STANLEY®

Assembly Technologies

# QB Alpha Controllers

## Performance from Simple Error-Proofing to Line Control

- Controls EA, EB, EC Tools to 2000 Nm
- Connectivity Options Include 24V I/O, USB, Ethernet and Fieldbus
- Alpha Toolbox $\alpha_{tb}$ Software Enables Configuration, Reports and Traces

QPM

# QB Alpha Controllers

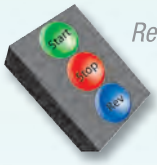
## Alpha Basic QB1001
## for Routine Error-Proofing

*Large light bars alert operator to fastening status*

*Two line data display with soft key navigation*

- Job setup from keypad or PC software
- Stores the last 100 fastening cycles and the last trace
- Includes tool diagnostics and maintenance intervals

### Fixed 24V Input/Output Enables Remote Start, Socket Tray and Alarms for Error Proofing



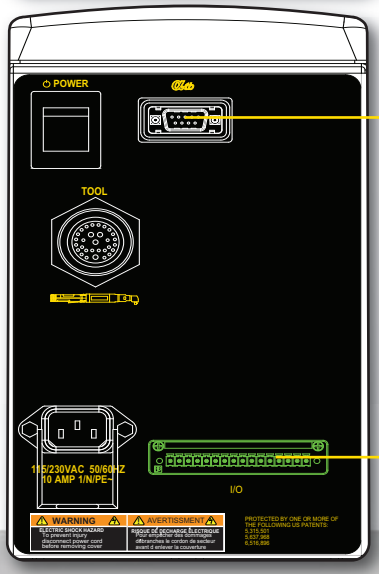

*Remote operation for tools mounted in machines, fixtures, or arms.*

*Error proofing I/O assures the job cannot inadvertently leave the station unless fastened as specified.*

*Socket tray for error proofed fastening job selection enables a single tool to reliably assemble joints of different target torque levels*

*PC Software Enables Tool Configuration and Data Collection*

- *Alpha tool box functionality*
- *No Setup Required… Browser based software executed from serial connection to controller*




*4 in/4 out fixed 24 V I/O for line control*

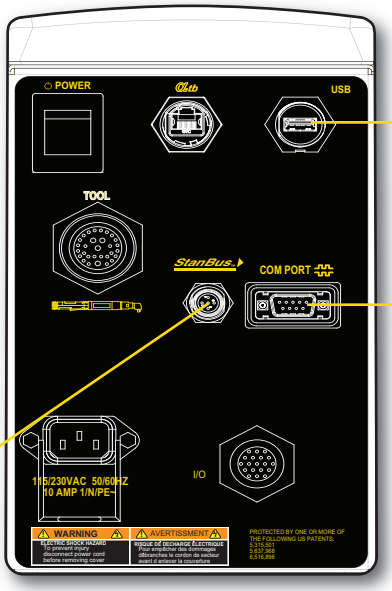
**ATC** **Adaptive Tightening Control** gives each tool the flexibility to adjust for different joint designs and variable part tolerances. Two fasteners may have the same size and torque specifications, but different joint characteristics (e.g, hard vs. soft). Without ATC, either torque overshoot or long cycle times result. ATC improves torque capability and reduces cycle time by automatically adjusting to joint variations—minimizing the number of tools and setups.

# Alpha

## Alpha Standard QB2001 Expands Fastening Strategies and Plant Interface Capability

- 16 jobs, 16 tasks with 8 steps, including smart steps
- Parameter setup is through the Alpha Toolbox αtb Ethernet port
- USB enables quick and easy backup/restore of controller information
- Stores data AND traces for the last 1,000 fastening cycles
- Includes Alpha Toolbox αtb software, tool diagnostics and maintenance intervals

*Alpha Toolbox αtb Trace, Tool Diagnostics and Statistics*



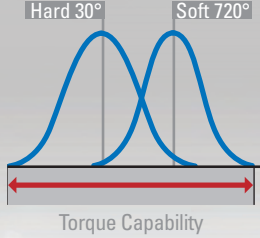

*USB enables quick and easy backup/restore of controller information and barcode input for job selection*

*Serial port can connect to plant networks*

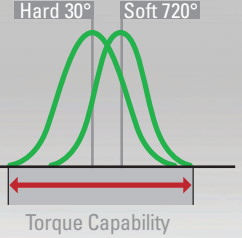
**StanBus™**

*Stanley exclusive port for quick connection of accessories such as light stacks and socket trays*

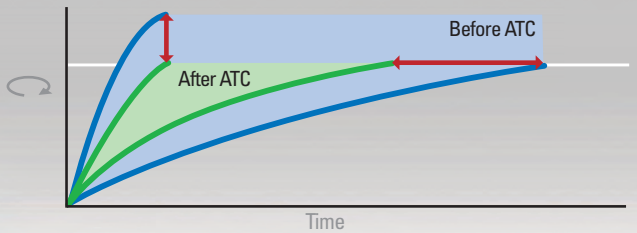
### Before ATC




### After ATC




### Improve capability...Reduce cycle time



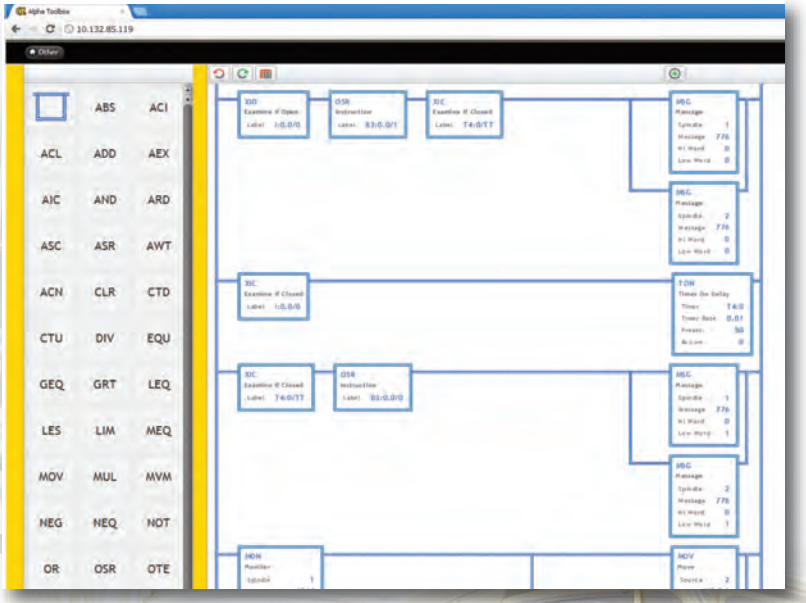
# Alpha

## Alpha Advanced QB3001

## Manages up to Two Spindles and has a PLC for Expanded Capability

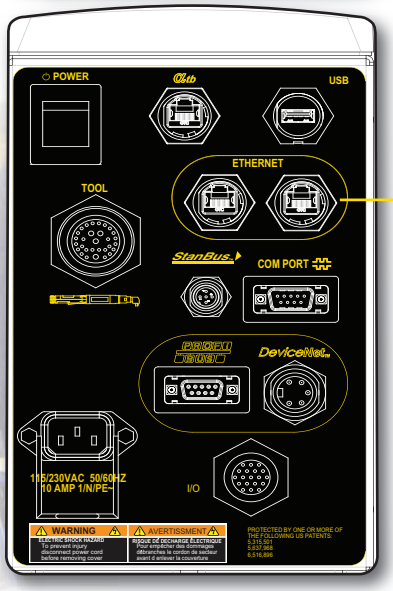
- 99 jobs, 99 tasks, 12 steps including smart steps and all advanced strategies
- Stores data AND traces for the last 10,000 fastening cycles
- One Node can be run as a trailing spindle from the Advanced Controller
- Includes Alpha Toolbox *αtb* software, tool diagnostics and maintenance intervals

*αtb* *Standard Ladder Logic PLC Capability*



*Two line color data display with soft key navigation*

*Single Spindle Fastening Cycle data gives way to second spindle run screen when a trailing spindle is connected*



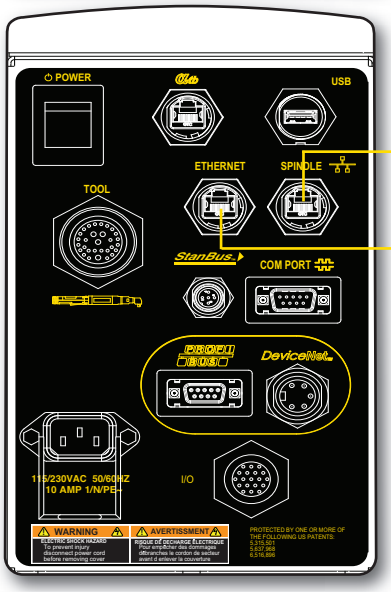

*Ethernet ports enable daisy chain connectivity on Node and Advanced Controllers*

# Alpha

## Alpha Expert QB4001

## Controls 1 Spindle and Manages as Many as 24 Through Ethernet

***Trailing Spindles can have Advanced or QB0001 Node Controllers***




*Manages as many as 24 spindles*

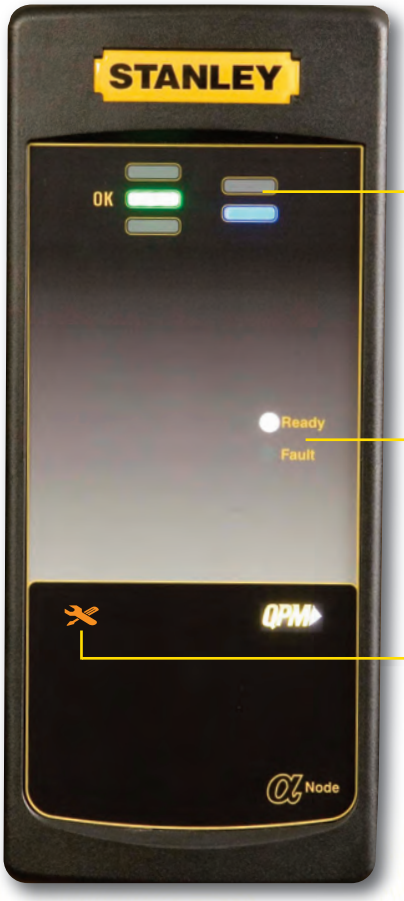
*Minimizes plant connections through a single point interface between the plant network*

- Synchronizes multiple spindles
- Onboard Standard Ladder Logic PLC Capability
- 99 jobs, 99 tasks, 12 steps including smart steps and all advanced strategies
- Stores data AND traces for the last 10,000 fastening cycles
- Includes Alpha Toolbox *tb* software, tool diagnostics and maintenance intervals
- Provides one data network connection for multiple spindles

# Alpha

## Alpha Node QB0001

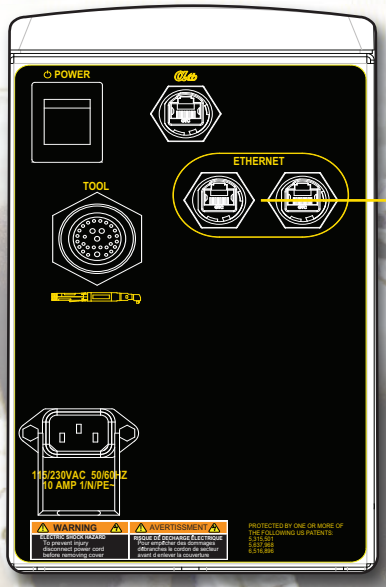
## For Efficient Multiple Spindle Operation




*Large light bars alert operator to fastening status*

*Fault / Ready lights indicate Controller status*

*Maintenance Due Indicator*

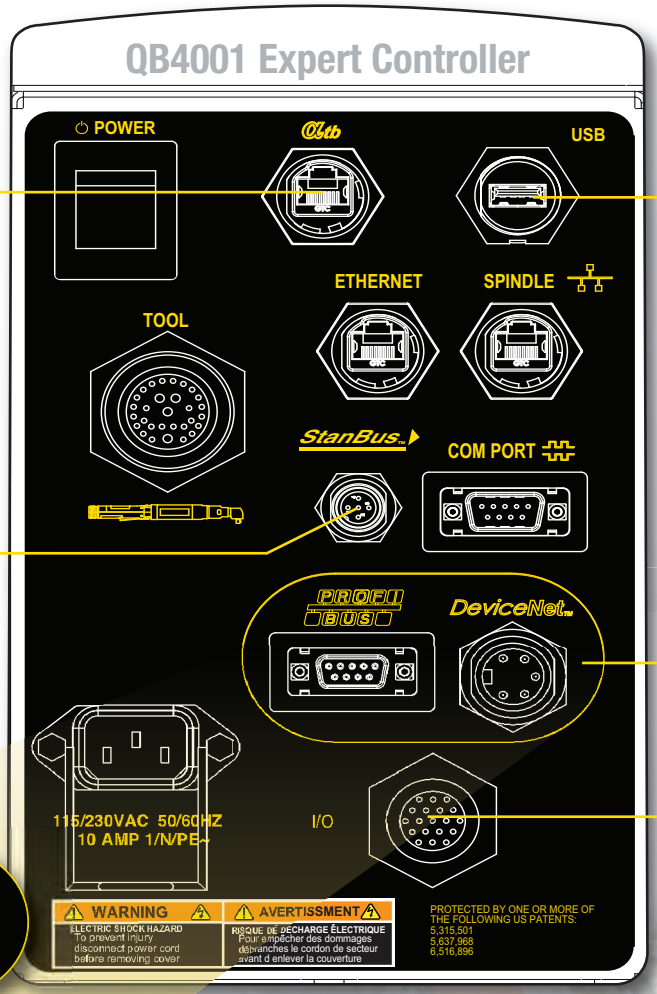



*Ethernet ports enable daisy chain connectivity*

- Can be managed by Advanced or Expert Alphas
- 99 jobs, 99 tasks, 12 steps including smart steps and all advanced strategies
- Parameter setup is through the Alpha Toolbox αtb Ethernet port
- Stores data AND traces for the last 10,000 fastening cycles
- Includes Alpha Toolbox software, tool diagnostics and maintenance intervals

# Connectivity Options

## Fill Needs from Single Tools to Multiple Spindle Production Line Management




*Parameter setup is through the Alpha Toolbox Ethernet port*

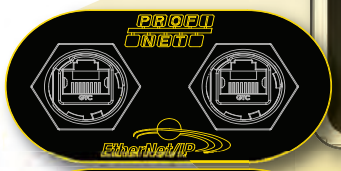
**StanBus™**

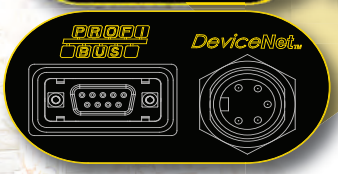
*Stanley exclusive port for quick connection of accessories such as light stacks and socket trays*

*Optional slave Fieldbus ports and protocols*

*8 in/8 out assignable 24V I/O for line control*

*(Military connector available)*



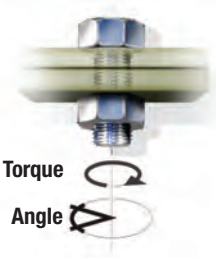




*Fieldbus Options*

### Included Ports

| | Model | Plinth | 24V I/O | Serial | Ethernet | USB | Stanbus | DeviceNet | Profibus | EthernetIP | ProfiNet | GM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Basic | QB1001 | Optional | 4 in, 4 out | ✔ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Standard | QB2001 | Optional | 8 in, 8 out | ✔ | Alpha Toolbox | ✔ | ✔ | N/A | N/A | N/A | N/A | N/A |
| Advanced | QB3001-XXV | ✔ | 8 in, 8 out | ✔ | ✔ | ✔ | ✔ | -XDV | -XPV | -XEV | -XNV | -XGV |
| Expert | QB4001-XXV | ✔ | 8 in, 8 out | ✔ | ✔ | ✔ | ✔ | -XDV | -XPV | -XEV | -XNV | -XGV |
| Node | QB0001 | ✔ | N/A | ✔ | ✔ | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

# QB Alpha Controllers

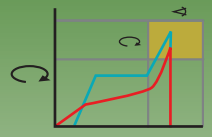



## Control Strategy Options to Fit Production and Product Requirements

### Strategies

Each strategy consists of a complete set of parameters to control and/or audit torque, angle, time, speed, and power. Each strategy may advance to the next, invisible to the operator, or pause the tool briefly to manage direction changes, multiple spindle synchronization, or relaxation and crosstalk effects.

### RC/AM
**Rate Control with Angle Monitoring**

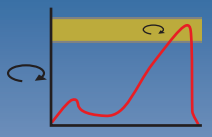


Used to detect changes in joint rate (gradient) to identify galling, cross-threading, and bottom out.

**Settings**
- Torque rate target
- Torque and angle limits

Ends at torque vs. angle rate = rate control target. Final torque and angle within limits for OK cycle.

### TC/AM
**Torque Control with Angle Monitoring**

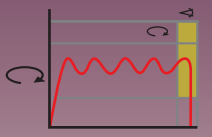


Most common control strategy for tightening threaded fasteners. Angle monitoring can detect changes in joint rate, indicating process concerns.

**Settings**
- Torque target and limits
- Angle limits

Ends at torque = torque target. Final torque and angle within limits for OK cycle.

### AC/TA
**Angle Control With Torque Averaging**

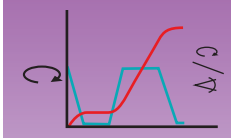


Averages the rolling torque from snug to the angle control target. Recalculates zero torque if used with TC/AM and the prevailing torque option.

**Settings**
- Average torque limits
- Angle target and limits
- Min and max torque bailouts

Ends at angle = angle target.

### YC/AM
**Yield Control with Angle Monitoring**

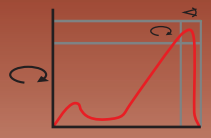


Used to detect the yield point of a fastener based on a decreasing torque vs. angle rate.

**Settings**
- Yield control target
- Torque and angle limits

Ends at torque vs. angle rate = yield control target. Final torque and angle within limits for OK cycle.

### AC or TC
**Torque or Angle Control**

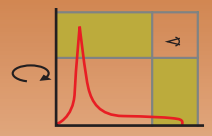


Similar to AC/TC.

**Settings**
- Torque target and limits
- Angle target and limits
- Torque and Angle bailouts

Ends at torque = torque target; or angle = angle target or both.

### BACK OFF
**Back off the Fastener**

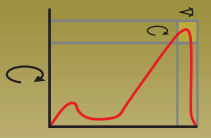


Backs off a fastener a selected amount of rotation.

**Settings**
- Back off angle target
- Angle limits

Ends at angle = angle target. Final angle and torque within limits for OK cycle.

### AC & TC
**Angle and Torque Control**

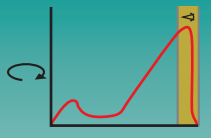


Used for very critical joints with precision components.

**Settings**
- Torque target and limits
- Angle target and limits
- Torque and angle bailouts

Ends at torque = torque target; angle = angle target. Final torque and angle within limits for OK cycle.

### AC/TM
**Angle Control with Torque Monitoring**



Controls the amount of fastener rotation. Angle control can determine component positions.

**Settings**
- Angle target and limits
- Torque limits

Ends at angle = angle target. Final angle and torque within limits for OK cycle.

**Options**

| Model | Basic | Standard | Advanced | Expert | Node |
|---|---|---|---|---|---|
| | QB1001 | QB2001 | QB3001 | QB4001 | QB0001 |
| Jobs | 2 | 16 | 99 | 99 | 99 |
| Tasks | 2 | 16 | 99 | 99 | 99 |
| * + 2 smart steps Steps | 2* | 8 | 12 | 12 | 12 |
| **Basic Strategies** | | | | | |
| TC/AM | ✔ | ✔ | ✔ | ✔ | ✔ |
| soft stop | ✔ | ✔ | ✔ | ✔ | ✔ |
| ATC | ✔ | ✔ | ✔ | ✔ | ✔ |
| **Smart Steps** | | | | | |
| wobble | | ✔ | ✔ | ✔ | ✔ |
| slow seek | ✔ | ✔ | ✔ | ✔ | ✔ |
| self tap | ✔ | ✔ | ✔ | ✔ | ✔ |
| condition fastener | | ✔ | ✔ | ✔ | ✔ |
| pre-torque | | ✔ | ✔ | ✔ | ✔ |
| backout fastener | | ✔ | ✔ | ✔ | ✔ |
| fastener release | | ✔ | ✔ | ✔ | ✔ |
| **Advanced Strategies** | | | | | |
| AC/TM | ✔ | ✔ | ✔ | ✔ | ✔ |
| AC/TC | | | ✔ | ✔ | ✔ |
| AC/TA | | | ✔ | ✔ | ✔ |
| BACKOFF | | | ✔ | ✔ | ✔ |
| RC/AM | | | ✔ | ✔ | ✔ |
| YC/AM | | | ✔ | ✔ | ✔ |
| Redundant Transducer | | | ✔ | ✔ | ✔ |
| Prevailing Torque | | | ✔ | ✔ | ✔ |
| Torque Recovery | | | ✔ | ✔ | ✔ |

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