

IT. 2-Wire and 3-Wire Control

Application Note

Electromechanical Contactors and Starters

General

This application note may be used for determining the basic start and stop wiring configurations for both **IT.** Contactors and Starters. The major difference between the Contactor and Starter control wiring is the terminal block configuration. The **IT.** Starter has additional terminals corresponding to the overload reset and alarm features that the Contactor does not have. Although these additional terminals will be shown in the following diagrams, their wiring is not indicated to allow a clearer representation of the basic start and stop control function for both product types. The complete control wiring information is available in the publications supplied within the product packaging, the product specific user manual, or find it online at www.cutler-hammer.eaton.com/it.

The contacts or pilot devices used for starting and stopping **IT.** Contactors and Starters must be rated for use with a 24V DC low current (3-5 mA DC) dry circuit to ensure reliable operation. See **Table 1** on Page 2 for recommendations.

3-Wire Control Non-Reversing

Figure 1 illustrates the connections for 3-wire control. The start contact is connected to the Forward input (F). There is a difference between an **IT.** Contactor or Starter and a typical electro-mechanical device in that a holding contact is not required to maintain the circuit when the momentary normally open start contact is released. This is a benefit of the electronic logic being used to operate the coil of the device.

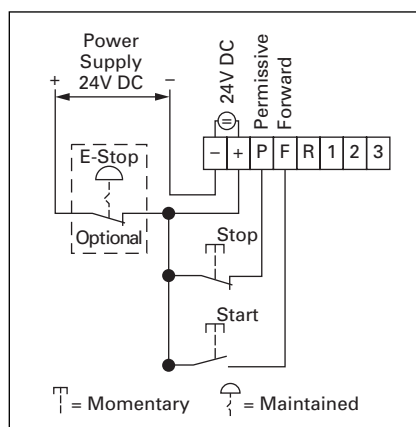


Figure 1. 3-Wire Non-Reversing

Another difference is that the stop contact is not in series with the start contact, as is done with generic contactors or starters. Instead, the normally closed stop contact is connected to the Permissive input (P) of the **IT.** device. When the Permissive input is opened, the **IT.** logic removes the power from the coil, opening the device.

2-Wire Control Non-Reversing

Figure 2 illustrates the connections for 2-wire control. The maintained run contact is connected to the Forward input (F). This is the same as the requirement for a typical electro-mechanical device with the addition of a second connection from the run contact to the Permissive input (P) of the **IT.** device. Control power is simultaneously applied to both the Permissive and Forward inputs.

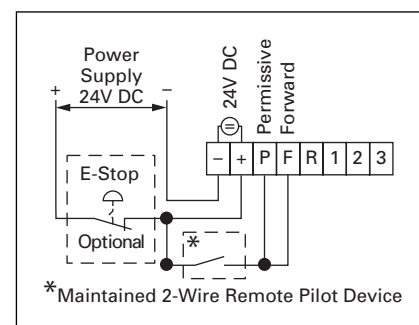


Figure 2. 2-Wire Non-Reversing

3-Wire Control Reversing

Figure 3 illustrates the connections for 3-wire reversing control. The momentary Forward contact is wired to the Forward input (F). The momentary Reverse contact is wired to the Reverse input (R). This differs somewhat from a typical electromechanical device in that it does not require holding contacts to maintain the circuit when the momentary normally open Forward or Reverse contact is released. This is a result of the electronic logic being used to operate the coils of the device.

An additional difference is that the stop contact is not in series with the Forward/Reverse contacts as is done with generic contactors or starters. Instead the normally closed stop contact is connected to the Permissive input (P) of the **17**. logic removes the power from the energized coil, opening the device.

As the note below the connection diagram indicates, if the contact for the opposite direction is closed to change the direction while operating in the other direction, a plug Reverse of the motor ensues. If it is desired instead to remove power from the motor before the reversal occurs, an auxiliary interlock can be added to both the Forward and Reverse contactors/starters to cause them to open before the direction is changed. The use of an EMA70 logic level auxiliary contact is highly recommended to ensure reliable operation.

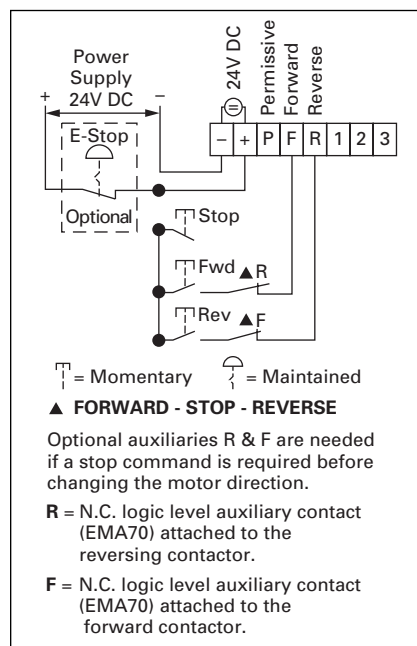


Figure 3. 3-Wire Reversing

Caution

For reversing applications, the Forward input will always override a Reverse input, if both are closed. Caution must be exercised to prevent an unintended direction change.

2-Wire Control Reversing

Figure 4 illustrates the connections for 2-wire reversing control. Two sets of interlocked contacts are utilized. The

first set applies power to the Permissive input (P) of the **17**. device. The second set determines the direction desired by powering either the Forward input (F) or the Reverse input (R).

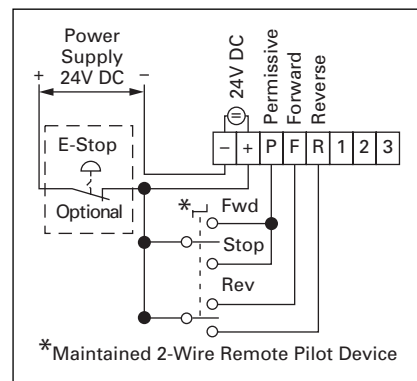


Figure 4. 2-Wire Reversing

Caution

For reversing applications, the Forward input will always override a Reverse input, if both are closed. Caution must be exercised to prevent an unintended direction change.

Low Energy Pilot Device Contact Blocks

The following contact blocks in **Table 1** are recommended for interfacing pilot devices with the Permissive (P), Forward (F), and Reverse (R) inputs of **17**. Contactors and Starters.

Table 1. Pilot Devices — Recommended Cutler-Hammer Contact Blocks

Catalog Number	E22B1E	E22B2E	E30KLAE1	E30KLAE2	E30KLAE3	E30KLAE4	E30KLAE5	10250T51E	10250T53E	10250T1E	10250T3E	10250T2E
Circuit	1 NC	1 NO	1 NO	1 NC	1 NO 1 NC	2 NO	2 NC	1 NC	1 NO	1 NO 1 NC	2 NC	2 NO

Note: Contact blocks with reliability "nibs" are also suitable.

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