

AMCI Frequently Asked Question

Can I Use Transducers From Other Manufacturers With AMCI Controllers?

When AMCI receives an inquiry about using foreign products, it is generally about transducers from one of four companies, Autotech, Namco/C&A, ElectroCam, or Gemco. Some of the transducers made by these companies can be used with AMCI controllers and some cannot. It depends on the type of transducer and how the resolver itself is wired in the transducer.

Even though it is possible to use transducers from other manufacturers, we *strongly* suggest using AMCI transducers whenever possible. AMCI is the only company in the marketplace that designs and manufactures the resolvers used in its products. Our transducers and modules are designed to work together, and will work for years to come when specified and installed properly.

- Because you can use some transducer from other manufacturers with AMCI controllers, the reverse of the question is also true. You can use AMCI transducers with controllers from other manufacturers. The last section of this FAQ covers how to accomplish this.

Types of Transducers

AMCI, and the three of the four companies listed above, make two types of resolver based transducers, single-resolver transducers, and dual-resolver transducers.

Single-resolver transducers come in two forms. The first is the single-turn transducer. The resolver is directly coupled to the transducer’s input shaft and one turn of the input shaft yields one turn of the resolver. The second form of the single-resolver transducer is the geared multi-turn. In this package, the resolver is attached to the input shaft through a gear reduction so that multiple turns of the input shaft yield one turn of the resolver. To the controller, single-resolver transducer appear to make only one rotation per cycle. The controller is unaware of any gear ratio between the transducer’s input shaft and the resolver.

*It is usually possible to make single-resolver transducers for other manufacturers compatible with AMCI controllers. In most cases, you will need to purchase a **Reference Module** from AMCI in order to make the transducer work with AMCI products.*

As the name implies, dual-resolver transducers contain two resolvers and are designed for high resolution, multi-turn applications. The first resolver is directly coupled to the input shaft while the second resolver is attached to the first through a gear ratio. This ratio defines the number of turns the transducer can encode.

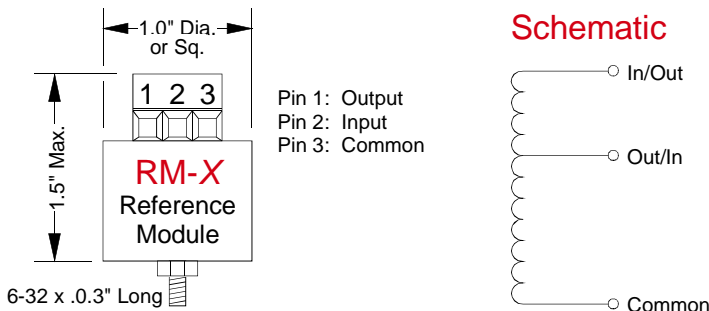
Due to differences in gearing, it is usually not possible to make dual-resolver transducers for other manufacturers compatible with AMCI controllers.

If you want to use a dual-resolver, multi-turn transducer, or your transducer is not from Autotech, Namco/C&A, ElectroCam, or Gemco, you must contact AMCI for assistance.

Reference Modules

Resolvers are similar to rotary transformers, and one of a resolver’s characteristics is the ratio of output voltage to input voltage, which is called the Transformation Ratio (TR). All of the AMCI resolvers designed to work with our products have a TR of 0.95. Autotech and Gemco use resolvers whose TR is 1.40, while Namco/C&A and ElectroCam use resolvers whose TR is 0.45.

A Reference Module, shown below, is a single-ended transformer that is used to adjust the Reference Voltage going out, so that the return signals appear to be coming from a resolver with a 0.95 TR.



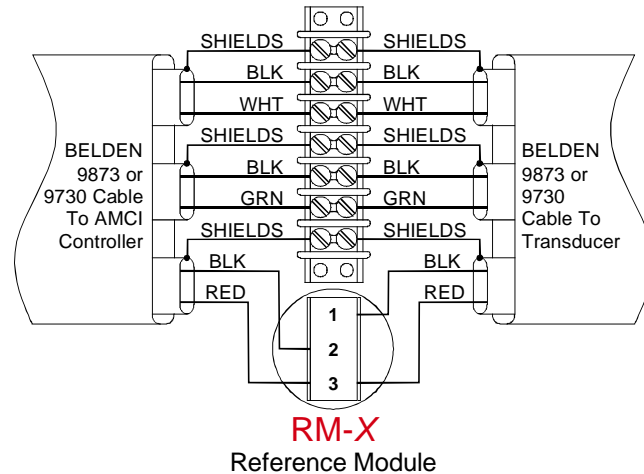
Manufacturer	Reference Module
Namco/C&A	RM-1
Autotech	RM-3
ElectroCam	RM-5
Gemco	Call AMCI

Using Transducers From Other Manufacturers

Reference Modules (continued)

The 6-32 mounting stud makes it easy to install the Reference Module on an enclosure wall or mounting panel. Note that the Reference Module must be mounted as close to the controller as possible. You should also mount a seven point terminal block next to the RM to simplify your wiring. If you use a terminal block, you can use AMCI's standard cable to wire from the controller to the Reference Module.

As shown in the diagram, the pairs shields should be kept separate when splicing the cable. This practice limits the amount of noise that can be coupled between the shields which helps improve the noise immunity of the system.



The next sections of this FAQ give specific instructions on using the transducers from other manufacturers.

Autotech Transducers

Some of AMCI's plug-in modules, and our *NEXUS* resolver interface units, directly support Autotech transducers. These units do not require a Reference Module to convert the reference voltage and may support Autotech's dual-resolver, absolute multi-turn transducers, the RL210's. Refer to the product's user manual to determine if a Reference Module is required.

If your controller does not directly support Autotech transducers, you can use a RM-3 Reference Module. The table below lists Autotech transducers that can be made compatible with AMCI controllers through the RM-3 and also lists AMCI replacement transducers. All connectors on AMCI transducers are AMCI's style and will not plug into Autotech cable connectors.

Autotech Transducers	AMCI Transducers	Comments
SAC-RL101-010	R11X-J10/7	Mechanically identical except that wires come out the back instead of the side.
E6R-RL101-000EF E7R-RL101-000EF	H25-FE	Bolt-in replacement. Shorter body length.
E6R-RL101-000ES E7R-RL101-000ES	H25-SE	Bolt-in replacement when servo mounting. Different bolt pattern on front, shorter body.
E6R-RL101-000SF E7R-RL101-000SF	H25-FS	Bolt-in replacement. Shorter body length, side connector in different location.
E6R-RL101-000SS E7R-RL101-000SS	H25-SS	Bolt-in replacement when servo mounting. Different bolt pattern on front, shorter body length, side connector in different location.
SAC-RL100-010	HT-400	Direct replacement.
SAC-RL100-M11	HT-400-1E	Bolt-in replacement, AMCI connector.
SAC-RL220-G010C, SAC-RL220-G010M	HTT-400-1	Bolt-in replacement, dual AMCI connectors with similar configuration to "-G101M"

Using Transducers From Other Manufacturers

Autotech Cabling

Due to differences in construction, Autotech cable is not supported by AMCI. Any existing cables must be replaced with Belden 9873, 9730, or an exact equivalent. The following is a wiring table for all Autotech transducers that can be used with an RM-3. The table cross references AMCI wire color, resolver designations, and Autotech connector pin-out. The RM-3 is wired into the cables as shown on the preceding page.

AMCI Wire Color	Resolver Designations	SAC-RL101-010 Wire Color	SAC-RL100-010 Terminals	SAC-RL100-Gxxx Terminals	Autotech MS Connector
BLK/RED ¹	R1	RED/WHT ²	R1(RL)	1	F
RED	R2	YEL/WHT ²	R2(RH)	2	E
WHT	S1	RED	S1	3	D
BLK/WHT ¹	S3	BLK	S3	4	C
BLK/GRN ¹	S2	YEL	S2	5	B
GRN	S4	BLU	S4	6	A

1: Denotes black wire of black and colored wire pair

2: Denotes colored wire with white strip



Do not, under any circumstances, connect the shields of the transducer cable to the earth ground connection of the transducer. This connection may form a ground loop that could damage the controller or transducer. The earth ground connection on the MS style connectors is pin G. The earth ground connection on the screw terminal transducers is a green screw.

Namco/C&A Transducers

One of the major driving forces behind the creation of this FAQ was Namco's decision to obsolete the entire C&A product line. This decision has left their former customers looking for system replacement parts. While some customers have decided to replace their entire system with AMCI products, others have replaced only the parts that have failed. If you find yourself in need of replacement parts, contact AMCI for assistance. We have developed extensive cross-reference table between product lines so we can help you to specify the proper AMCI components quickly.

Fortunately, Namco/C&A transducers are the easiest to get working with AMCI controllers. All that Namco/C&A transducers require to operate with AMCI products is a RM-1 Reference Module and minor changes in cabling.

Namco/C&A Cabling

Namco/C&A transducer cable specifications were almost identical to AMCI's. They specified the same Belden cable, the same transducer connectors and the same wiring pattern for those connectors with one exception. If you followed Namco/C&A guidelines when specifying the transducer cable, you should be able to use it with only one change.

- Some Namco/C&A cabling prints show the shields of the transducer cable connected to pin D of the transducer connector. This connection must be removed before connecting the Namco/C&A transducer to AMCI controllers. AMCI grounds the shields at the controller end of the cable and if this connection is not removed, the shields will be grounded at both ends, potentially forming a ground loop that could damage the transducer or controller.

To remove this connection, carefully disassemble the transducer connector and check to see if the shields are attached to the connector's pin D. If they are, cut the shields at the pin and cut them back to the cable's outer insulation. Carefully re-assemble the connector.

You may also need to purchase the proper Transducer Input Connector for the AMCI controller. Refer to the product's user manual for the appropriate connector part number.

Using Transducers From Other Manufacturers

ElectroCam Transducers

ElectroCam uses the same resolver used in Namco/C&A transducers. Therefore, all ElectroCam transducers require a RM-5 Reference Module to operate with AMCI controllers.

ElectroCam Cabling

AMCI does not have the full technical specifications on the transducer cable used by ElectroCam but it is individually shielded, twisted pair. Even if the capacitance specifications are significantly different from AMCI's, the cable should be acceptable for lengths of up to 50 feet. Longer lengths should be replaced or extensively tested before used in a production setting.

- ElectroCam cabling prints show a shield lug at the transducer end of the cable that is usually attached to the connector strain relief screw or the body of the transducer. This connection must be removed before connecting the ElectroCam transducer to an AMCI controller. AMCI grounds the shields at the controller end of the cable and if this connection is not removed, the shields will be grounded at both ends, potentially forming a ground loop that could damage the transducer or controller.

To remove this connection, remove the lug connection from the connector or transducer body and cut the shields off inside the cable's outer insulation.

You will also need to purchase the proper Transducer Input Connector for the AMCI controller. Refer to the AMCI product's user manual for the appropriate connector part number. The following cross reference table shows how to cross resolver signals between AMCI and ElectroCam.

ElectroCam Connector Pin	ElectroCam Wire Color	Resolver Designations	AMCI Wire Color	AMCI Transducer Connector Pin
F	WHT	R1	BLK/RED ¹	A
E	BLK/WHT ¹	R2	RED	B
D	BLK/GRN ¹	S1	WHT	F
C	GRN	S3	BLK/WHT ¹	G
B	RED	S2	BLK/GRN ¹	E
A	BLK/RED ¹	S4	GRN	C

1: Denotes black wire of black and colored wire pair

When wiring an ElectroCam cable to an AMCI Transducer Input Connector, use the table to cross the ElectroCam Wire Color to the AMCI Wire Color and then refer to published AMCI cable wiring diagrams to determine the correct pin on the input connector. Exact pin numbers on the AMCI Transducer Input Connector cannot be shown because the pin numbers are based on the style of connector and the input channel you are connecting the transducer to. Using a terminal block next to the RM-5 when converting the installation will greatly simplify the process by allowing you to switch between color codes at the terminal block.

Gemco Transducers

Gemco usually installs the same resolver used by Autotech, but AMCI is aware that Gemco has used resolvers from different manufacturers in their transducer products in the past and has installed resistors across the stator windings to increase the load on these windings. This has the effect of lowering the voltage from these windings, which makes the TR of the resolvers all look the same, but it also has the added effect of introducing a large amount of phase shift and signal distortion which makes these transducer impossible to use with our products. Consequently, AMCI has handled Gemco requests on a case by case basis through technical support and will continue to do so in the future. If you want to use a Gemco transducer with AMCI product, contact AMCI for assistance.

Using Transducers From Other Manufacturers

Gemco Transducers (continued)

AMCI is also aware that Gemco has introduced a new line of transducers that are advertised as drop in replacements for AMCI transducers. You must be aware of two points before you decide to use these transducers.

- 1) The resolvers used in the transducers are not manufactured by AMCI. AMCI is the only company in the marketplace that designs and manufactures the resolvers used in its products. The resolvers used by Gemco are probably manufactured by Harowe or Singer/Kearfoot and consequently will have different electrical characteristics than AMCI resolvers. These differences could affect accuracy and reliable operation, especially in applications with long cable runs.
- 2) The mounting blocks, bearing blocks and internal mounting plates for all of our geared single-resolver and dual-resolver transducers are manufactured by AMCI at our facility to exacting standards. The assembly, alignment, and testing of these transducers also follow exacting standards. AMCI obviously has no control over how Gemco manufactures and tests their transducers. Therefore, we cannot guarantee their accuracy or reliable operation.

Gemco Cables

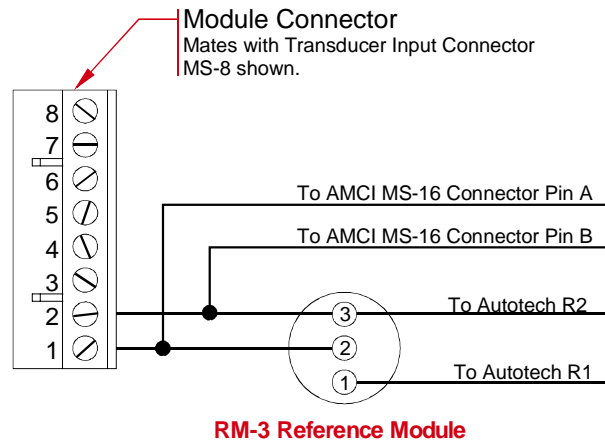
Like their transducers, AMCI handles Gemco cabling questions on a case by case basis. Contact AMCI if you have any questions about using Gemco cabling in your application.

Using AMCI Transducers With Controllers From Other Manufacturers

If you can get a transducer from another manufacturer working with an AMCI controller, then it is also possible to get an AMCI transducer to work with the controllers from that manufacturer that interface with its transducer. This is accomplished by installing the RM module as shown on page 2 of this FAQ but reverse its Input and Output connections. The Output connection (Pin 1 of the RM) goes to the controller and the Input connection (Pin 2) goes to the AMCI transducer. Remember that dual-resolver transducers from AMCI will generally not work with competitors controllers because of a difference in gearing styles.

Using AMCI and a Competitors Transducer Together

If your AMCI controller has multiple transducer inputs, you bring AMCI transducers and transducers from other manufacturers into the controller by wiring the AMCI transducer directly into the controllers Transducer Input Connector and attaching the other transducers through a Reference Module. The following figure is an example of doing this with Autotech transducers.



If you are using an AMCI product that directly supports Autotech transducers and you wish to attach both AMCI and Autotech transducers, set the Resolver Type parameter on the unit to *AMCI* and follow the above paragraph.