Axia80 Techman® (TM)
F/T Sensor Manual

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Engineered Products for Robotic Productivity
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Foreword

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> Note
>
> Please read the manual before calling customer service. Before calling, have the following information available:
>
> 1. Serial number (e.g., FT01234)
> 2. Sensor model (e.g., Axia)
> 3. Calibration (e.g., US-15-50, SI-65-6, etc.)
> 4. Accurate and complete description of the question or problem
> 5. Computer and software information. (operating system, PC type, drivers, application software, and other relevant information about the application's configuration)
>
> If possible, be near the F/T system when calling.

For additional information or to speak with a customer service representative, please contact ATI at:

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Glossary

Term	Definition
Algorithm	A process or set of rules the robot uses to provide force feedback to control the robot motion.
ATI EtherCAT Axia80 F/T Sensor or Axia 80	An ATI F/T sensor that uses EtherCAT protocol.
ATI EtherCAT F/T Sensor	An ATI EtherCAT F/T sensor that is not an Axia80.
DoF	Degrees of Freedom. See Six Degrees of Freedom.
EtherCAT	An industrial automation fieldbus.
Force	The push or pull exerted on an object.
F/T	Force/Torque.
F/T Sensor	The device that converts mechanical forces and torques into electrical signals.
Interface Plate	A separate plate that attaches the sensor to another surface. Interface plates are often used if the bolt pattern on the MAP or TAP doesn't match the bolt pattern on the robot arm or customer tooling. The interface plate has (2) bolt patterns on either side of the plate. One side is for the MAP or TAP. The other side is for the robot arm or customer tooling.
Mounting Adapter Plate | MAP	The surface of the sensor that attaches to a fixed surface like an interface plate or robot arm.
Plug-in Technology	A customized program that when downloaded and installed on to a host device adds a specific feature to an existing computer program.
P/N	Part number
Six Degrees of Freedom	F_x \ F_y \ F_z \ T_x \ T_y \ T_z
Torque	The measurement of force exerted on an object causing it to rotate.
TMFlow software	A TM software program that enables the TM robot to bypass data from an internal sensor on the robot to use data from an ATI F/T sensor for force feedback control.
TM	A collaborative robot manufactured and distributed by the company, Techman Robots (TM).
TM Kit	A packaged option that includes the EtherCAT Axia F/T sensor, interface plate, EtherCAT and power cables, mounting hardware, and downloadable TMFlow software.
Tool Adapter Plate | TAP	The surface of the sensor that attaches to a fixed surface like an interface plate or the customer tooling.

1. Safety

The safety section describes general safety guidelines to be followed with this product, explanations of the notifications found in this manual, and safety precautions that apply to the product. Product specific notifications are imbedded within the sections of this manual (where they apply).

1.1 Explanation of Notifications

These notifications are used in all of ATI manuals and are not specific to this product. The user should heed all notifications from the robot manufacturer and/or the manufacturers of other components used in the installation.

DANGER: Notification of information or instructions that if not followed will result in death or serious injury. The notification provides information about the nature of the hazardous situation, the consequences of not avoiding the hazard, and the method for avoiding the situation.

WARNING: Notification of information or instructions that if not followed could result in death or serious injury. The notification provides information about the nature of the hazardous situation, the consequences of not avoiding the hazard, and the method for avoiding the situation.

CAUTION: Notification of information or instructions that if not followed could result in moderate injury or will cause damage to equipment. The notification provides information about the nature of the hazardous situation, the consequences of not avoiding the hazard, and the method for avoiding the situation.

NOTICE: Notification of specific information or instructions about maintaining, operating, installing, or setting up the product that if not followed could result in damage to equipment. The notification can emphasize, but is not limited to: specific grease types, best operating practices, and maintenance tips.

1.2 General Safety Guidelines

The customer should verify that the sensor selected is rated for maximum loads and torques expected during operation. Because static forces are less than the dynamic forces from the acceleration or declaration of the robot, be aware of the dynamic loads caused by the robot.

2. Overview

This manual explains how to install an ATI EtherCAT Axia80 Force/Torque (F/T) sensor onto a Techman (TM) robot and the TMFlow software that is used for integration.

F/T sensors convert sensed loads from forces and torques into electrical signals. The F/T sensor provides data to the robot. This data is the six DoF (degrees of freedom): $F_x \setminus F_y \setminus F_z \setminus T_x \setminus T_y \setminus T_z$. TM robots have algorithms to use force feedback to control the robot motion. The Techman TMFlow software provides a way to input data from an ATI sensor into those algorithms by using plug-in technology.

For more information on TM robots and the TM user interface refer to *www.tm-robot.com*. For more information on the ATI F/T EtherCAT sensors, refer to the *9610-05-EtherCAT Axia* manual for the Axia80.

NOTICE: The *ATI customer drawing* (ATI P/N 9230-05-1535) is available on the ATI F/T Literature website: *https://www.ati-ia.com/products/ft/ft_literature.aspx*.

2.1 TM Kit, Part Number 9105-COB-TM-Axia80-01

ATI supplies a kit that is compatible with a TM robot.

Table 2.1—TM Kit 9105-COB-TM-Axia80-01 (*Figure 2.1*)

Item	P/N	Quantity
EtherCAT Axia F/T Sensor[1]	9105-ECAT-Axia80-M20	1
Mounting Interface Plate Assembly	9105-IP-2126	
Tool Interface Plate Assembly	9105-IP-2191	
Ethernet and Power Cable Kit	9105-CKIT-ZC22-ZC28-4	
Split Power and RJ45 Ethernet Cable: 8-pin M12 connector that splits to a RJ45 EtherCAT connection and an unterminated end for power	9105-C-ZC28-U-RJ45S-4	

Notes:
1. For information about the EtherCAT Axia F/T sensor, refer to the *9610-05-EtherCAT Axia* manual. The *9610-05-EtherCAT Axia* manual includes mechanical and electrical specifications.

Cable kit (ATI P/N 9105-CKIT-ZC22-ZC28-4) includes the following:

- (1) EtherCAT and power cable (ATI P/N 9105-C-ZC22-ZC28-4) with a 6-pin connector and 8-pin M12 connector
- (1) L-bracket kit (ATI P/N 9005-05-1076) for cable routing
- (1) P-clip kit and (6) cable straps for cable routing (ATI P/N 9005-05-1077)

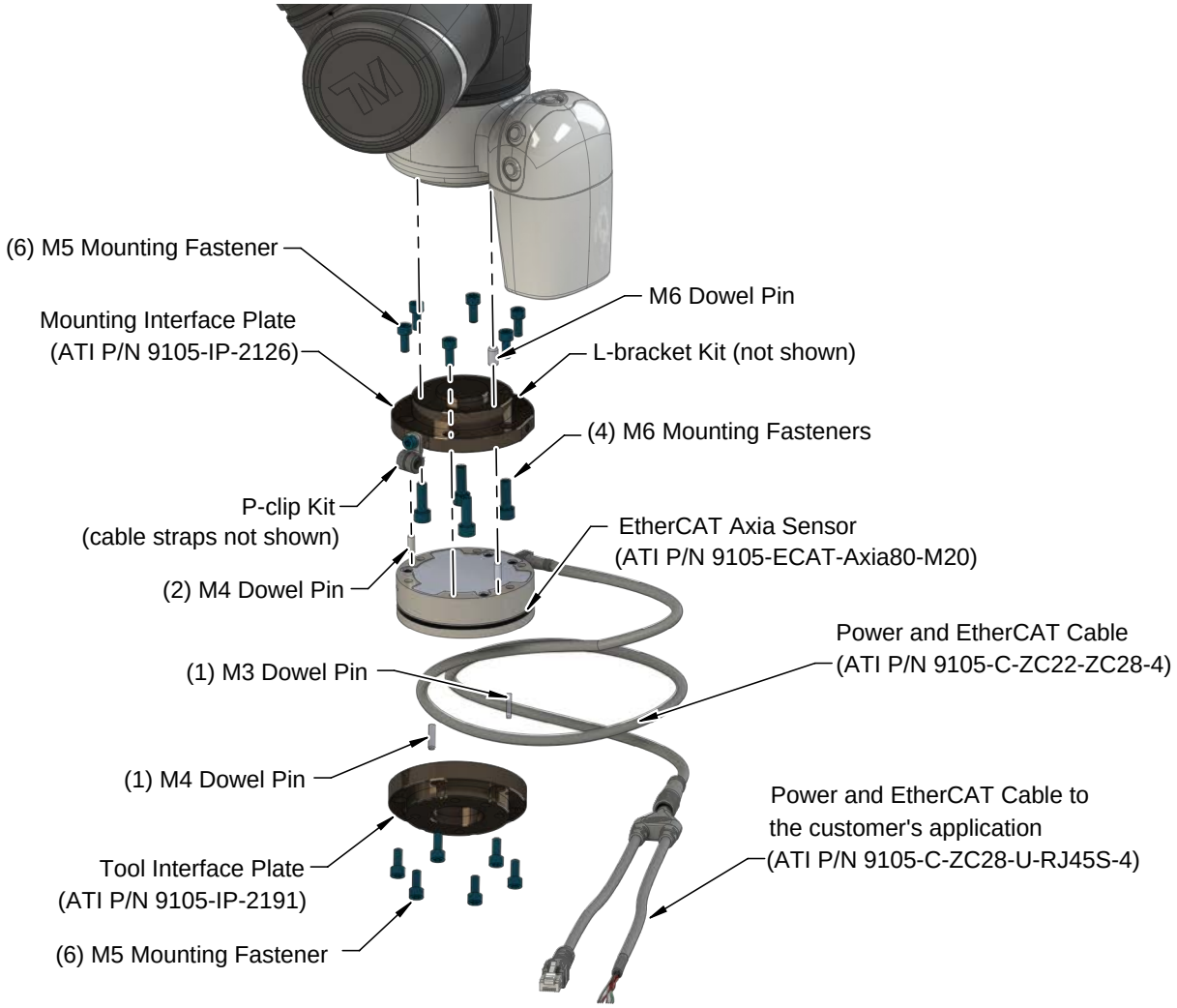
Mounting interface plate assembly (ATI P/N 9105-IP-2126) includes the following:

- Mounting interface plate (ATI P/N 3700-05-2126)
- (6) M5-0.8 x 12 mm socket head cap screws (ATI P/N 3500-1064012-15) for mounting the sensor to the interface plate
- (4) M6-1 x 18 mm socket head cap screws (ATI P/N 3500-1066018-15) for mounting the interface plate to the robot
- (1) 4 mm low profile hex key, (ATI P/N 3810-05-2182).

Tool interface plate assembly (ATI P/N 9105-IP-2191) includes the following:

- Tool interface plate (ATI P/N 3700-05-2191)
- (6) M5-0.8 x 12 mm socket head cap screws (ATI P/N 3500-1064012-15) for mounting the sensor to the interface plate

Figure 2.1—TM Kit, Part Number 9105-COB-TM-Axia80-01



2.1.1 Unpacking the TM Kit

After receiving the TM Kit, complete the following actions:

- Check the shipping container and components for damage that may have occurred during shipping. Report damage to ATI Industrial Automation.
- Verify the components from the packing list are included in the TM Kit.
- For standard components included in the TM Kit, refer to *Section 2.1—TM Kit, Part Number 9105-COB-TM-Axia80-01*.

2.1.2 Installing the EtherCAT Axia Sensor

For mechanical installation, cable routing, wiring information for the connectors, and electrical specifications, refer to the *9610-05-EtherCAT Axia* manual.

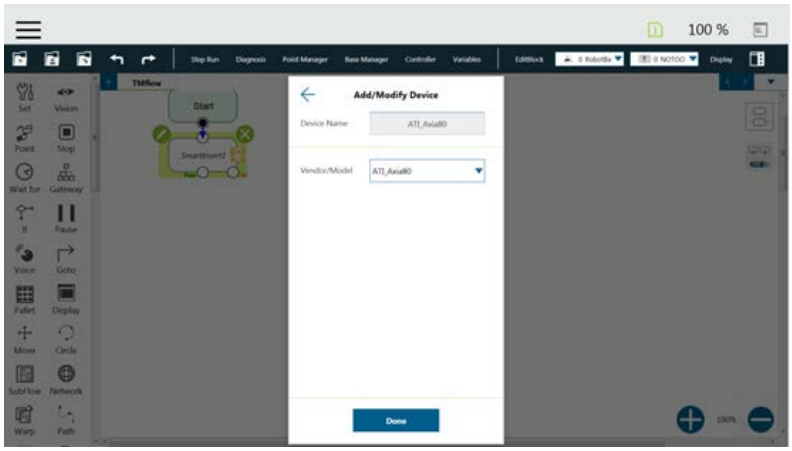
3. TMFlow software

TMFlow is compatible with ATI EtherCAT Axia F/T sensor. To understand how to apply the Axia F/T sensor with the TM robot, refer to the ***Software Manual-TMFlow, Chapter 14: Force Related Node*** that is available from TM.

NOTICE: The TMFlow software version is compatible with SW 1.68 and onwards.

An example of an ATI sensor added to an application through the TMFlow Software interface is in the following figure.

Figure 3.1—TMFlow Software



4. Troubleshooting

Customer service is available to users who have problems or questions addressed in the manuals.

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5. Terms and Conditions of Sale

The following Terms and Conditions are a supplement to and include a portion of ATI's Standard Terms and Conditions, which are on file at ATI and available upon request.

ATI warrants to Purchaser that force torque sensor products purchased hereunder will be free from defects in material and workmanship under normal use for a period of one (1) year from the date of shipment. The warranty period for repairs made under a RMA shall be for the duration of the original warranty, or ninety (90) days from the date of repaired product shipment, whichever is longer. ATI will have no liability under this warranty unless: (a) ATI is given written notice of the claimed defect and a description thereof with thirty (30) days after Purchaser discovers the defect and in any event, not later than the last day of the warranty period and (b) the defective item is received by ATI not later than (10) days after the last day of the warranty period. ATI's entire liability and Purchaser's sole remedy under this warranty is limited to repair or replacement, at ATI's election, of the defective part or item or, at ATI's election, refund of the price paid for the item. The foregoing warranty does not apply to any defect or failure resulting from improper installation, operation, maintenance, or repair by anyone other than ATI.

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