

Technical Data

Original Instructions

Dynamix 1444 Series Monitoring System Specifications

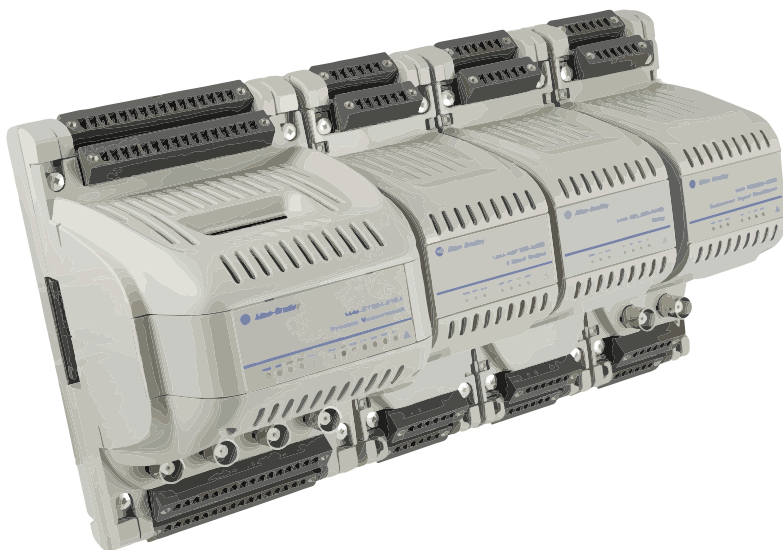
Catalog Numbers 1444-DYN04-01RA, 1444-TSCX02-02RB, 1444-RELX00-04RB, 1444-AOFX00-04RB, 1444-TB-A, 1444-TB-B

Topic	Page
Summary of Changes	2
Dynamix 1444 Series Modules Common Information	3
Dynamic Measurement Module	5
Tachometer Signal Conditioner Expansion Module	13
Relay Expansion Module	15
Analog Output Expansion Module	17
Terminal Bases	18
Software, Connectors, and Cables	19
Additional Resources	21

The Dynamix™ 1444 series of intelligent I/O modules provides an integrated, distributed solution to monitor the condition of critical machinery. The system can monitor and protect motors, pumps, fans, gearboxes, steam and gas turbines, high-speed compressors, and other machines that rotate or reciprocate.

The Dynamix system can measure dynamic signals such as vibration, strain or pressure, and position measures, such as thrust, differential expansion, or rod position. Measurements are made in real time to protect industrial machinery from possible failure, and then processed to calculate critical fault parameters that are used to assess the current and predicted health of the machines.

Configuration and management of the Dynamix system is accomplished through a Logix controller that is linked via an EtherNet/IP™ network. As part of the Integrated Architecture® system, other components such as controllers, visualization products, other input/output products, and others are easily applied to build a solution to the specific needs of an application.



Summary of Changes

This publication contains the following new or updated information. This list includes substantive updates only and is not intended to reflect all changes.

Topic	Page
Added the CCC and UKCA certifications	3

Dynamix 1444 Series Modules

Common Information

The Dynamix modules monitor the condition of industrial machinery that rotates and reciprocates. Use the modules in combination as is necessary to the application.

Type	Module	Cat. No.	Page
Module	Dynamic measurement (main) module	1444-DYN04-01RA	5
	Tachometer signal conditioner (speed) expansion module	1444-TSCX02-02RB	13
	Relay expansion module	1444-RELX00-04RB	15
	Analog output (4...20 mA) expansion module	1444-AOFX00-04RB	17
Terminal base ⁽¹⁾	Dynamic measurement module terminal base	1444-TB-A	18
	Expansion modules terminal base	1444-TB-B	

(1) To use and install each module and to create a local bus, a terminal base and the corresponding interconnect cable are required. For more information, see [page 18](#).

All Dynamix modules and terminal bases have the following specifications and certifications in common. For specifications specific to each module and terminal base, see the corresponding sections that are listed in the previous table.

Common Technical Specifications - 1444 Series

Attribute	1444-DYN04-01RA, 1444-TSCX02-02RB, 1444-RELX00-04RB, 1444-AOFX00-04RB, 1444-TB-A, 1444-TB-B
Enclosure type rating	None (open-style)
Temperature code	T4
Voltage range, input	North American: 18...32V, max 8 A, Limited Voltage Source ATEX/IECEX: 18...32V, max 8 A, SELV/PELV Source
Conformal Coating	All printed circuit boards are conformally coated in accordance with IPC-A-610C and in compliance with: <ul style="list-style-type: none"> IPC-CC-830 B UL508

Common Environmental Specifications - 1444 Series

Attribute	1444-DYN04-01RA, 1444-TSCX02-02RB, 1444-RELX00-04RB, 1444-AOFX00-04RB, 1444-TB-A, 1444-TB-B
Temperature, operating IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock):	-25...+70 °C (-13...+158 °F)
Temperature, surrounding air, max	70 °C (158 °F)
Temperature, nonoperating IEC 60068-2-1 (Test Ab, Unpackaged nonoperating Cold), IEC 60068-2-2 (Test Bb, Unpackaged nonoperating Dry Heat), IEC 60068-2-14 (Test Na, Unpackaged nonoperating Thermal Shock):	-40...+85 °C (-40...+185 °F)
Relative humidity IEC 60068-2-30 (Test dB, Unpackaged Damp Heat):	5...95% noncondensing
Vibration Per IEC 60068-2-6 (Test Fc, Operating):	2 g @ 10...500 Hz
Shock, operating IEC 60068-2-27 (Test Ea, Unpackaged Shock):	15 g
Shock, nonoperating IEC 60068-2-27 (Test Ea, Unpackaged Shock):	30 g
Emissions	IEC 61000-6-4
ESD immunity IEC 61000-4-2:	6 kV contact discharges 8 kV air discharges

Common Certifications - 1444 Series

Certification ⁽¹⁾	1444-DYN04-01RA, 1444-RELX00-04RB	1444-TSCX02-02RB, 1444-AOFX00-04RB, 1444-TB-A, 1444-TB-B
c-UL-us	UL Listed Industrial Control Equipment, which is certified for US and Canada. See UL File E65584. UL Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations, which are certified for U.S. and Canada. See UL File E194810.	
CE	European Union 2004/108/EC EMC Directive, compliant with: <ul style="list-style-type: none"> EN 61326-1; Meas./Control/Lab, Industrial Requirements EN 61000-6-2; Industrial Immunity EN 61000-6-4; Industrial Emissions EN 61131-2; Programmable Controllers (Clause 8, Zone A & B) 	
RCM	European Union 2006/95/EC LVD, compliant with: EN 61131-2; Programmable Controllers (Clause 11)	
ATEX and UKEX	UK Statutory Instrument 2016 No. 1107 and European Union 2014/34/EU ATEX Directive, compliant with: <ul style="list-style-type: none"> EN IEC 60079-0:2018; General requirements CENELEC EN IEC 60079-7:2015+A1:2018, Explosive Atmospheres, Protection "e" CENELEC EN IEC 60079-15:2019, Potentially Explosive Atmospheres, Protection "n" Ex ec nC IIC T4 Gc DEMKO 14 ATEX 1365X and UL22UKEX2750X 	
IECEX	IECEX systems compliant with: <ul style="list-style-type: none"> IEC 60079-0:2018; General requirements IEC 60079-7:2015+A1:2018, Explosive Atmospheres, Protection "e" IEC 60079-15:2019, Potentially Explosive Atmospheres, Protection "n" Ex ec nC IIC T4 Gc IECEX UL 14.0010X 	
KC	Korean Registration of Broadcasting and Communications Equipment, compliant with: Article 58-2 of the Radio Waves Act, Clause 3	
CCC	CNCA-C23-01 强制性产品认证实施规则 防爆电气 CNCA-C23-01 CCC Implementation Rule Explosion-Proof Electrical Products CCC 2020122309113798	
UKCA	2016 No. 1091 - Electromagnetic Compatibility Regulations 2016 No. 1107 - Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2012 No. 3032 - Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations	

(1) See the Product Certification link at rok.auto/certifications for Declarations of Conformity, Certificates, and other certification details.

API-670 Compliance

The Dynamix system is designed in accordance with the relevant sections of the 5th Edition of the American Petroleum Institutes (API) standard 670,^(a) 'Machinery Protection Systems'.

(a) System compliance is based on the components that are provided, the optional elements of the standard that you require, and the configuration of the installed system.

Removal and Insertion Under Power

All Dynamix modules can be removed and replaced while power is applied to its terminal base^{(a)(b)}.



WARNING:

- If you insert or remove the module while backplane power is on, an electric arc can occur. This arc could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.
 - If you connect or disconnect wiring while the field-side power is on, an electric arc can occur. This arc could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.
-

DIN Rail Requirements

Mount the terminal bases on a 35 x 7.5 mm (1.38 x 0.30 in.) DIN rail according to EN 50022, BS 5584, or DIN 46277-6.

Dynamix modules do not connect a ground to the DIN rail, therefore you can use both uncoated or coated DIN rail.

Controller Independence

While the Dynamix system is dependent on a Logix controller for the initial configuration. If communication with the controller is lost, the system continues to measure signals, evaluate alarm conditions, actuate relays, and send data^(c).

Also, the dynamic measurement module maintains the initial configuration in nonvolatile memory. After any subsequent power cycle, the module loads the configuration from the nonvolatile memory and the functions of the system resume.

(a) If a removed module includes an energized relay, the relay goes to its de-energized state.

(b) If Ethernet is daisy chained, one module to the next, and DLR is not used, removal of a main module causes the loss of Ethernet communication to all 'downstream' main modules.

(c) Only the host controller can change the configuration of a module. Other processors, such as personal computers, DCS computers, or other controllers, can query the module for data.

Dynamic Measurement Module

1444-DYN04-01RA



The dynamic measurement module has four channels and uses general-purpose monitoring. The module is used to protect and monitor the condition of industrial machinery. The module supports measurements of dynamic inputs such as vibration and pressure, and static inputs such as thrust, eccentricity, and rod drop.

The module can be used to monitor these conditions:

- Shaft vibration
- Casing vibration
- Pedestal vibration
- Shaft and rod position
- Casing expansion
- Other critical dynamic and position measurements on machines that rotate or reciprocate

To achieve this amount of adaptability, this module contains flexible firmware and a powerful multi-processor hardware platform.

The dynamic measurement module is designed for integration with Logix 5000® controllers that are connected across an industrial Ethernet network. This design makes the Dynamix system a synergistic member of larger total facility control and information management systems.

Technical Specifications - 1444-DYN04-01RA

Attribute	1444-DYN04-01RA
Channel Inputs (4)	
Sensor types	ICP accelerometers (CCS) Dynamic pressure transducers Dual sensors (acceleration + temperature) Eddy current probe systems (-24V DC) Self-powered sensors Voltage signals
Transducer positive power	Constant current: 4 mA @ 24V Voltage regulated: 24V/25 mA
Transducer negative power	Voltage regulated: -24V/25 mA
Voltage range	± 24V DC
Isolation	Non-isolated, single-ended analog inputs. Sensor signal returns must be isolated from the ground
Impedance	>100 kΩ
Protection	Reverse polarity
Transducer fault detection	Bias level high / low limits Current threshold level monitoring, which is implemented in hardware for -24V supplied sensors. Provides the fastest fault detection possible with excellent reliability.

Technical Specifications - 1444-DYN04-01RA (continued)

Attribute	1444-DYN04-01RA
Analog to Digital Converter	
Conversion	24 bit
Accuracy	±0.1% (typical) See the Dynamix 1444 Series Monitoring System User Manual, publication 1444-UM001 for more information.
Resolution	3 μV (theoretical)
Dynamic range	80 dBfs (0.01% FS), 90 dBfs typical
Sample rate	2 Channels: 93 kS/s 4 Channels: 47 kS/s
Tachometer Inputs (2)	
Terminal inputs	TTL class with internal pull-up resistor (5V DC)
Local bus inputs	Opto-isolated TTL input for signal and TX status
Detection threshold	Fixed (-2.5V DC)
Transducer status	Only local bus inputs
Protection	Reverse polarity
Digital Inputs (2)	
Connection	Terminal pins
Type	TTL class
Power	32V DC, 15 mA max per output
Isolation	Non-isolated
Application	Trip inhibit/bypass Alarm/relay reset Alarm SPM/gate control 0, 1 Tachometer 0, 1 status
Digital Outputs (2)	
Connection	Terminal pins
Type	Opto-isolated open-collector
Power	32V DC, 15 mA max per output
Application	Module status Tachometer 0, 1 TTL Tachometer 0, 1 status Replicate digital input 0, 1 Transducer 0...3 Status Voted alarm 0...12 status
Buffered Outputs (4)	
BNC	For temporary connection to instruments, such as portable data collectors or analysis systems over distances ≤10 m (32 ft). Resistance: 100 Ω Protection: ESD/EFT
Terminal Pins	For permanent connections to instruments or over distances that are 10 m...100 m (32 ft...328 ft). Resistance: 100 Ω Protection: ESD/EFT, Surge
Power	To reduce the power requirement and heat load when not required, you can enable or disable with a local switch. Buffered outputs operating power: ≈0.8 W
Notes	<ul style="list-style-type: none"> • All outputs are single-ended and have no isolation. • Buffered output is not representative of input when no load (sensor) is connected to the associated measurement channel. • Confirm that the connected instrumentation does not provide power, such as if to power an accelerometer, to the buffer output.

Technical Specifications - 1444-DYN04-01RA (continued)

Attribute	1444-DYN04-01RA
Relay (1)	
Contact Arrangement	Single pole double throw (SPDT) change-over contact
Contact Material	Surface Material: Gold Plated
Resistive Load	AC 250V: 8 A DC 24V: 5 A @ 40 °C (104 °F), 2 A @ 70 °C (158 °F)
Inductive Load	AC 250V: 5 A DC 24V: 3 A
Rated Carry Current	8 A
Maximum Rated Voltage	AC 250V DC 24V
Maximum Rated Current	AC 8 A DC 5 A
Maximum Switching Capacity	Resistive Load: AC 2000VA, DC 150 W Inductive Load: AC 1250VA, DC 90 W
Minimum Permissible Load	DC 5V: 10 mA
Maximum Operating Time	15 ms @ rated voltage
Maximum Releasing Time	5 ms @ rated voltage
Mechanical Life	Operations (Minimum): 10,000,000
Electrical Life	Operations (Minimum): 50,000
Indicators	
Status indicators (16)	Power Module status Network status Processor status Processor operating state DSP status DSP operating state Channel status (4) Relay status Ethernet link status (2) Ethernet activity indicator (2)
Real-time Clock	
Synchronization	Clock is synchronized to controller time per IEEE-1588 V2 / CIP Sync (ODVA) standard
Accuracy	Max drift: 100 ms per year
Communication	
Ethernet	Connector (2): RJ45, shielded Speed: 10 MB/100 MB Modes: half/full duplex Operation: auto-switching - auto negotiation - auto mitigation
Communication protocol	ODVA-compliant (conformance tested) EtherNet/IP industrial protocol
Supported connectivity protocols	Single Ethernet (IEEE 802.3) Device Level Ring (ODVA)
IP address	<ul style="list-style-type: none"> Set by hardware switch on the terminal base as 192.168.0.xxx (last octet set by switch), or Set in configuration with DHCP/BOOTP tools
Concurrent access	Controller (owner) and up to 3 (more) sessions

Technical Specifications - 1444-DYN04-01RA (continued)

Attribute	1444-DYN04-01RA
Power	
Connections (2)	Terminal pins
Current	411 mA @ 24V (546...319 mA @ 18...32V)
Consumption	11.5 W
Dissipation	9 W
Redundant power	Two 18...32V DC, max 8 A SELV power supply inputs Higher voltage supply is applied to main and expansion modules
PowerMonitor™	The two power supply voltage levels are monitored. Status is indicated via process operating status indicators and on controller input (I/O).
Isolation voltage	50V (continuous), basic insulation type between Ethernet, power, ground, and AUX bus 50V (continuous), basic insulation type between signal ports, power, ground, and AUX bus 250V (continuous), basic insulation type between relay ports and system No isolation between signal ports and Ethernet ports No isolation between individual signal ports or Ethernet ports Relay ports type tested at 1500V AC for 60 s All other ports type tested at 707V DC for 60 s
Environmental	
EFT/B Immunity IEC 61000-4-4:	±2 kV at 5 kHz on unshielded power ports ±2 kV at 5 kHz on shielded signal ports ±2 kV at 5 kHz on shielded Ethernet ports ±3 kV at 5 kHz on unshielded relay ports
Surge Transient Immunity IEC 61000-4-5:	±1 kV line-line (DM) and ±2 kV line-earth (CM) on unshielded power and relay ports ±2 kV line-earth (CM) on shielded signal ports ±2 kV line-earth (CM) on shielded Ethernet ports
Terminal Base	
Requires terminal base 1444-TB-A	
Removable Plug Connector Sets	
Module	Spring: 1444-DYN-RPC-SPR-01 Screw: 1444-DYN-RPC-SCW-01
Terminal base	Spring: 1444-TBA-RPC-SPR-01 Screw: 1444-TBA-RPC-SCW-01
Dimensions (H x W x D), approx.	
Without terminal base	153.8 x 103.1 x 100.5 mm (6.06 x 4.06 x 3.96 in.)
With terminal base	157.9 x 103.5 x 126.4 mm (6.22 x 4.07 x 4.98 in.)
Weight, approx.	
Without terminal base	400 g (0.88 lb)
With terminal base	592 g (1.31 lb)
Wiring	
Wiring category ⁽¹⁾	2 - on signal ports 2 - on power ports 2 - on communications ports 1 - on relay ports
Wire type	Shielded on signal connections Only Shielded on Ethernet ports Unshielded on power and relay ports

(1) Use this Conductor Category information to plan the conductor routing. See Industrial Automation Wiring and Grounding Guidelines, publication [1770-4.1](#).

For **Specifications** and **Certifications**, see [page 3](#).

Module Personalities

The selected module personality defines the application of the channels and the available sample rates per channel. The module can measure static values such as position from proportional (DC) voltages, but it is designed to make dynamic measurements. Dynamic measurements are typically of vibration but can also be of pressure, strain, or other signals.

Personality	Channels	Description
Real-time	4 channel dynamic (4 kHz) or static	All channels are available. Each channel pair can be defined for either Static (DC) or Dynamic (AC) measurements. Dynamic channels can be configured for an FMAX up to 4578 Hz (274,680 CPM).
	4 channel dynamic (4 kHz), dual path	Measurement is the same as "4 channel dynamic (4 kHz) or static". Inputs are internally connected between channels 0 and 2 and between channels 1 and 3.
	2 channel dynamic (20 kHz), 2 channel static	Channels 0 and 1 can be configured for Dynamic (AC) measurements with an FMAX of up to 20.6 kHz (1,236,000 CPM). Channels 2 and 3 are available for Static (DC) measurements.
	2 channel dynamic (40 kHz)	Channels 0 and 1 (pair) can be configured for Dynamic (AC) measurements with a measurement span of 40 kHz ⁽¹⁾ , or as gSE. Channels 2 and 3 are disabled (off).
Multiplexed	4 channel dynamic (40 kHz) or static	Channels can be configured in pairs (0 and 1, 2 and 3) for Dynamic (AC) measurements with a measurement FMAX of 40 kHz ⁽¹⁾ , as gSE, as Static (DC) measurements, or off.

(1) The 40 kHz personality provides high frequency overall and gSE measurements. The maximum possible FFT FMAX available from a 40 kHz personality is 2747 Hz (164.8 CPM).

Supported Engineering Units

Signal Type	Engineering Units
Acceleration	m/s ² , inch/s ² , g, mm/s ² , mg, RPM/min
Velocity	m/s, inch/s, mm/s
Displacement	m, mm, micron, inch, mil
Spike energy	gSE
Temperature	°K, °C, °F
Voltage	V, mV
Current	A, mA
Power	W, kW, MW, VA, kVA, VAR, kVAR,
Pressure	Pa, kPa, MPa, bar, mbar, psi
Frequency	Hz, CPM, RPM
Flow	l/min, cgm, US g/min, m3/min
Other	EU

Measurement Data Sources

Meas. Source	Description
ADC out	Signal out of the ADC
Mid filter	Before high pass filter and integration
Post filter	After high pass filter and integration
Alternate path	Alternate signal path

Signal Conditioning

The signal source (input) to dynamic measurements is selectable from up to four points in the signal processing path. Signal sources include the output of the analog to digital converter, before and after the high pass filter within the 'primary' signal processing path, and from the output of an entirely independent 'alternate' signal processing path.

Attribute	Description
Maximum frequency	4 Ch. protection: 4 kHz 2 Ch. protection: 20.6 kHz Surveillance: 40 kHz (OA only)
Low pass filter	-3 dB corner 10 Hz to 40 kHz -24, -60 dB/octave
Signal detection	Peak to peak Peak RMS Calculated peak to peak Calculated peak

Primary Path Signal Conditioning

Sample mode	Asynchronous
Bandwidth FMAX	35 Hz...20.6 kHz
High pass filter	-3 dB corner: 0.1 Hz to 1 kHz -24, -60 dB/octave
Integration	None, single or double

Alternate Path Signal Conditioning

Sample mode	Asynchronous Synchronous
Asynchronous mode FMAX	30 Hz...4578 Hz
Synchronous mode	Tachometer source: 0, 1 Samples per rev: 8...128 Orders: 2.0...31.3

Special Dynamic Signal Conditioning

Absolute shaft	Per channel pair Ch-0/2: displacement Ch-1/3: acceleration or velocity Relative mounting: 0°, 180°
gSE	2 gSE channels max Only 2-channel protection or surveillance modes Overall, only TWF/FFT HPF: 200, 500 Hz, 1, 2, 5 kHz FFT FMAX: 100 Hz...5 kHz

Real-time Measurements

Real-time measurements are made on the Primary Path signal-source data stream. How quickly these measurements update is dependent on the selected module personality.

Attribute (#)	Description	
Personality	Real-time Update Rate: 40 ms	
Overall (8)	Number per channel: 2	
	Signal detection	
	Data source: OA 0: post filter (fixed) OA 1: ADC out/mid filter (selectable)	
	Time constant	
Tracking filters (16)	Number per channel: 4	
	Data source: ADC out	
	Roll Off: -48 dB/octave	
	Per channel	<ul style="list-style-type: none"> Signal detection Integration: none, single, double Revolutions (resolution)
	Per filter	<ul style="list-style-type: none"> Enable Speed reference: 0 or 1 Order: 0.25...32x
	Measure	<ul style="list-style-type: none"> Magnitude Phase (integer orders)
SMAX (2)	Per channel pair	
Not 1x (4)	Number per channel: 1	
Bias/gap (4)	Number per channel: 1	
Shaft absolute (2)	Per channel pair	
gSE overall (2)	Number per channel: 1	

Static (DC) Measurements

The module supports common DC and rod drop measurements. When specified, these measurements are also real-time measures.

Measurement	Attribute	Description
DC	Measurement type	Proportional voltage
		Eccentricity
		Position
Rod drop	Trigger source	Speed reference: 0 or 1

Continuous Measurements

Continuous measurement types include the fast Fourier transform (FFT) band measurements, and the time waveform (TWF) and FFT measurements. Each complex measurement type has its own data source and TWF/FFT attribute definitions.

TWF measurements can be updated rapidly because they are captured with 'maximum overlap'. However, as these measures are second in priority to any defined real-time measurements, how fast they update is dependent on the configuration.

FFT Band Measurements

This continuous data measurement is applied uniquely to the FFT band measurements. As the band values are the only use of these complex measurements, the source TWF/FFT measurements are not otherwise available.

Attribute (#)	Description
Personality	Data source Update Rate: Selectable
	Real-time Update Rate: 100 ms (typical)
FFT (4)	Number of lines: 600, 1000, 1800 Averaging: exponential Number of averages ⁽¹⁾ : 1, 2, 3, 6, 12, 23, 45, 89 or 178 Windows: none, flat top, Hamming, Hann
FFT bands (32)	Number per channel: 8 Measurement: OA, max peak amp, max peak Hz Domain: Hz, orders Order domain speed ref: 0, 1

(1) If the Time Waveform data source is Alternate Path, and the Alternate Path processing mode is Synchronous, averaging is performed in the time domain.

FFT and TWF Measurements

This continuous data measurement is applied to the TWF and FFT values that are written to the alarm, trend (trend and alarm capture), and dynamic measurement buffers. These measurements are also the TWF and FFT values that are sent to a remote host when the 'live' complex measurements are requested.

Attribute (#)	Description
Data format	32-bit float
Time waveform (4)	Number per channel: 1 Block size: 256...8,192 Overlap: continuous maximum overlap Data source: selectable
FFT (4)	Number of lines: 75...1,800 Averaging: exponential Number of averages: 1, 2, 3, 6, 12, 23, 45, 89 or 178 Windows: none, flat top, Hamming, Hann
gSE FFT (2)	Number per channel: 1 Number of lines: 100...1,600 Averaging: exponential Number of averages: 1, 2, 3, 6, 12, 23, 45, 89 or 178

Demand Measurements

Demand measurements are unscheduled data requests from the controller or computers. This data is typically measured from another source, at another resolution, or with another Fmax from the continuous measures.

Demand data is executed as a background process as time is available, because the real-time and continuous measurements must meet the minimum required update rates for protection applications. Therefore, how fast demand data can be serviced is dependent on module configuration and the modules activity when the request is made.

Attribute	Update Rate
Personality	Real-time Update Rate: 500 ms (typical)
	Multiplexed Update Rate: Configuration dependent
	Data source Update Rate: Selectable - post filter, mid filter, alternate path
Time waveform	Block size: 256...65,536 Sample rate: ≤Fmax
FFT	FMAX ^{SP} : Fmax for the signal path of the selected data source FFT Lines: 75...14400

Speed Measurements

The dynamic measurement module includes two speed inputs. The speed time to live (TTL) signal and other speed values are passed to the module on the Input Table.

The speed values are applied to measurements, not channels. Signal measurements that are applied to any channel can be processed by using speed values.^(a)

Attribute (#)	Description
Speed (2)	Number per module: 2 Source: Selectable per speed Local bus: TTL, Transducer status Terminal pins: TTL Input table: RPM, Transducer status Accuracy: ± 3° of speed input for 1/rev up to 20 kHz when configured with a 4 kHz Module personality. High frequency configurations can reduce speed measurement accuracy and responsiveness.
Speed maximum ⁽¹⁾ (2)	Number per speed measurement: 1 Reset: Via controller I/O
Speed acceleration (2)	Number per speed measurement: 1 Units: RPM/min Update rate: 1/second
Mode	Normal - Two independent speeds Redundant - Speed 0 = Speed 1 when tach 0 in fault

(1) Speed maximum is the maximum speed since reset.

(a) Phase measurements are only valid when the speed is from a TTL source.

Alarms and Relays

The module offers two types of alarms, measurement and voted alarms. Relays are associated with voted alarms.

Measurement Alarms

Measurement alarms provide for the customary threshold limits that are applied to selected measurements.

Alarm threshold limits can be entered into the configuration, normal mode, or can be read from Controller I/O, profile mode. 'Normal' mode permits the usual static limits. Profile mode lets the controller determine and send to the module the limit for any given machine state, such as an instance of an alarm 'profile' to be applied during a process cycle.

Attribute	Description
Number	24
Input parameter	Any real-time or discrete continuous measurement
Alarm form	<ul style="list-style-type: none"> Over/under threshold Inside/outside window
Deadband	0...20% of limit
Transducer state consideration	<ul style="list-style-type: none"> OK required Not OK forces an alarm OK status is not considered
Processing mode	<ul style="list-style-type: none"> Normal - Static limits that are applied Profile - Limits that are read from controller I/O
Delay times	0.10...60.0 s Separate delay times for alert and danger alarms
Sustain time	1.0 s (fixed)
Setpoint multiplier	Range: 0.1...100x Multiply the threshold limits by this value when invoked. The multiplier can be: <ul style="list-style-type: none"> Static - Enabled by controller I/O or manual switch Adaptive - Up to 5 multipliers that are defined for ranges of any third parameter (typically speed)

Voted Alarms

Voted alarms provide a voted logic solution that is based on the status of up to four measurement alarms.

Attribute	Description
Number	13
Input condition	<ul style="list-style-type: none"> Alert Danger Transducer fault
Latching	<ul style="list-style-type: none"> Non-latching - resets when condition clears Latching - after condition clears, resets upon command via controller I/O
Fail-safe	If assigned to a relay, when in alarm the relay coil is de-energized
Alarm logic	1001, 1002, 2002, 1003, 2003, 3003, 1004, 2004, 3004, 4004, 1002 AND 1002, 2002 OR 2002, 1002 AND 2002, 2002 AND 1002
Logic inputs	1..4 measurement alarms
SPM timer	Number of seconds the SPM is applied after the SPM signal is reset. 0..65.5 s in 0.1 s increments
SPM control source	Controller I/O SPM control bit 0 or 1/digital input 0 or 1
Speed gating control	Speed reference: 0, 1 Condition: >, <, <=>, >< Speed limits: low, high
I/O gating control	<ul style="list-style-type: none"> Alarm is evaluated when the gate condition is true Control on either of two controller output (I/O) bits Control on either of two digital inputs (hardware)
I/O Logic control	<ul style="list-style-type: none"> Alarm actuates when the logic control is set Control on either of two controller output (I/O) bits Control on either of two digital inputs (hardware)

Relays

Relays are enabled and mapped to a voted alarm and selected faults. All logic that is associated with relay actuation on alarm is included in the voted alarm definition.^(a) Logic that is associated with relay activation on a fault is local to the relay.

Attribute	Description
Number	13
Enable	Enable the relay to assign it to a voted alarm
Voted alarm	Assign to any enabled voted alarm (0..12)
Faults	Main module fault Main module tachometer fault Expansion module fault Ethernet network fault Expansion bus fault <ul style="list-style-type: none"> If associated with a voted alarm that is configured fail-safe, a main module fault is required Latching/non-latching

Event Management

The Dynamix system manages events as follows:

- Optimizes behavior
- Uses alarm gating or adaptive limit multipliers
- Provides tools for recording the occurrence of events and data from an event

Event Log

The dynamic measurement module includes a rolling event log (first-in, first-out), which is saved in the nonvolatile memory and is in compliance with API-670.

Attribute	Description
Event types	<ul style="list-style-type: none"> System Alarm Buffer
Conditions	35 logged conditions Categorized by event type
Number of entries	1500 total records 256 records per event type
Time stamp resolution	0.1 ms

(a) Expansion module relays can also be configured to act on fault (page 19).

Trend and Alarm Capture

Comprised of static and dynamic data, the trend feature provides a source for real-time, recent history, and high-density data without the need for continuous updates to an external data historian.

The alarm feature captures data immediately before and after an alarm or receipt of a trigger from the controller signals an event. The alarm feature includes a copy of the static and dynamic data from the trend capture. The static and dynamic data includes samples from after the trigger, plus a second set of static data that was captured at the maximum rate.

Attribute	Description
Type of data captured	Static data Dynamic data
Recorded content	Discrete data: Any number of measurements Dynamic data: TWF and FFT per channel
Trend Capture	
Static data	Number of records: 640 Sample rate: N x 100 ms
Dynamic data	Number of records: 64 Sample rate ⁽¹⁾ : N x 100 ms
Alarm Buffer	
Trigger source	<ul style="list-style-type: none"> Controller output (I/O) control bit Any voted alarm (alert condition) Any voted alarm (danger) Any voted alarm (TX Fault)
Saved trend buffer	640 static records 64 dynamic records Includes N% records sampled post trigger
High-resolution samples	320 static records Sampled rate: 100 ms

(1) How fast dynamic data is written to Trend and Alarm buffers is dependent on the total module configuration. While a 1 second rate is possible, a 100 millisecond is not.

Transient Capture

Comprised of static and dynamic data, the transient feature captures critical data necessary to diagnose machine condition during its run up (start) and run down (stop) events. The transient feature is designed to verify this capture regardless of whether; the event is scheduled or occurs unexpectedly, is a long or short duration event, or if the acceleration or deceleration of the machine is fast, slow, or varied.

Attribute	Description
Buffers	<ul style="list-style-type: none"> 4 buffers, each contains: 640 discrete records, 64 dynamic records Discrete records: User defined, any discrete measures (OA, TX magnitude, 1x phase, and so on) from any or all channels Dynamic records: TWF and FFT as defined for complex measurements. Complex data that is saved to transient buffers is limited to a maximum 2048 TWF samples and 900 FFT lines Buffer type (assigned per buffer): Startup, Coastdown
Overflow	When enabled, allows buffers of up to 2560 discrete and 256 dynamic records
Definition	<ul style="list-style-type: none"> Speed Source: 0.1 Transient minimum Transient maximum speed Startup - speed increases from under to over the maximum speed Coastdown - speed decreases from over to under the maximum speed
Sample Intervals	<ul style="list-style-type: none"> At delta RPM (off or 1...1000 RPM) At delta time (off or ≥ 1 second) Post startup time Dynamic records are captured every tenth trigger
Latching	When enabled, a buffer latches once it has been filled, so it has no remaining empty records A latched buffer is not available for update until it is reset

Time Synchronization

Use CIP Sync™ technology to implement time synchronization on EtherNet/IP. CIP Sync technology is based on and fully compliant with the IEEE-1588 Standard Version 2 for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems. With CIP Sync technology, you can achieve synchronization between the Dynamix modules and networked controllers down to 100 nanoseconds.

Supported Network Topologies

When a more fault-tolerant topology is required, the Dynamix system offers two alternatives to the applied network solution. These alternatives include the single-wire Ethernet network and the Device Level Ring network.

Single-wire Ethernet

By using single-wire Ethernet, as defined by IEEE 802.3, modules are connected in series on a common network. In this architecture, typically, the network is routed through adjacent modules by using one RJ45 connector as its input and the second connector as an output.

Device Level Ring

Device Level Ring (DLR) is a network topology that lets devices be connected in series, one-to-the-next, and back to the beginning, which forms a ring. Ring topologies offer a far simpler fault-tolerant network design that requires less cabling and can be installed at lower cost, while still providing a resilient, responsive solution.

Unlike typical ring solutions, DLR is deployed at the end devices, instead of the switches. So, a DLR-enabled device can connect directly to nodes that neighbor each other. A ring topology at the device level greatly reduces the number of wires on the network, and the number of needed industrial Ethernet switches.

Fault Management

If a fault is detected, a dynamic measurement module provides an indication via the status indicators, and communicates the status via the controller I/O data. Also, you can configure the onboard relay to activate if a fault is detected.

Attribute	Description	
Expansion bus link timeout	100 ms (fixed)	
Fault actions	Indicated by	Status indicators
	Controller I/O	Status bits on controller input table
	Relay action	Select fault on any ⁽¹⁾ : <ul style="list-style-type: none"> Module⁽²⁾ Expansion module Ethernet Expansion bus Latching/non-latching on fault

(1) If a fault action is not defined for the relay, and the voted alarm that is associated with the relay is not configured fail-safe, the relay is held in its current position until the fault condition clears.

(2) Activates on a module fault if the associated voted alarm is configured as fail-safe.

Controller I/O Data

The dynamic measurement module provides data from its controller input and output assemblies.

Input and Output Assemblies

The content of the assemblies is configurable, in the module definition.

At a minimum, the input assembly consists of a fixed record of status information. Also, the input assembly can contain any number of measured values. These values include [Real-time Measurements](#), [Static \(DC\) Measurements](#), and [Continuous Measurements](#).

The output assembly includes various control bits, and speed values and alarm limits, when specified.

Assembly	Control Bits	Data
Input	Auxiliary processor Trend alarm Alarm status Relay status DSP processor Transducer Channel setup Expansion module	-
Output	Trip inhibit Setpoint multiplier enable Alarm reset Alarm buffer trigger Alarm buffer reset Alarm gate control	Speed (2) Alarm limits (16)

Tachometer Signal Conditioner Expansion Module

1444-TSCX02-02RB



The tachometer signal conditioner expansion module is a two-channel monitor that converts the signal from speed sensors into a once-per-revolution TTL signal suitable for use by the dynamic measurement module.

The dynamic measurement module acts as a host to the expansion modules. It provides power and manages configuration.

Specifications - 1444-TSCX02-02RB

Attribute	1444-TSCX02-02RB
Channel Inputs (2)	
Sensor types	Voltage signals Eddy current probe systems TTL NPN proximity switch PNP proximity switch Self-generating magnetic sensors
Transducer positive power	Voltage regulated: 24V/25 mA
Transducer negative power	Voltage regulated: -24V/25 mA
Voltage range	± 24V
Isolation	Non-isolated, single-ended analog inputs. Connected sensors have their signal return isolated from the ground
Impedance	>100 kΩ
Protection	Reverse polarity
Analog to digital converter	10 bits
BNC Connectors (2)	
Function	Raw signal output
Distance	Limited to wire lengths of 3 m (9.84 ft)
Impedance	680 Ω output impedance 1.5k Ω return resistance for ESD protection of direct discharges to BNC connector shell
EMC	ESD/EFT
Protection	Short circuit protected
Drive Current	±4 mA
Noise	Due to the 1.5k Ω return resistor, negligible noise can be added
Terminal Pin Connectors (4)	
Function	Conditioned I/REV and N/REV signal output
Distance	Wire lengths up to 30 m (98.43 ft)
Impedance	100 Ω
EMC	ESD/EFT/Conducted Immunity
Protection	Short circuit protected
Drive Current	5 mA per output

Specifications - 1444-TSCX02-02RB (continued)

Attribute	1444-TSCX02-02RB
Local Bus Outputs (2)	
Connection	Integral, via ribbon connector
Type	Opto-isolated open-collector
Signal	TTL speed (once-per-rev) Tach channel status
Capacity	Can serve six dynamic measurement modules (minimum)
Power	5V DC, 5 mA max per output
Indicators	
Status indicators (4)	Power Channel status (2) Local bus status
Power	
Current	128 mA, 24V (174...104 mA, 18...32V)
Consumption	4 W
Dissipation	3 W
Isolation	50V (continuous), basic insulation type between signal ports and AUX bus. No isolation between individual signal ports. Type Tested at 707V DC for 60 s.
Environmental	
EFT/B immunity IEC 61000-4-4:	±2 kV at 5 kHz on shielded signal ports
Surge transient immunity IEC 61000-4-5:	±2 kV line-earth (CM) on shielded signal ports
Terminal Base	
Requires terminal base 1444-TB-B	
Removable Plug Connector Sets	
Module	Spring: 1444-TSC-RPC-SPR-01 Screw: 1444-TSC-RPC-SCW-01
Terminal base	Spring: 1444-TBB-RPC-SPR-01 Screw: 1444-TBB-RPC-SCW-01
Dimensions (H x W x D), approx.	
Without terminal base	153.8 x 54.2 x 74.5 mm (6.06 x 2.13 x 2.93 in.)
With terminal base	157.9 x 54.7 x 100.4 mm (6.22 x 2.15 x 3.95 in.)
Weight, approx.	
Without terminal base	160 kg (0.35 lb)
With terminal base	270 g (0.60 lb)

For **Specifications** and **Certifications**, see [page 3](#).

Host Module Dependence

The tachometer signal conditioner expansion module can send speed signals to dynamic measurement modules that are not the host. So, except for configuration services, the tachometer signal conditioner expansion module operates independently of its host module, unlike the other expansion modules. Therefore, after it is configured, the tachometer signal conditioner module continuously sends TTL speed signals regardless of the state or availability of its host module or local bus.

Fault Management

If a self-test or a communication link fails, the tachometer signal conditioner expansion module notifies its host module, if possible, and indicates the condition via the status indicators.

Attribute		Description	
Trigger	Eddy Current Probes	Auto Threshold ⁽¹⁾	Minimum signal amplitude: 1.5 volts, peak to peak Minimum freq: 6 CPM (0.1 Hz) Minimum pulse width: 25 μ s
		Manual Threshold	Level: -32...+32V Minimum freq: 1 cPM (0.017 Hz)
	Self-generating Magnetic Pickups	Auto Threshold ⁽¹⁾	Threshold: 0.4V Hysteresis: 0.8V Minimum freq: 12 CPM (0.2 Hz)
		Manual Threshold	Level: -32...+32V Minimum freq: 1 CPM (0.017 Hz)
	TTL, NPN, and PNP proximity switch	Auto Threshold	Fixed trigger level dependent on sensor type
		Manual Threshold	Not available
Accuracy		$\pm 3^\circ$ of speed input for 1/rev up to 20 kHz	
Error		0.0167...4 Hz: ± 0.0033 Hz 4...200 Hz: ± 0.033 Hz 200...340 Hz: ± 0.083 Hz 340...2000 Hz: ± 0.333 Hz 2000...6000 Hz: ± 1.0 Hz 6000...20,000 Hz: ± 2.67 Hz	
Error		1...240 RPM: ± 0.2 RPM 240...12k RPM: ± 2.0 RPM 12k...20.4k RPM: ± 5.0 RPM 20.4k...120k RPM: ± 20 RPM 120k...360k RPM: ± 60 RPM 360k...1,200k RPM: ± 160 RPM	
Fault Detection		Communication link timeout: 1 second (fixed)	
Fault Action		Update the module status indicator	

(1) Auto Threshold requires the 1444-TSCX02-02RB/B (series B) hardware.

Relay Expansion Module

1444-RELX00-04RB



The relay expansion module adds four relays to a host module.

The dynamic measurement module acts as a host to the expansion modules. It provides power and manages configuration.

Specifications - 1444-RELX00-04RB

Attribute	1444-RELX00-04RB
Relay (4)	
Contact Arrangement	Single pole double throw (SPDT) change-over contact
Contact Material	Surface Material: Gold Plated
Resistive Load	AC 250V: 8 A DC 24V: 5 A @ 40 °C (104 °F), 2 A @ 70 °C (158 °F)
Inductive Load	AC 250V: 5 A DC 24V: 3 A
Rated Carry Current	8 A
Maximum Rated Voltage	AC 250V DC 24V
Maximum Rated Current	AC 8 A DC 5 A
Maximum Switching Capacity	Resistive Load: AC 2000VA, DC 150 W Inductive Load: AC 1250VA, DC 90 W
Minimum Permissible Load	DC 5V: 10 mA
Maximum Operating Time	15 ms @ rated voltage
Maximum Releasing Time	5 ms @ rated voltage
Mechanical Life	Operations (Minimum): 10,000,000
Electrical Life	Operations (Minimum): 50,000
Contact Arrangement	Single pole double throw (SPDT) change-over contact
Contact Material	Surface Material: Gold Plated

Specifications - 1444-RELX00-04RB (continued)

Attribute	1444-RELX00-04RB
Indicators	
Status indicators (6)	Power Relay status (4) Local bus status
Power	
Current	56 mA @ 24V (73...48 mA @ 18...32V)
Consumption	1.6 W
Dissipation	2.3 W
Isolation voltage	250V (continuous), basic insulation type between relay ports and system Type tested at 1500V AC for 60 s
Environmental	
EFT/B immunity IEC 61000-4-4:	±3 kV at 5 kHz on unshielded relay ports
Surge transient immunity IEC 61000-4-5:	±1 kV line-line (DM) and ±2 kV line-earth (CM) on unshielded relay ports
Terminal Base	
Requires terminal base 1444-TB-B	
Removable Plug Connector Sets	
Module	Spring: 1444-REL-RPC-SPR-01 Screw: 1444-REL-RPC-SCW-01
Terminal base	Spring: 1444-TBB-RPC-SPR-01 Screw: 1444-TBB-RPC-SCW-01
Dimensions (H x W x D), approx.	
Without terminal base	153.8 x 54.2 x 74.5 mm (6.06 x 2.13 x 2.93 in.)
With terminal base	157.9 x 54.7 x 100.4 mm (6.22 x 2.15 x 3.95 in.)
Weight, approx.	
Without terminal base	180 g (0.40 lb)
With terminal base	290 g (0.64 lb)
Wiring	
Wiring category ⁽¹⁾⁽²⁾	1 - on relay ports
Wire type	Unshielded on relay ports

- (1) Use this Conductor Category information to plan the conductor routing. See Industrial Automation Wiring and Grounding Guidelines, publication [1770-4.1](#).
- (2) Use this Conductor Category information to plan conductor routing as described in the appropriate System Level Installation Manual.

For **Specifications and Certifications**, see [page 3](#).

Host Module Dependence

The relay expansion module is designed to act as an extension of its host module. Use of the relay expansion module is dependent on the availability of its host.

The host module and the relay expansion module use handshake communication to verify communication and operation of each module. Failure of this communication causes a Link Failure condition on the relay module and a Module Fault on the host module.

Double-pole Relays

When API-670 compliance or other applications require the use of double pole double throw (DPDT) relays, you can pair two relays.

Fault Management

If a relay expansion module fails self-tests (module fault) or detects a Link Failure, it activates all relays that are configured as fail-safe in the referenced voted alarm definition, and all relays that are configured to activate on the expansion bus fault.

Upon re-establishing communication to a relay module, a host module verifies the position of all relays, and commands each to be repositioned based on current alarm status and latching definition.

For information on fault management in the dynamic measurement module, see [page 11](#).

Analog Output Expansion Module

1444-AOFX00-04RB



The analog output expansion module is a four-channel module that outputs 4...20 mA analog signals that are proportional to the measured values from the host module.

The dynamic measurement module acts as a host to the expansion modules. It provides power and manages configuration.

Specifications - 1444-AOFX00-04RB

Attribute	1444-AOFX00-04RB
Channels (4)	
Current output	20 mA max per output
Protection	Insensitive to polarity
Accuracy	1% full-scale
Not OK output	Configurable: force low (2.9 mA), force high (>20 mA), hold current level
Indicators	
Status indicators (6)	Power Channel status (4) Local bus status
Power	
Current	18 mA @ 24V (22...8 mA @ 18...32V)
Consumption	0.76 W
Dissipation	3.6 W
Isolation voltage	50V (continuous), basic insulation type between signal ports and AUX bus. No isolation between individual signal ports. Type tested at 707V DC for 60 s
Environmental	
EFT/B immunity IEC 61000-4-4	±2 kV at 5 kHz on shielded signal ports
Surge transient immunity IEC 61000-4-5	±2 kV line-earth (CM) on shielded signal ports
Terminal Base	
Requires terminal base 1444-TB-B	
Removable Plug Connector Sets	
Module	Spring: 1444-AOF-RPC-SPR-01 Screw: 1444-AOF-RPC-SCW-01
Terminal base	Spring: 1444-TBB-RPC-SPR-01 Screw: 1444-TBB-RPC-SCW-01

Specifications - 1444-AOFX00-04RB (continued)

Attribute	1444-AOFX00-04RB
Dimensions (H x W x D), approx.	
Without terminal base	153.8 x 54.2 x 74.5 mm (6.06 x 2.13 x 2.93 in.)
With terminal base	157.9 x 54.7 x 100.4 mm (6.12 x 2.15 x 3.95 in.)
Weight, approx.	
Without terminal base	140 g (0.31 lb)
With terminal base	250 g (0.55 lb)
Wiring	
Wiring category ⁽¹⁾⁽²⁾	2 - on signal ports
Wire type	Shielded on all signal ports

- (1) Use this Conductor Category information to plan conductor routing. See Industrial Automation Wiring and Grounding Guidelines, publication [1770-4.1](#).
- (2) Use this Conductor Category information to plan conductor routing as described in the appropriate System Level Installation Manual

For **Specifications** and **Certifications**, see [page 3](#).

Host Module Dependence

The analog output expansion module is designed to act as an extension of its host module. Therefore, operation of the 1444-AOFX00-04RB module is dependent on the availability of its host.

Fault Management

On failure of self-test or on communication link failure, if possible, the 4...20 mA Output module notifies its host module, signals the condition via status indicators and drives its outputs as specified by configuration.

Attribute	Description	
Communication timeout	1 second (fixed)	
Fault Actions	Indication	Update the module status indicator
	Output behavior on fault options	<ul style="list-style-type: none"> No action Force low (<4 mA) Force high (>20 mA)

Terminal Bases

Each Dynamix module is installed in a terminal base that, when linked together, serve as the backplane of a Dynamix system.

Terminal Base	Cat. No.	Use With These Modules
Dynamic measurement module terminal base	1444-TB-A	1444-DYN04-01RA
Expansion modules terminal base	1444-TB-B	1444-TSCX02-02RB, 1444-RELX00-04RB, 1444-AOFX00-04RB

Specifications - 1444 Terminal Bases

Attribute	1444-TB-A	1444-TB-B
DIN rail	35 x 7.5 mm (1.38 x 0.30 in.) according to EN 50022, BS 5584, or DIN 46277-6	
Voltage range, input	North American: 18...32V, max 8 A, Limited Voltage Source ATEX/IECEx: 18...32V, max 8 A, SELV/PELV Source	
Voltage range, auxiliary bus	18...32V, 1 A max	
Dimensions (H x W x D) ⁽¹⁾ , approx.	157.9 x 103.5 x 35.7 mm (6.22 x 4.07 x 1.41 in.)	157.9 x 54.7 x 35.7 mm (6.22 x 2.15 x 1.41 in.)
Weight, approx. ⁽¹⁾	192 g (0.42 lb)	110 g (0.24 lb)
Removable Plug Connector Sets	Spring clamp: 1444-TBA-RPC-SPR-01 Screw clamp: 1444-TBA-RPC-SCW-01	

(1) Dimensions and weight include the terminal base only.

For **Specifications** and **Certifications**, see [page 3](#).

Besides providing connections for common or 'dirty' wiring, the terminal bases provide two key capabilities for the system.

Addressing

Set the MAC ID with DHCP/BOOTP tools, or via the switch on the terminal base. The terminal base switch provides a portable, physical relationship that makes sure that installed modules are set to the address on the base rather than an address that is stored in the memory of the module.

The expansion module terminal base, 1444-TB-B, also includes an address switch. This switch is only used when a relay module is installed. Addresses for the tachometer signal conditioner expansion module and the analog output expansion module are set automatically so they do not use the switch.

For more information on how to set the switches, see the Dynamix 1444 Series Monitoring System Product Information, publication [1444-PC001](#).

Local Bus

The Dynamix modules include a power and communication bus that, like a backplane of a rack-based system, connects a series of modules. The terminal bases include the circuitry and connectors necessary to extend the local bus. A local bus is created with interconnect ribbon cables that connect one module to the next. ^(a)

Attribute	Description
Power	<ul style="list-style-type: none"> Passes power from each host module to its expansion modules. Power is not passed between two main modules. When redundant power supplies are connected to a host module, only the voted power source is distributed to its expansion modules.
TTL signals	<ul style="list-style-type: none"> Dual independent TTL signals, with tachometer sensor status, are passed on the Local Bus There can be only one tachometer expansion module on a local bus The TTL signal can serve up to six main modules
Communication	<ul style="list-style-type: none"> A digital network that is used between a main module and its expansion modules is implemented on the local bus Communication does not link main modules

The local bus is not interrupted when a module is removed. Removal or failure of any module does not affect tachometer signals, power, or local bus communication.

Interconnect Cables

Each terminal base ships with a cable that is the exact length necessary to connect two adjacent modules. Standard length replacement cables are available.

Extender interconnect cables make it possible to extend the local bus between terminal bases on different DIN rails, or in different areas of a cabinet. Extender interconnect cables are rated to 300V and from -40...+105 °C (-40...+221 °F).

Interconnect Cable	Cat. No.
Local Bus Replacement Cable, qty 4	1444-LBIC-04
Local Bus Extender Cable, 30 cm (11.81 in)	1444-LBXC-0M3-01
Local Bus Extender Cable, 1 m (3.28 ft)	1444-LBXC-1M0-01

(a) A dynamic measurement module must be installed to the left of all expansion modules that it manages. Do not connect the RIGHT sides of two dynamic measurement modules directly or through one or more expansion modules.

Software, Connectors, and Cables

Use the following software, connectors, and cables with the Dynamix modules.

Configuration Software

The Rockwell Automation Logix controllers send configuration information to the Dynamix modules. After a powerup, or whenever a configuration is changed, the controller automatically pushes the configuration to the module.

As a part of an Integrated Architecture system, and with the use of a Studio 5000® Add-on Profile, the Dynamix system configuration tools and processes are consistent with all other products in the Studio 5000 Automation Engineering & Design Environment®.

The Dynamix system is supported in Studio 5000 V24 and later and in some versions of V20 (contact Rockwell Automation for compatible versions). Controller firmware V24.51 and later is required for redundancy.

Controller Memory Requirements

Module Number	kB, Approx
1	50
2...N	15 ea

Condition Monitoring Software

Support for the Dynamix system is included in the Emonitor® Condition Monitoring Software (CMS) from Rockwell Automation.

Catalog Number	Description
9309-CMS00ENE	Emonitor CMS

CMS supports the Dynamix system through a suite of three utilities.

Utility	Description
Real Time Analyzer (RTA)	A freely deployed application that provides real-time visualization and analysis of TWF and FFT data read from any dynamic measurement module. The RTA is intended to aid system installation and configuration, and to provide a simple tool to view current live data from any module, from anywhere, whenever required. The RTA does not require Emonitor software to be installed on the personal computer, is not licensed separately, and requires only RSLinx® Lite to access network devices.
Emonitor Extraction Manager (EEM)	A simple environment that maps data from Dynamix modules to an Emonitor database, and defines schedules for routine data acquisition. The output of the EEM is the input to the DDM.
Data Download Manager (DDM)	A utility that runs as a Windows® Service, which executes data acquisition from any number of Dynamix modules following any number of schedules as defined by the EEM. Once sampled, the DDM writes the data to standard Emonitor Unload Files.

Removable Plug Connectors

Use removable plug connectors to wire the Dynamix modules. The connectors are available with either spring or screw-type clamps. They are not shipped with the module, and must be ordered separately.

Module/Terminal Base	Spring Connector Cat. No.	Screw Connector Cat. No.
1444-DYN04-01RA	1444-DYN-RPC-SPR-01	1444-DYN-RPC-SCW-01
1444-TSCX02-02RB	1444-TSC-RPC-SPR-01	1444-TSC-RPC-SCW-01
1444-RELX00-04RB	1444-REL-RPC-SPR-01	1444-REL-RPC-SCW-01
1444-AOFX00-04RB	1444-AOF-RPC-SPR-01	1444-AOF-RPC-SCW-01
1444-TB-A	1444-TBA-RPC-SPR-01	1444-TBA-RPC-SCW-01
1444-TB-B	1444-TBB-RPC-SPR-01	1444-TBB-RPC-SCW-01

Wire Requirements

Attribute	Value		
Conductor wire type	Copper		
Conductor/insulation temperature rating, min	85 °C (185 °F)		
Operating temperature, max	Screw connector	115 °C (239 °F)	
	Spring connector	105 °C (221 °F)	
Torque (screw connector only)	0.22...0.25 Nm (2...2.2 lb•in)		
Insulation-stripping length	9 mm (0.35 in.)		
Conductor wire size	Solid or stranded	0.14...1.5 mm ² (26...16 AWG)	
	Stranded with ferrule without plastic sleeve	0.25...1.5 mm ² (24...16 AWG)	
	Stranded with ferrule with plastic sleeve	0.25...0.5 mm ² (24...20 AWG)	
	mm ² /AWG	Screw connector	0.08...1.5 mm ² (28...16 AWG)
		Spring connector	0.14...1.5 mm ² (26...16 AWG)
	UL/cUL mm ² /AWG	Screw connector	0.05...1.5 mm ² (30...16 AWG)
Spring connector		0.08...1.5 mm ² (28...16 AWG)	

Interconnect Cables

For information about the interconnect cables that connect terminal bases, see [page 18](#).

Ethernet Cable

The Dynamix system is designed to operate in harsh industrial environments and possibly near electrically noisy or high-voltage devices and wiring.

When a Dynamix system is fully enclosed in a shielded environment (cabinet, metal conduit), unshielded media can be used. Otherwise, shielded, category Cat 5e (or 6), class D (or E) cables are recommended.

Use the Ethernet cable accessories in the 1585 Series Ethernet media products from Rockwell Automation.

For cable specifications, see the Ethernet Media Specifications, publication [1585-TD001](#).^{(a)(b)}

- (a) Only Straight connectors are recommended for use with Dynamix modules.
- (b) The Dynamix system can be installed in environments where the temperature is up to 70 °C (158 °F), be sure that the temperature rating of a selected cable corresponds to the environment.

Notes:

Additional Resources

These documents contain additional information about related products from Rockwell Automation. You can view or download publications at rok.auto/literature.

Resource	Description
Dynamix 1444 Series Monitoring System Product Information, publication 1444-PC001	Provides installation information for the Dynamix modules.
Dynamix 1444 Series Monitoring System User Manual, publication 1444-UM001	Describes the configuration, and operation of a Dynamix system.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for the installation of a Rockwell Automation® industrial system.
Product Certifications website, rok.auto/certifications .	Provides declarations of conformity, certificates, and other certification details.

Rockwell Automation Support

Use these resources to access support information.

Technical Support Center	Find help with how-to videos, FAQs, chat, user forums, Knowledgebase, and product notification updates.	rok.auto/support
Local Technical Support Phone Numbers	Locate the telephone number for your country.	rok.auto/phonesupport
Technical Documentation Center	Quickly access and download technical specifications, installation instructions, and user manuals.	rok.auto/techdocs
Literature Library	Find installation instructions, manuals, brochures, and technical data publications.	rok.auto/literature
Product Compatibility and Download Center (PCDC)	Download firmware, associated files (such as AOP, EDS, and DTM), and access product release notes.	rok.auto/pcdc

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