- **Eliminate rear-of-panel devices and reduce number of panel instruments required.**

- **Controller XL offers on-demand automatic tuning of PID parameters.**

- **Choice of installation and termination strategies.**

- **Clear indication of process and operating detail.**

- **Comprehensive diagnostics differentiate between instrument faults and failures of related field hardware.**

E-3007-49

The MOD 30™ Controller 1700R and Controller XL 1701R are microprocessor-based instruments intended for continuous regulatory control. The two instruments are almost identical from a hardware perspective; only their built-in programs are different. Each features advanced algorithms and comprehensive local operator interface, and built-in communications are standard.

Unified Controller 1702R and Unified Controller XL 1703R are functionally identical to the Controller 1700R and Controller XL 1701R. The 1702R and 1703R are provided in a housing which includes terminations, optional analog input selection, and an optional integral self-regulating power supply with ac power connection. The controllers interact with other instruments over the Instrument Communications Network (ICN). The ICN is a two-wire twisted pair that permits peer-to-peer and higher level system communications to occur.

The ICN permits you to combine as many controllers and other instruments as necessary to gather the degree of control power required for an application. Pre-programmed control and support functions contained in the controllers range from linearization and simple PID to communication and advanced algorithms. Refer to Table 1.

Rugged, highly visible vacuum fluorescent display technology is used to present operating parameters in both analog and digital form. Where applicable, variables are presented in engineering units as well as in percent. Variables such as set-point, output, ratio, and bias are subject to configurable limits. Scale and limit information is available for display on request.
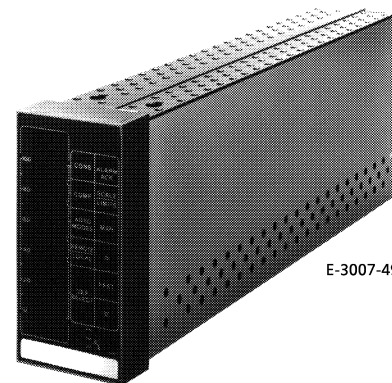
Mode changes for even complex multivariable control schemes, are procedureless and bumpless. Specific active modes are indicated, such as FF (feed forward), CAS (cascade), TRK (track), and ACT (active computer control).

Integral process alarms alert the operator to current and developing conditions. Local indications include display flashing and built-in audible annunciation. A detailed display showing user-configured labels and describing alarm conditions can be readily accessed by the operator. Digital outputs can be used to operate external devices for control or annunciation.

For controller XL dual PID configurations, both independent loops have full display and operation capability. The operator can switch from one complete set of process and operating parameters to the other, as required. A hybrid display specifically intended for single-station cascade or the ability to indicate and clear totalized counts can also be selected during configuration.

The service manual function, which is selected from the instrument front panel, permits the operator to view and manually adjust the field output(s) while the instrument is off-line for configuration.

The controllers are tuned, and configured, using the Portable Configurator 1700D or MOD 30 Instrument Configuration Software 1706S.

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The user enters into a dialogue in English prompted by the configuration device to select functionality.

An optional device called the Portable Memory Module (1711F), which is located on the back of the instrument during normal operation, permits instant configuration of replacement or similar instruments.

Extensive on-line and off-line diagnostics add an unprecedented level of security. More than 80 unique diagnostic conditions can be annunciated in the same manner as process alarms.

An optional feature available with the 1700R and 1701R is the output holder card on the first field output. It effectively isolates controller failures (such as a watchdog timeout) by detecting sudden output drop and holding the last known-good output to the field. A feedback signal from the output holder permits the replacement instrument to start up bumplessly.

The Unified Controllers (1702R and 1703R) are provided in a housing which includes termination, optional analog input selection, and an optional integral power supply.

Table 1. Controller XL and Controller Functions

Controller XL 1701R, Unified Controller XL 1703R	Controller 1700R, Unified Controller 1702R
Main Algorithm (One of the following): • Independent PID with advanced continuous control algorithms, such as feedforward, output selection, and dead time compensation or adaptive response (display flexibility permits use of algorithm as a multipoint indicator, manual loader, or ratio-bias station). • Single-station cascade slave	**Main Algorithm** (One of the following): • Independent PID with advanced continuous control algorithms, such as feedforward, and adaptive response • Advanced auto/manual ratio-bias • Dual indicator with targets and manual loading
Auxiliary Algorithm (One of the following): • Math function consisting of a 13-step equation calculated in engineering units and two 8-digit totalizers • Independent PID with advanced continuous control algorithms, such as feedforward, output selection, and dead time compensation (display flexibility permits use of algorithm as a multipoint indicator, manual loader, or ratio-bias station). • Single-station cascade slave	**Totalizer Block** • Math function consisting of a 13-step equation calculated in engineering units and two 8-digit totalizers
Support Functions (Any or all of the following): • Ramp generator (with lock and float commands)* • Cycle timer (with hold capability) * • Analog I/O and digital I/O • ICN and system communications • Process and diagnostic alarms • Linearization • Auto tuning of both main PID and auxiliary PID algorithms • Internal control via logic and set commands (operating variables, mode, and tuning parameters) • Discrete and continuous logic functions • Signal selection • Addition and subtraction	**Support Functions** (Any or all of the following): • Analog I/O and digital I/O • ICN and system communications • Process and diagnostic alarms • Linearization

* Requires some logic support functions

PERFORMANCE SPECIFICATIONS

Voltage Requirements
  Without Power Supply (all forms)
   Operating Range
    23 to 28V dc
   Momentary Dip (<100 ms)
    22.5V dc minimum
   Power Down
    20V dc maximum
   Supply Ripple
    600 mV dc maximum
  With Power Supply (1702R, 1703R only)
   Operating
    105 to 257V ac, 47 to 63 Hz

Current Requirements
  Average Operating
  1700R, 1701R
   0.5A
  1702R, 1703R
   1.5A maximum
  Average Operating with Portable Configurator 1700D Connected
  1700R, 1701R
   0.8A
  1702R, 1703R
   1.8A maximum
  In-Rush at Turn-on
   5 A (50 µs maximum)

Power Consumption
  12W average
  With Power Supply
  40W maximum

Cooling Load
  41 BTU/hr average
  With Power Supply
  136.5 BTU/hr maximum

Circuit Common
  (-) supply

Analog Inputs (3)
  Range (0 to 100%)
  1 to 5V dc
  Lower Limit (-14%)
  0.44V dc
  Upper Limit (114%)
  5.559V dc
  Sample Rate
  250 ms
  Resolution
  12 bits
  Resistance
  1 Megohm minimum
  Overrange Capability
  ±28V dc maximum
  Current Load
  20 mA average

Analog Outputs (2)
  Range (0 to 100%)
  4 to 20 mA
  Lower Limit (-8%)
  2.72 mA
  Upper Limit (108%)
  21.28 mA
  Refresh Rate
  250 ms
  Resolution
  12 bits
  Current Load
  20 mA average

Analog Outputs (2) (cont'd)
  Output Resistance
  50K ohms minimum
  Open-Circuit Voltage
   External Load Capability
    28V dc maximum
   Resistance
    800 ohms maximum
   Capacitance
    10 µF maximum
   Inductance
    10H maximum

Digital Inputs (2)
  High-Level Logic (Logic 1)
  4.0V dc minimum
  Low-Level (Logic 0)
  1.5V dc maximum
  Sample Rate
  250 ms
  Open-Circuit Voltage
  4.75 to 5.25V dc maximum
  Short-Circuit Current
  2.5 mA maximum
  Current Load
  3 mA average

Digital Outputs with Clamping Diodes (3)
  Voltage
  30V dc maximum
  Rated Current (Externally limited)
  50 mA maximum
  Open-Collector Transistor Characteristics
   On-State Residual Voltage
    1.5V dc maximum
   Off-State Leakage Current
    0.5 mA maximum

Set-Point Limits
  Lower Limit
  -8%
  Upper Limit
  108%

Diagnostic Alarms
  80

Process Alarms (8)
  Configurable as high, low, or deviation, with choice of priority

Display Type
  Vacuum fluorescent (green)

Analog Display
  Type
  2 vertical bar graphs
  Vertical
  101 segments

Digital Display
  5-digit, 7-segment with decimal point at top and bottom of display

Display Mnemonics
  21, with up to three 2.5 mm (0.1 in.) characters

Brightness
  50 ft-lm minimum

Audio Alarm
  Configurable volume and function

PERFORMANCE SPECIFICATIONS (cont'd)

Operating Temperature
5 to 50°C (41 to 122°F)

Storage Temperature
-40 to 75°C (-40 to 167°F)

Humidity
5 to 95% at 32°C (90°F)

Vibration
0.5g at 5 to 150 Hz

Calibrated Stability
Zero Drift After 8 Hours
0.1% maximum
100% Drift After 8 Hours
0.1% maximum

Calibrated Accuracy (as % of Span), Analog Inputs to
Digitized Value
Accuracy
0.1%
Repeatability
0.05%

Display - Digitized Value to Bar Graph
Accuracy
±1%
Resolution
1% (1/100)

Display - Digitized Value to Numerical
Accuracy
0.1%
Resolution
0.05%

Alarms - Digitized Value to Trip-Point
Alarm-Point Accuracy
±0.1%
Alarm-Point Dead Band
Configurable

Outputs - Digitized Value
Accuracy
±0.1%
Resolution
0.05%

Output 1 - Digitized Value to Current
Accuracy
±0.2%
Resolution
0.01%

Output 2 - Digitized Value to Current
Accuracy
±0.2% (1701R), ±1% (1700R)
Resolution
0.01%

Data Retention (Memory)
1 year minimum with no power supplied to instrument

ICN Baud Rate
31,250 bits per second

RFI
Tested per SAMA Std. PMC33.1-1978 Class 2, Bands A, B,
and C

Static-Discharge Protection
≤5 KV

PHYSICAL SPECIFICATIONS

1700R, 1701R
Height
144 mm (5.67 in.)
Width
72 mm (2.835 in.)
Depth
Back of Panel
395 mm (15.55 in.)
Front of Panel
30.5 mm (1.2 in.)
Weight
1.0 kg (2.2 lb)

1702R, 1703R
Height
168 mm (6.61 in.)
Width
72 mm (2.835 in.)

1702R, 1703R (Cont'd)
Depth
Back of Panel
544 mm (21.42 in.)
Front of Panel
30.5 mm (1.2 in.)
Weight
2.7 kg (6 lb)
Weight with Power Supply
2.8 kg (6.2 lb)

Mounting
Instrument mounts in Instrument Housing 1701F. Instrument
Housing 1701F and Unified Math Unit 1701N can be panel
mounted in a standard DIN panel cutout or rack mounted in
1/6 of Six-Unit bezel 1706F.

Mounting Position
Front to back-horizontal to 75°, incline backward from
horizontal
Side to side - 5° of vertical

ORDERING INFORMATION

Select one character or set of characters from each category and specify complete catalog number per sample below.

Code No.	Description

MOD 30 CONTROLLERS
BASE INSTRUMENT

1700RZ10005C	MOD 30 Controller, Version 5, 3rd Design Level
1701RZ10003D	MOD 30 Controller XL, Version 3, 4th Design Level

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Limited Availability   1702R UNIFIED CONTROLLER

BASE NUMBER - 1st thru 5th characters
1702R   Unified Controller

Z   UNUSED CHARACTER - 6th character

ELECTRICAL CODE - 7th and 8th characters
10   General Purpose, ABB standard

POWER SUPPLY - 9th character
0   None (Accepts 24V dc)
1   AC Powered (105 to 257V ac, 47 to 63 Hz)

INPUT OPTION - 10th character
0   None
2   Three analog inputs - each configurable for 4-20 mA dc (two wire), 4-20 mA dc (non-two wire), or 1-5V dc (non-two wire)
3   Three analog inputs - one input 4-20 mA dc (two wire)

0   UNUSED CHARACTER - 11th character

MODEL - 12th character
A   1st Design Level

1702RZ10100A   SAMPLE CATALOG NUMBER

Limited Availability   1703R UNIFIED CONTROLLER XL

BASE NUMBER - 1st thru 5th characters
1703R   Unified Controller XL

Z   UNUSED CHARACTER - 6th character

ELECTRICAL CODE - 7th and 8th characters
10   General Purpose, ABB standard

POWER SUPPLY - 9th character
0   None (Accepts 24V dc)
1   AC Powered (105 to 257V ac, 47 to 63 Hz)

INPUT OPTION - 10th character
0   None
2   Three analog inputs - each configurable for 4-20 mA dc (two wire), 4-20 mA dc (non-two wire), or 1-5V dc (non-two wire)
3   Three analog inputs - one input 4-20 mA dc (two wire)

0   UNUSED CHARACTER - 11th character

MODEL - 12th character
A   1st Design Level

1703RZ10100A   SAMPLE CATALOG NUMBER

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The Company's policy is one of continuous product improvement and the right is reserved to modify specifications contained herein without notice.
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