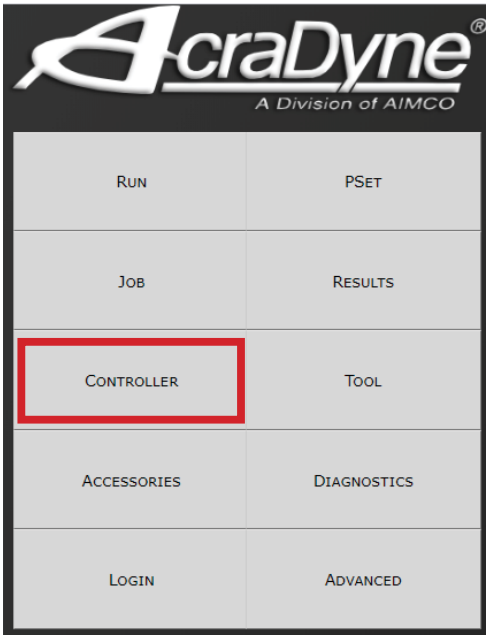
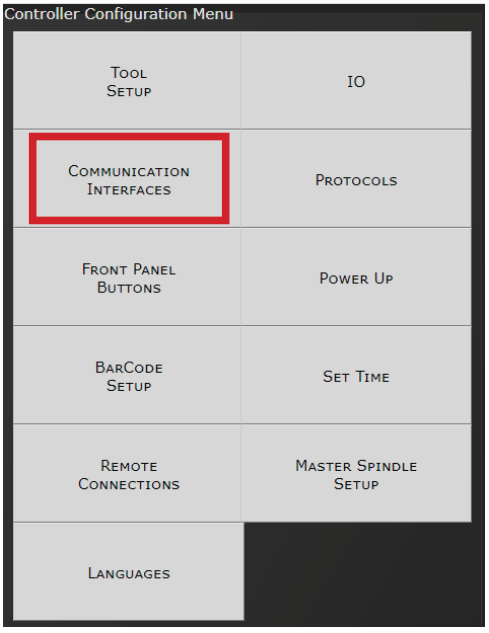
Gen IV Controller
Serial Port Instructions

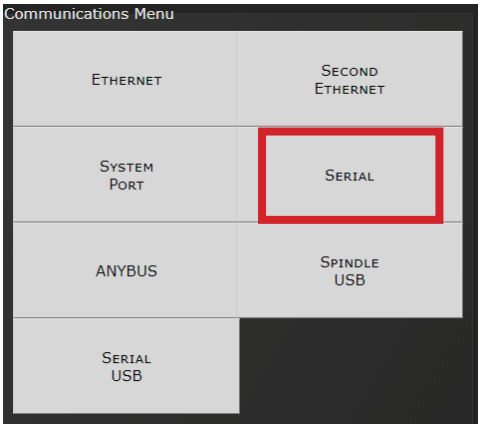
From the main menu, select Controller.



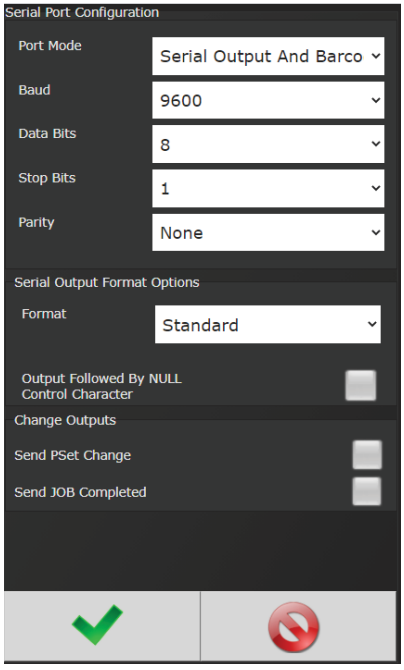
Select IO.



Select Serial.



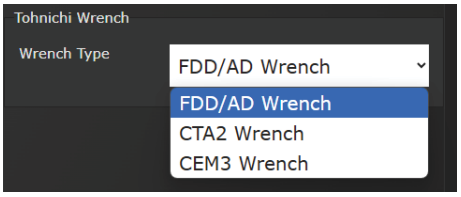
Port Mode: The following modes are available:



- **Serial Output:** A serial data string will be Output in the following format after each rundown:
  - # P 1 BB TTT.T AAAA 0000 0000 J (Notice the decimal point next to the least significant T)
  - P: Parameter set ("1" – "9") for PSets 1-9, ("A" – "W") for PSets 10-32.
  - B: Job count
  - T: Torque result
  - A: Angle result
    - @=overall pass, H=low torque, I (eye)=high torque, J=low angle, K=high angle, G=fault during fastening
- **Barcode Reader:** See the Gen IV Controller User Manual for information on barcode setup.
- **Serial Output and Barcode Reader:** Select from dropdown and configure per hardware requirements
- **Open Protocol:** Select from dropdown and configure per hardware requirements
- **PFCS:** Select from dropdown and configure per hardware requirements

- **PI Line Control:** This is customer specific. Please reference PI Line Control Document on AIMCO Website/Product Manuals.
- **Tohnichi Wrench:** Supports connecting a Tohnichi FD/FDD/AD wrench/R-CM receiver to the controller. See "Tohnichi Wrench Details" on page 4

  Choosing "Tohnichi Wrench" in Port Mode presents a "Wrench Type" drop down where the appropriate Wrench Type should be selected



  Find instructions for Gen IV/Tohnichi wrench operation at AIMCO Website/Manuals.

Baud: Serial ports can be configured for different baud rates available.
- 75, 110, 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200

Data Bits / Stop Bits / Parity: Configure per hardware requirements

Serial Output Formats:
- Standard
- Standard with PSet
- UEC Serial Modified
- Profibus
- UEC Serial
- CVS String

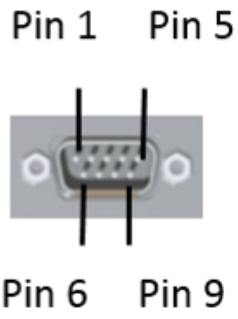
Output Followed by Null Control Character: Adds a one-byte NULL character to the end of the serial string. Needed by systems that use the NULL character to signify the end of the string. See following section for more information.

Send PSet Change:
- Sends a serial string any time the PSet is changed. String is in the form '%%CAN8X%%%%CAN4YNAC%%' where X is the previous pset and Y is the new pset. See following section for more information.

Send Job Completed:
- Sends a serial string containing "Job Completed" whenever a job has been completed.

Gen IV Serial Port Pin-out

Pin	Signal
1	
2	RX
3	TX
4	DTR
5	GND
6	
7	
8	
9	



Serial Output Format Options

Standard Output Format:

- O P HHHHH LLLLL TTTTT P HHHHH LLLLL AAAAA CR CR NULL*
  - O: Overall Pass/Fail
    - 'P' = Pass, 'F' = Fail
  - P: Torque Pass/Fail
    - * 'P' = Pass, 'F' = Fail
  - HHHHH: Torque High Limit
    - Units selected in the PSet X10
  - LLLLL: Torque Low Limit
    - * Units selected in the PSet X10
  - TTTTT: Torque Result
    - Units selected in the PSet X10
  - P: Angle Pass/Fail
    - 'P' = Pass, 'F' = Fail
  - HHHHH: Angle High Limit
    - Degrees
  - LLLLL: Angle Low Limit
    - Degrees
  - AAAAA: Angle Result
    - Degrees
  - CR: Carriage return control character
  - CR: Carriage return control character
  - NULL*: Null control character (*if option is selected)

Standard Output with Carriage Return, Line Feed and PSet Format:

- O P HHHHH LLLLL TTTTT P HHHHH LLLLL AAAAA 1 CR LF NULL*
  - O: Overall Pass/Fail
    - 'P' = Pass, 'F' = Fail
  - P: Torque Pass/Fail
    - 'P' = Pass, 'F' = Fail
  - HHHHH: Torque High Limit
    - Units selected in the PSet X10
  - LLLLL: Torque Low Limit
    - Units selected in the PSet X10
  - TTTTT: Torque Result
    - Units selected in the PSet X10
  - P: Angle Pass/Fail
    - 'P' = Pass, 'F' = Fail
  - HHHHH: Angle High Limit
    - Degrees
  - LLLLL: Angle Low Limit
    - Degrees
  - AAAAA: Angle Result
    - Degrees
  - 1: PSet
    - PSet('1' – '9') for PSets 1-9, ('A' – 'Z') for PSets 10-35
  - CR: Carriage return control character
  - LF: Line feed control character
  - NULL*: Null control character (*if option is selected)

UEC Serial Modified Format (matches some Gen4 earlier versions):

- # P 1 BB TTT.T AAAA PPPP 0000 J CR NULL*
  - #: Message Start
  - P: PSet
    - PSet('1' – '9') for PSets 1-9, ('A' – 'Z') for PSets 10-35
  - 1: Spindle Number (Always 1)
  - BB: Job Bolt Count
    - Total number of accepts during the Job
  - TTT.T: Torque Result
    - Units selected in the PSet
  - AAAA: Angle Result
    - Degrees
  - PPPP: Pulse Count
  - 0000
  - J: Judgment
    - '@' = Overall Pass, 'H' = Low Torque, 'I' = High Torque, 'J' = Low Angle, 'K = High Angle, 'G' = Fault During Fastening
  - CR: Carriage return control character
  - NULL*: Null control character (*if option is selected)

Profibus Output Format:

- %CAN 1 O P HHHHH LLLLL TTTTT P HHHHH LLLLL AAAAA NAC% CR LF NULL*
  - %CAN: Message Start
  - 1: PSet
    - * PSet('1' – '9') for PSets 1-9, ('A' – 'Z') for PSets 10-35
  - O: Overall Pass/Fail
    - * 'P' = Pass, 'F' = Fail
  - P: Torque Pass/Fail
    - * 'P' = Pass, 'F' = Fail
  - HHHHH: Torque High Limit
    - * Units selected in the PSet X10
  - LLLLL: Torque Low Limit
    - * Units selected in the PSet X10
  - TTTTT: Torque Result
    - * Units selected in the PSet X10
  - P: Angle Pass/Fail
    - 'P' = Pass, 'F' = Fail
  - HHHHH: Angle High Limit
    - Degrees
  - LLLLL: Angle Low Limit
    - Degrees
  - AAAAA: Angle Result
    - Degrees
    - NAC%: Message End
  - CR: Carriage return control character
  - LF: Line feed control character
  - NULL*: Null control character (*if option is selected)

UEC Serial Format (matches UEC 4800 and Gen3):

- # 1 P BB TTT.T AAAA PPPP 0000 J CR NULL*
  - #: Message Start
  - 1: Spindle Number (Always 1)
  - P: PSet
    - * PSet('1' – '9') for PSets 1-9, ('A' – 'Z') for PSets 10-35
  - BB: Job Bolt Count
    - * Total number of accepts during the Job
  - TTT.T: Torque Result
    - * Units selected in the PSet
  - AAAA: Angle Result
    - * Degrees
  - PPPP: Pulse Count
    - L = Low Pulse Count, M = High Pulse Count
  - 0000
  - J: Judgment
    - * '@' = Overall Pass, 'H' = Low Torque, 'I' = High Torque, 'J' = Low Angle, 'K = High Angle, 'G' = Fault During Fastening, '*' = None of these conditions apply
  - CR: Carriage return control character
  - NULL*: Null control character (*if option is selected)

'CSV String'

- S01,JB01, TTT.T, S, AAA.A, S, O, MM/DD/YYYY HH:MM:SS, VVV<CR><LF>
  - S01: Spindle number
  - JB01: Job number
  - TTT.T: Torque
  - S: Torque Status (A = OK, H = High, L = Low)
  - AAA.A: Angle
  - S: Angle Status (A = OK, H = High, L = Low)
  - O: Overall Status (A = OK, R = NOK)
  - MM: Month
  - DD: Day
  - YYYY: Year
  - HH: Hour
  - MM: Minute
  - SS: Second
  - VVV: 32 character barcode ID
  - <CR>: Carriage Return
  - <LF>: Line Feed

'Output Followed by NULL Character'.

- The NULL characters can be seen by using PUTTY and connecting to the controller in 'Raw' mode. Then set logging to log all output and check the log to see the NULL characters.

'Send PSet Change'.

- PSets up to 9 match the number, 10-35 are A-Z, greater than 35 is '*':
  - %%CAN8X%%%%CAN4YNAC%%
  - X: Last PSet
  - Y: New PSet

Tohnichi Wrench Details

Serial Port Mode "Tohnichi Wrench"

The Gen IV iBC controller supports connecting a Tohnichi wrench. Following are instructions for connecting Tohnichi FD/FDD/AD model wrenches with a R-CM receiver. For instructions on connecting CTA2 and CEM3 wrenches, see instructions at AIMCO Website/Manuals.

The R-CM receiver connects to the Gen IV controller via the serial port with a straight through serial cable (do not use a null modem cable). The R-CM receiver data format needs to be configured as "STD" (the default setting). Once configured the controller will monitor the serial port for a string from the R-CM receiver and record the click as a manual install.

The manual install record will contain the following data from the wrench:

- Torque value
- Torque units (the following units are supported Nm, Kgcm, Kgm, Lbin, Lbft)
- 7 digit ID (will be recorded as the tool S/N)
- Angle when supported by the wrench
- Low, High, or OK status in some configurations

Using the controller parameter set to evaluate the click results:

Setting all the limits in the R-CM receiver to 0 (default) will cause it to report the values without any status. In this setup, the controller will evaluate the value(s) against the current parameter set limits and generate the correct status. Then report the status back to the R-CM receiver and wrench.

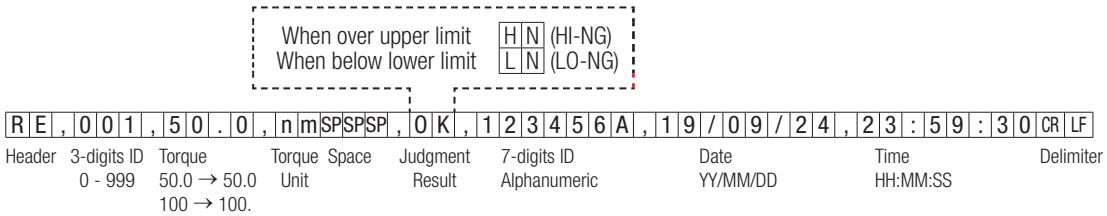
Using the R-CM receiver to evaluate the click results:

Setting limits in the R-CM receiver will cause it to report the status to the wrench and the controller. In this setup the controller parameter set settings are ignored.

Wrench Configuration

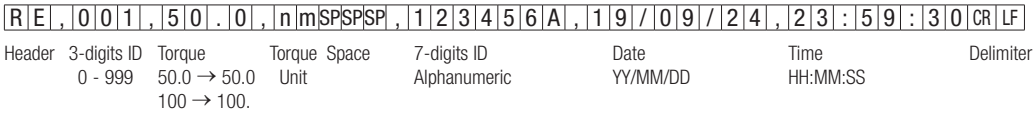
The controller supports torque and torque/angle wrenches and both modes of operation. The four possible wrench/configurations from the R-CM are as follows:

1. Torque only wrench with limits programmed in the R-CM
   - R-CM output format would be as follows:



   - The controller will use the status from the record

2. Torque only wrench with no limits programmed in the R-CM
   - R-CM output format would be as follows:



   - The controller will evaluate the torque value against the current parameter set low and high torque limits and set the results accordingly
   - The controller will tell the R-CM module the Low, High, or OK status

3. Torque and angle wrench with limits programmed in the R-CM
   - R-CM output format would be as follows:

Torque Result	Angle Result	Judgment	
OK	OK	O	O
OK	HIGH NG	O	H
OK	LOW NG	O	L
High NG	OK	H	O
High NG	HIGH NG	H	H
High NG	LOW NG	H	L
Low NG	OK	L	O
Low NG	HIGH NG	L	H
Low NG	LOW NG	L	L

RE	,	001	,	50.0	,	nm	SPSPSP	,	045	,	deg	,	00	,	123456A	,	19/09/24	,	23:59:30	CR LF
Header		3-digits ID 0 - 999		Torque 50.0 → 50.0 100 → 100.		Torque Unit	Space		Angle 45 → 045 120 → 120		Angle Unit		Result		7-digits ID Alphanumeric		Date YY/MM/DD		Time HH:MM:SS	Delimiter

   - The controller will use the status from the record.

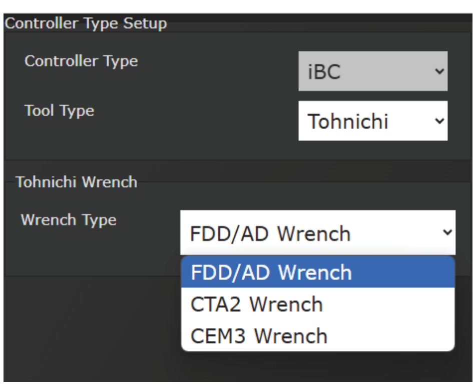
4. Torque and angle wrench with no limits programmed in the R-CM
   - R-CM output format would be as follows:

RE	,	001	,	50.0	,	nm	SPSPSP	,	045	,	deg	,	123456A	,	19/09/24	,	23:59:30	CR LF
Header		3-digits ID 0 - 999		Torque 50.0 → 50.0 100 → 100.		Torque Unit	Space		Angle 45 → 045 120 → 120		Angle Unit		7-digits ID Alphanumeric		Date YY/MM/DD		Time HH:MM:SS	Delimiter

   - The controller will evaluate the torque and angle values against the current parameter set low and high torque and angle limits and set the results accordingly
   - The controller will tell the R-CM module the Low/High torque, Low/High angle or OK status.

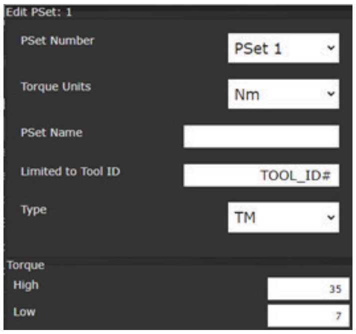
Using an iBC as a Standalone Tohnichi Monitor

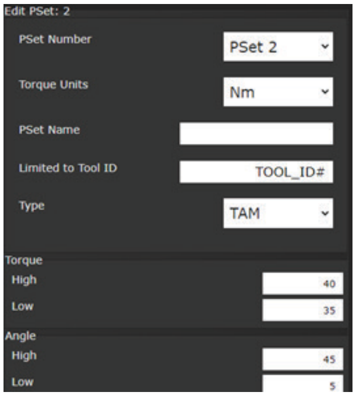
standard iBC can be configured as a Tohnichi wrench monitor with or without the monitoring parameter sets programmed into the controller. In the "Controller Type Setup" screen there is an option to select the "Tool Type" between AcraDyne or Tohnichi. Setting it to Tohnichi will disable the use of an AcraDyne tool and force the serial port option to Tohnichi Wrench.



This will also enable the parameter set menu where the user will be able to create a torque or torque and angle monitor strategy.

If the "Limited to Tool ID" parameter" is populated, rundown results only from the Tohnichi wrench with the matching ID will be evaluated and recorded.





If the R-CM has limits programmed, the controller parameter sets will be ignored.

CORPORATE HEADQUARTERS
10000 SE Pine Street
Portland, Oregon 97216
Phone: (503) 254-6600
Toll Free: 1-800-852-1368

AIMCO CORPORATION DE MEXICO SA DE CV
Ave. Cristobal Colon 14529
Chihuahua, Chihuahua. 31125
Mexico
Phone: (01-614) 380-1010