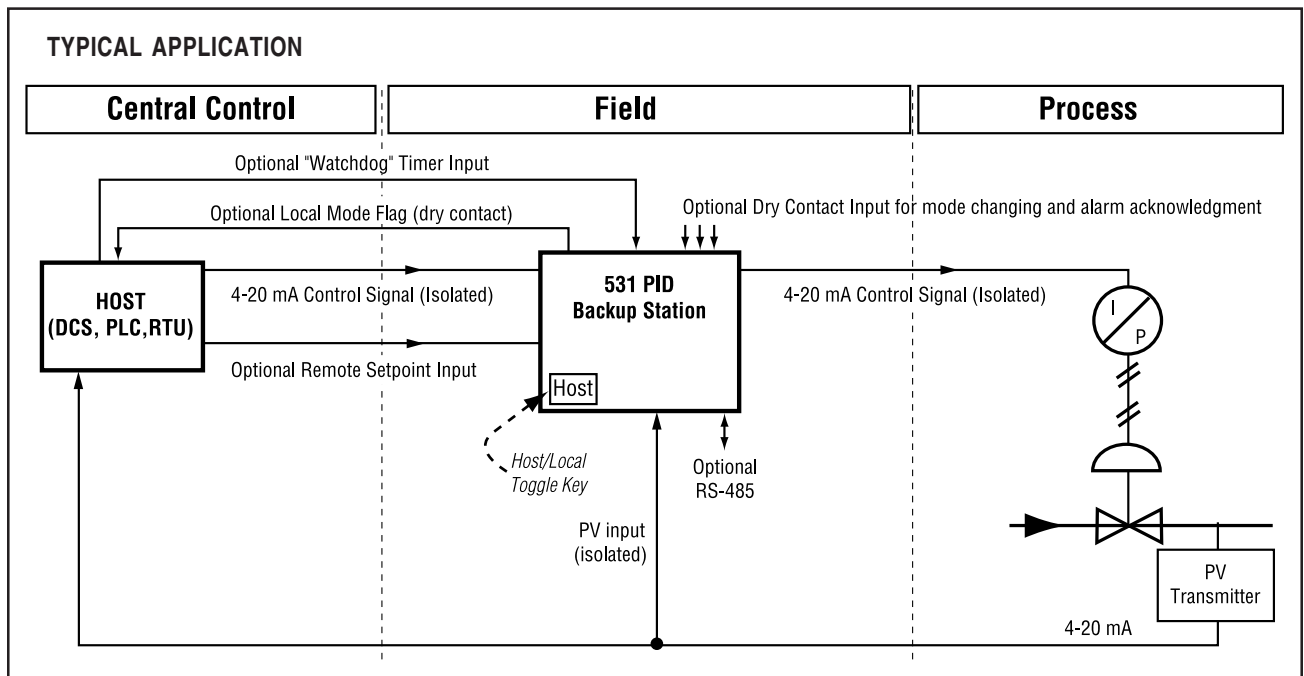
## AGENCY APPROVALS



LISTED  
 Process Control Equipment  
 4N66



(Heavy Industrial)  
 (Available as an option)



# ORDERING INFORMATION \*

531 -   2  1  1  0  B    0  0

## OUTPUT 1 — ALARM

### ORDER CODE

- None ..... 0
- Mechanical relay ..... 1
- Solid state relay (1 amp triac) ..... 3
- DC logic (SSR drive) ..... 4

## OPTIONAL INPUTS

ENTER "0" IF NOT DESIRED

- None ..... 0
- Set of five digital inputs ..... D

## SERIAL COMMUNICATIONS

ENTER "0" IF NOT DESIRED

- None ..... 0
- RS-485 serial communications ..... S

\* **Note:** Base instrument contains universal PV input, remote setpoint input and 4-20mA CV (control) output with internal hard wired by-pass relays.



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