

RDSI *Addendum*

RDSI Instructions for Drives and Flex-M



MAGNETEK
E N R A N G E

Part Number: 178-01917-0001 R1
May 2014
© 2014 Magnetek Material Handling

Your New RDSI System

Thank you for your purchase of Magnetek's Enrange® brand Flex-M Radio Remote Equipment Control with RDSI. Magnetek has set a whole new standard in radio-remote performance, dependability, and value with this line of modular receivers.

If your product ever needs modification or service, please contact one of our representatives at the following locations:

U.S. Service Information

For questions regarding service or technical information contact:

+1.866.MAG.SERV
+1.866.624.7378

World Headquarters:

Magnetek, Inc.
N49 W13650 Campbell Drive
Menomonee Falls, WI 53051

Telephone: 1.800.288.8178
Website: www.magnetek.com
e-mail: mhcustomerservice@magnetek.com

Fax Numbers:

Main: +1.800.298.3503
Sales: +1.262.783.3510
Service: +1.262.783.3508

Magnetek, Inc. has additional satellite locations for Canada and the United States. For more information, please visit <http://www.magnetek.com>.

©2014 MAGNETEK

All rights reserved. This notice applies to all copyrighted materials included with this product, including, but not limited to, this manual and software embodied within the product. This manual is intended for the sole use of the person(s) to whom it was provided, and any unauthorized distribution of the manual or dispersal of its contents is strictly forbidden. This manual may not be reproduced in whole or in part by any means whatsoever without the expressed written permission of MAGNETEK.

TABLE OF CONTENTS

1.0: CRITICAL INSTALLATION CONSIDERATIONS	3
1.1 GENERAL	3
1.2 PERSONS AUTHORIZED TO OPERATE RADIO CONTROLLED EQUIPMENT	4
1.3 SAFETY INFORMATION & RECOMMENDED TRAINING FOR OPERATORS	4
1.4 PRE-OPERATION TEST	5
1.5 PRE-INSTALLATION	6
2.0 RDSI SYSTEM INSTALLATION/CONFIGURATION	7
2.1 GENERAL RDSI SYSTEM OVERVIEW	8
2.2 GENERAL WIRING DIAGRAMS	9
2.2.1 Stepless RDSI Using an IMPULSE®•G+ Mini Drive	10
2.2.2 Stepless RDSI Using an IMPULSE®•G+ Mini Drive and Stepped Pendant Switchover	11
2.2.3 Stepped or Infinitely Variable RDSI Using an IMPULSE®•G+ Mini Drive and Stepped Pendant Switchover	12
2.2.4 Stepless RDSI Using an IMPULSE®•G+ Mini Drive and Stepless Pendant Switchover	13
2.2.5 Stepless RDSI Using an IMPULSE®•G+ & VG+ Series 3 Drive	14
2.2.6 Stepless RDSI Using an IMPULSE®•G+ & VG+ Series 3 Drive and Stepped Pendant Switchover	15
2.2.7 Stepped or Infinitely Variable RDSI Using an IMPULSE®•G+ & VG+ Series 3 Drive and Stepped Pendant Switchover	16
2.2.8 Stepless RDSI Using an IMPULSE®•G+ & VG+ Series 3 Drive and Stepless Pendant Switchover	17
2.2.9 Stepless RDSI Using an IMPULSE®•G+ & VG+ Series 4 Drive	18
2.2.10 Stepless RDSI Using an IMPULSE®•G+ & VG+ Series 4 Drive and Stepped Pendant Switchover	19
2.2.11 Stepped or Infinitely Variable RDSI Using an IMPULSE®•G+ & VG+ Series 4 Drive and Stepped Pendant Switchover	20
2.2.12 Stepless RDSI Using an IMPULSE®•G+ & VG+ Series 4 Drive and Stepless Pendant Switchover	21
2.3 DRIVE PARAMETER SETTINGS	22
2.3.1 IMPULSE®•G+ Mini Series Drive RDSI General Parameter Settings	22
2.3.2 IMPULSE®•G+ & VG+ Series 3 Drive RDSI General Parameter Settings	23
2.3.3 IMPULSE®•G+ & VG+ Series 4 Drive RDSI General Parameter Settings	24
2.4 FLEX-M INSTALLATION NOTES	26
2.4.1 Flex-M Serial Communications Module Wiring Schematic	26
2.5 RADIO TRANSMITTER SETUP NOTES	28
3.0 NORMAL OPERATION	29
3.1 FLEX-M OPERATION	29
3.1.1 RF/CPU Module	29
3.1.2 Serial Communication Module(s)	30
3.2 RADIO TRANSMITTER OPERATION	31
4.0 TROUBLESHOOTING	33
4.1 FLEX-M SERIAL COMMUNICATION MODULE LOOPBACK TEST	33
4.2 RADIO TRANSMITTER FAULT/ALERT DISPLAY DETAILS	34
5.0 APPENDIX A – COMPATIBILITY	35
6.0 NOTES	36

PRODUCT MANUAL SAFETY INFORMATION

Magnetek, Inc. (Magnetek) offers a broad range of radio remote control products, control products and adjustable frequency drives, and industrial braking systems for overhead material handling applications. This manual has been prepared by Magnetek to provide information and recommendations for the installation, use, operation and service of Magnetek's material handling products and systems (Magnetek Products). Anyone who uses, operates, maintains, services, installs or owns Magnetek Products should know, understand and follow our instructions and safety recommendations in this manual for Magnetek Products.

The recommendations in this manual do not take precedence over any of the following requirements relating to cranes, hoists and lifting devices:

- Instructions, manuals, and safety warnings of the manufacturers of the equipment where the radio system is used,
- Plant safety rules and procedures of the employers and the owners of facilities where the Magnetek Products are being used,
- Regulations issued by the Occupational Health and Safety Administration (OSHA),
- Applicable local, state or federal codes, ordinances, standards and requirements, or
- Safety standards and practices for the overhead material handling industry.

This manual does not include or address the specific instructions and safety warnings of these manufacturers or any of the other requirements listed above. It is the responsibility of the owners, users and operators of the Magnetek Products to know, understand and follow all of these requirements. It is the responsibility of the owner of the Magnetek Products to make its employees aware of all of the above listed requirements and to make certain that all operators are properly trained. **No one should use Magnetek Products prior to becoming familiar with and being trained in these requirements.**

WARRANTY INFORMATION

FOR INFORMATION ON MAGNETEK'S PRODUCT WARRANTIES BY PRODUCT TYPE, PLEASE VISIT WWW.MAGNETEK.COM.

WARNINGS and CAUTIONS

Throughout this document WARNING and CAUTION statements have been deliberately placed to highlight items critical to the protection of personnel and equipment.

WARNING – A warning highlights an essential operating or maintenance procedure, practice, etc. which if not strictly observed, could result in injury or death of personnel, or long term physical hazards. Warnings are highlighted as shown below:



CAUTION – A caution highlights an essential operating or maintenance procedure, practice, etc. which if not strictly observed, could result in damage to, or destruction of equipment, or loss of functional effectiveness. Cautions are highlighted as shown below:



WARNINGS and CAUTIONS SHOULD NEVER BE DISREGARDED.

The safety rules in this section are not intended to replace any rules or regulations of any applicable local, state, or federal governing organizations. Always follow your local lockout and tagout procedure when maintaining any radio equipment. The following information is intended to be used in conjunction with other rules or regulations already in existence. It is important to read all of the safety information contained in this section before installing or operating the Radio Control System.

1.0: CRITICAL INSTALLATION CONSIDERATIONS



WARNING

ONLY QUALIFIED INSTALLERS SHOULD INSTALL THIS RADIO CONTROL EQUIPMENT AND DRIVE EQUIPMENT. THIS MANUAL SHOULD BE CONSULTED TO MINIMIZE POTENTIAL HAZARDS WITH THE EQUIPMENT INTERFACED. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY OR DEATH AND DAMAGE TO EQUIPMENT.



WARNING

PRIOR TO INSTALLATION AND OPERATION OF THIS EQUIPMENT, READ AND DEVELOP AN UNDERSTANDING OF THE CONTENTS OF THIS MANUAL AND THE OPERATION MANUAL OF THE EQUIPMENT OR DEVICE TO WHICH THIS EQUIPMENT WILL BE INTERFACED. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY OR DEATH AND DAMAGE TO EQUIPMENT.

ALL EQUIPMENT MUST HAVE A MAINLINE CONTACTOR INSTALLED AND ALL TRACKED CRANES, HOISTS, LIFTING DEVICES AND SIMILAR EQUIPMENT MUST HAVE A BRAKE INSTALLED. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY OR DEATH AND DAMAGE TO EQUIPMENT.

AN AUDIBLE AND/OR VISUAL WARNING MEANS MUST BE PROVIDED ON ALL REMOTE CONTROLLED EQUIPMENT AS REQUIRED BY CODE, REGULATION, OR INDUSTRY STANDARD. THESE AUDIBLE AND/OR VISUAL WARNING DEVICES MUST MEET ALL GOVERNMENTAL REQUIREMENTS. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY OR DEATH AND DAMAGE TO EQUIPMENT.

FOLLOW YOUR LOCAL LOCKOUT TAGOUT PROCEDURE BEFORE MAINTAINING ANY REMOTE CONTROLLED EQUIPMENT. ALWAYS REMOVE ALL ELECTRICAL POWER FROM THE CRANE, HOIST, LIFTING DEVICE OR SIMILAR EQUIPMENT BEFORE ATTEMPTING ANY INSTALLATION PROCEDURES. DE-ENERGIZE AND TAGOUT ALL SOURCES OF ELECTRICAL POWER BEFORE TOUCH-TESTING ANY EQUIPMENT. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY OR DEATH AND DAMAGE TO EQUIPMENT.

THE DIRECT OUTPUTS OF THIS PRODUCT ARE NOT DESIGNED TO INTERFACE DIRECTLY TO TWO STATE SAFETY CRITICAL MAINTAINED FUNCTIONS, I.E., MAGNETS, VACUUM LIFTS, PUMPS, EMERGENCY EQUIPMENT, ETC. A MECHANICALLY LOCKING INTERMEDIATE RELAY SYSTEM WITH SEPARATE POWER CONSIDERATIONS MUST BE PROVIDED. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY OR DEATH OR DAMAGE TO EQUIPMENT.

1.1 GENERAL

Radio controlled material handling equipment operates in several directions. Cranes, hoists, lifting devices and other material handling equipment can be large, and operate at high speeds. Quite frequently, the equipment is operated in areas where people are working in close proximity to the material handling equipment. **The operator must exercise extreme caution at all times.** Workers must constantly be alert to avoid accidents. The following recommendations have been included to indicate how careful and thoughtful actions may prevent injuries, damage to equipment, or even save a life.

1.2 PERSONS AUTHORIZED TO OPERATE RADIO CONTROLLED EQUIPMENT

Only properly trained persons designated by management should be permitted to operate radio controlled equipment.

Radio controlled cranes, hoists, lifting devices and other material handling equipment should not be operated by any person who cannot read or understand signs, notices and operating instructions that pertain to the equipment.

Radio controlled equipment should not be operated by any person with insufficient eyesight or hearing or by any person who may be suffering from a disorder or illness, is taking any medication that may cause loss of equipment control, or is under the influence of alcohol or drugs.

1.3 SAFETY INFORMATION & RECOMMENDED TRAINING FOR OPERATORS

Anyone being trained to operate radio controlled equipment should possess as a minimum the following knowledge and skills before using the radio controlled equipment.

The operator should:

- have knowledge of hazards pertaining to equipment operation
- have knowledge of safety rules for radio controlled equipment
- have the ability to judge distance of moving objects
- know how to properly test prior to operation
- be trained in the safe operation of the radio receiver as it pertains to the crane, hoist, lifting device or other material handling equipment being operated
- have knowledge of the use of equipment warning lights and alarms
- have knowledge of the proper storage space for a radio control receiver when not in use
- be trained in transferring a radio control receiver to another person
- be trained how and when to report unsafe or unusual operating conditions
- test the receiver emergency stop and all warning devices prior to operation; testing should be done on each shift, without a load
- be thoroughly trained and knowledgeable in proper and safe operation of the crane, hoist, lifting device, or other material handling equipment that utilizes the radio control
- know how to keep the operator and other people clear of lifted loads and to avoid “pinch” points
- continuously watch and monitor status of lifted loads
- know and follow cable and hook inspection procedures
- know and follow the local lockout and tagout procedures when servicing radio controlled equipment
- know and follow all applicable operating and maintenance manuals, safety procedures, regulatory requirements, and industry standards and codes

The operator shall not:

- lift or move more than the rated load
- operate the material handling equipment if the direction of travel or function engaged does not agree with what is indicated on the controller
- use the crane, hoist or lifting device to lift, support or transport people
- lift or carry any loads over people
- operate the crane, hoist or lifting device unless all persons, including the operator, are and remain clear of the supported load and any potential pinch points
- operate a crane, hoist or lifting device when the device is not centered over the load
- operate a crane, hoist or lifting device if the chain or wire rope is not seated properly in the sprockets, drum or sheave
- operate any damaged or malfunctioning crane, hoist, lifting device or other material handling equipment
- change any settings or controls without authorization and proper training
- remove or obscure any warning or safety labels or tags
- leave any load unattended while lifted
- leave power on the radio controlled equipment when the equipment is not in operation
- operate any material handling equipment using a damaged controller because the unit may be unsafe
- operate manual motions with other than manual power
- operate radio controlled equipment when low battery indicator is on



WARNING

THE OPERATOR SHOULD NOT ATTEMPT TO REPAIR ANY RADIO CONTROLLER. IF ANY PRODUCT PERFORMANCE OR SAFETY CONCERNS ARE OBSERVED, THE EQUIPMENT SHOULD IMMEDIATELY BE TAKEN OUT OF SERVICE AND BE REPORTED TO THE SUPERVISOR. DAMAGED AND INOPERABLE RADIO CONTROLLER EQUIPMENT SHOULD BE RETURNED TO MAGNETEK FOR EVALUATION AND REPAIR. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY OR DEATH AND DAMAGE TO EQUIPMENT.

1.4 PRE-OPERATION TEST

At the start of each work shift, or when a new operator takes control of the crane, operators should do, as a minimum, the following steps before making lifts with any crane or hoist:

Test all warning devices.

Test all direction and speed controls.

Test the receiver emergency stop.

1.5 PRE-INSTALLATION

1. Transmitter and receiver access code and channel must match before the system will communicate.
2. Be aware of other radio channels in the surrounding area - set your system to a unique channel.
3. Make sure that your equipment is working properly in manual mode prior to system installation.
4. Make sure the power to the receiver is the correct voltage.
5. Disconnect equipment power prior to system installation.

2.0 RDSI SYSTEM INSTALLATION/CONFIGURATION

NOTE: Reference the specific Drive and Flex-M manuals for detailed installation notes for the Drive and Flex-M receiver. This section only references the additional requirements and details that may be needed for an RDSI system installation.

NOTE: Reference the system drawings provided by the factory for detailed wiring diagrams and drive parameter settings. This section only references the general requirements and details needed to install the Drive and Flex-M radio receiver as part of an RDSI system.



WARNING

BEFORE OPERATING THE RECEIVER FAMILIARIZE YOURSELF WITH ALL SAFETY INFORMATION IN THIS MANUAL, APPROPRIATE MANUAL SUPPLEMENTS AND ANY OTHER LOCAL, STATE, OR FEDERAL RULES OR REGULATIONS ALREADY IN EXISTENCE. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY OR DEATH AND DAMAGE TO EQUIPMENT.



WARNING

POWER SUPPLY FAILURE CAN LEAD TO UNSAFE CONDITIONS IN SOME EQUIPMENT BEING CONTROLLED BY THE RADIO CONTROLLER. THE INSTALLER SHOULD BE AWARE OF THESE RISKS AND INSTALL THE RADIO CONTROLLER IN A MANNER THAT MINIMIZES THE IMPACT A POWER SUPPLY FAILURE WILL HAVE ON RADIO CONTROLLED EQUIPMENT. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY OR DEATH AND DAMAGE TO EQUIPMENT.

2.1 GENERAL RDSI SYSTEM OVERVIEW

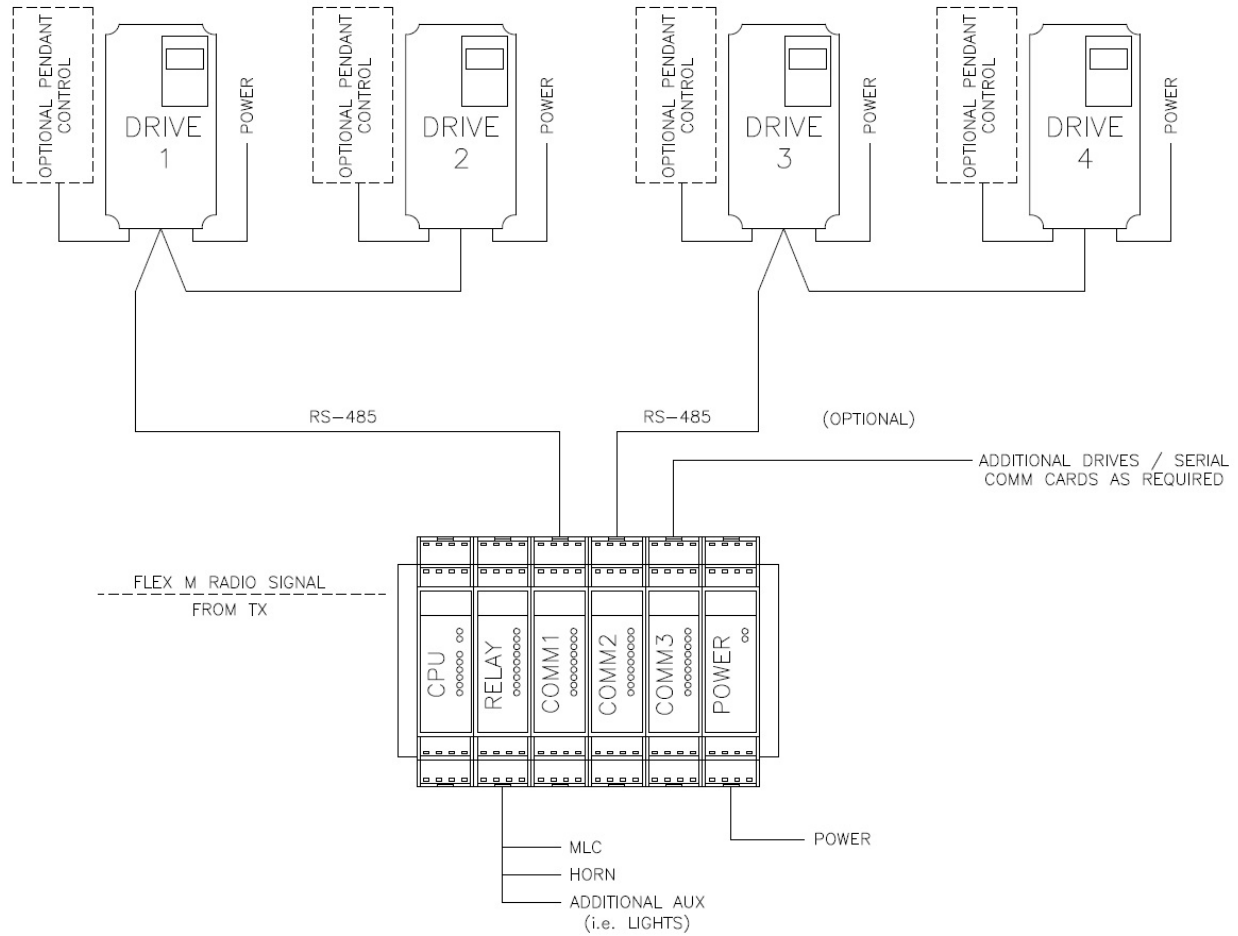


Figure 1: Basic RDSI System Block Diagram

Up to two drives can be connected to a single communication card. The final drive in the daisy chain MUST have the termination resistor turned on. The following table shows the switch that needs to be turned on for the different drive types.

Drive Type	Switch
IMPULSE®•G+ & VG+ Series 4	S2 ON (110 Ohm)
IMPULSE®•G+ & VG+ Series 3	S1-1 ON (110 Ohm)
IMPULSE®•G+ Mini	S2 ON (110 Ohm)

2.2 GENERAL WIRING DIAGRAMS

The following sections provide general drive to Flex-M wiring diagrams for RDSI setup based on drive type and pendant switchover options.

NOTE: Reference the system drawings provided by the factory for detailed wiring diagrams. This section only references the general requirements and details needed to install the drive and Flex-M radio receiver as part of an RDSI system.

The following table lists the typical wiring connections between the Flex-M serial communication module and the drive:

Flex-M Terminal Function	Terminal On Flex-M	Terminal On Drive	Drive Terminal Function
RS422 Z (TX B)	13	R-	Receive (-)
RS422/485 B (RX B)	14	S-	Transmit (-)
RS422 Y (TX A)	15	R+	Receive (+)
RS422/485 A (RX A)	16	S+	Transmit (+)
N/A	None	IG	Shield

2.2.1 Stepless RDSI Using an IMPULSE®•G+ Mini Drive

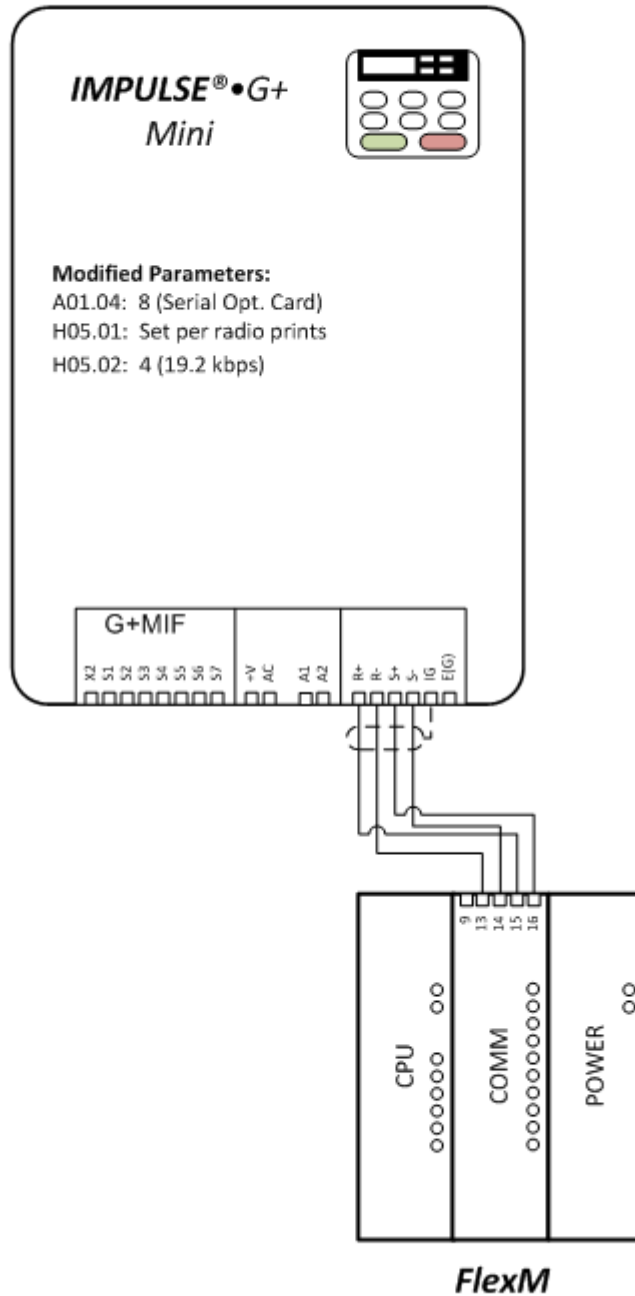


Figure 2: Basic RDSI Wiring Diagram for Stepless RDSI Using an IMPULSE®•G+ Mini Drive

2.2.3 Stepped or Infinitely Variable RDSI Using an IMPULSE®•G+ Mini Drive and Stepped Pendant Switchover

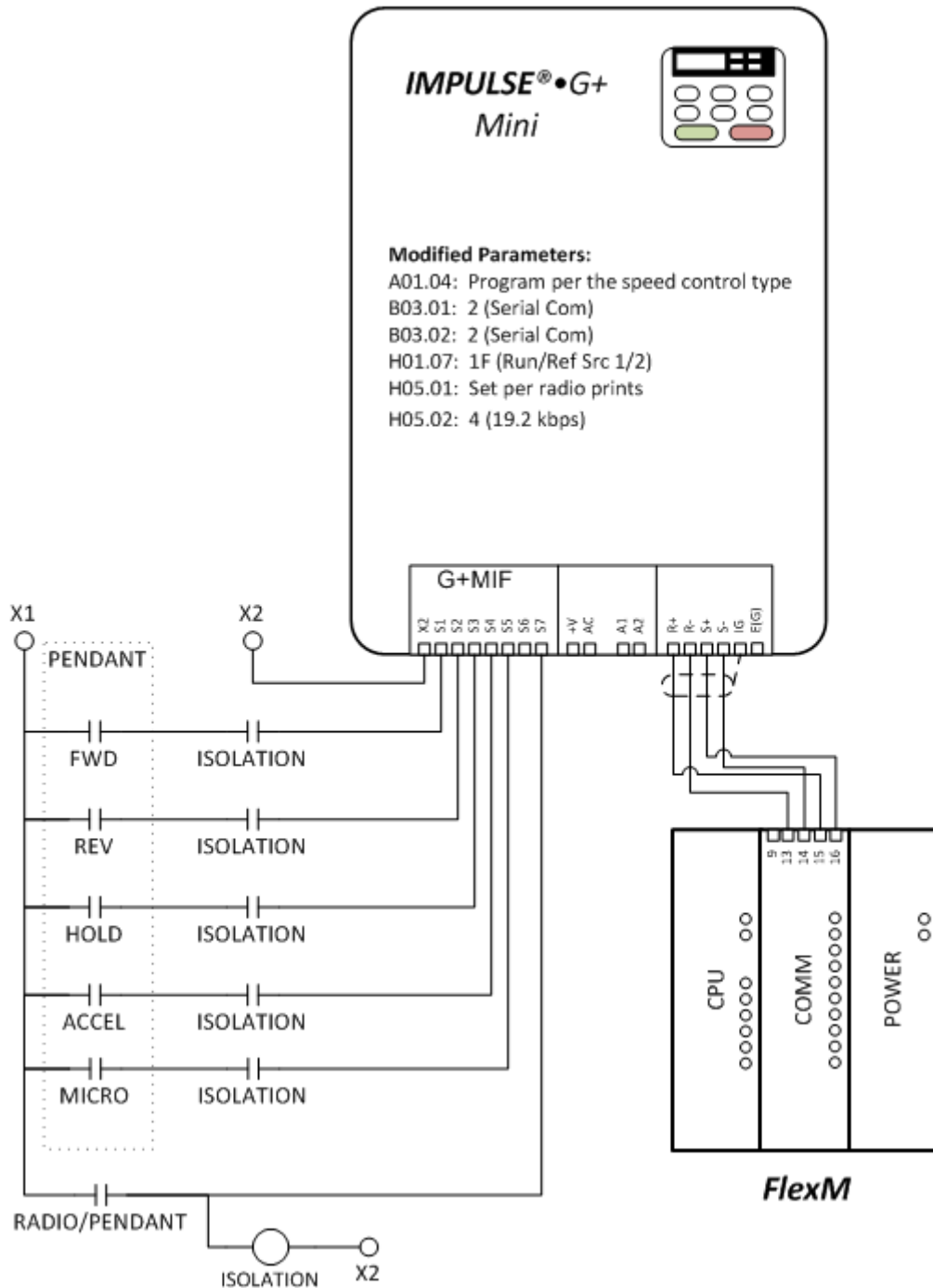


Figure 4: Basic RDSI Wiring Diagram for Stepped or Infinitely Variable RDSI Using an IMPULSE®•G+ Mini Drive with Pendant Switchover

2.2.4 Stepless RDSI Using an IMPULSE®•G+ Mini Drive and Stepless Pendant Switchover

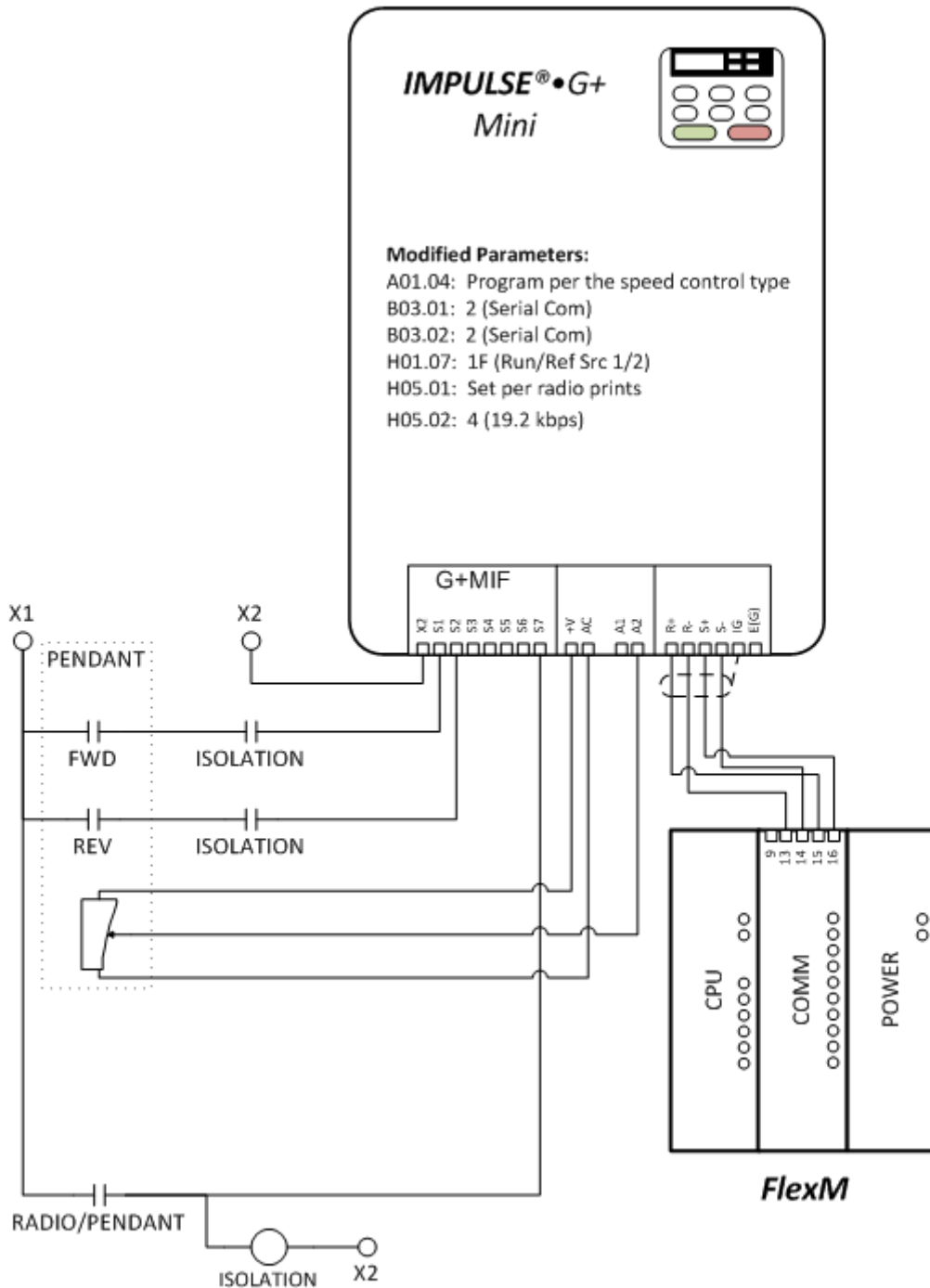


Figure 5: Basic RDSI Wiring Diagram for Stepless RDSI Using an IMPULSE®•G+ Mini Drive with Stepless Pendant Switchover

2.2.5 Stepless RDSI Using an IMPULSE®•G+ & VG+ Series 3 Drive

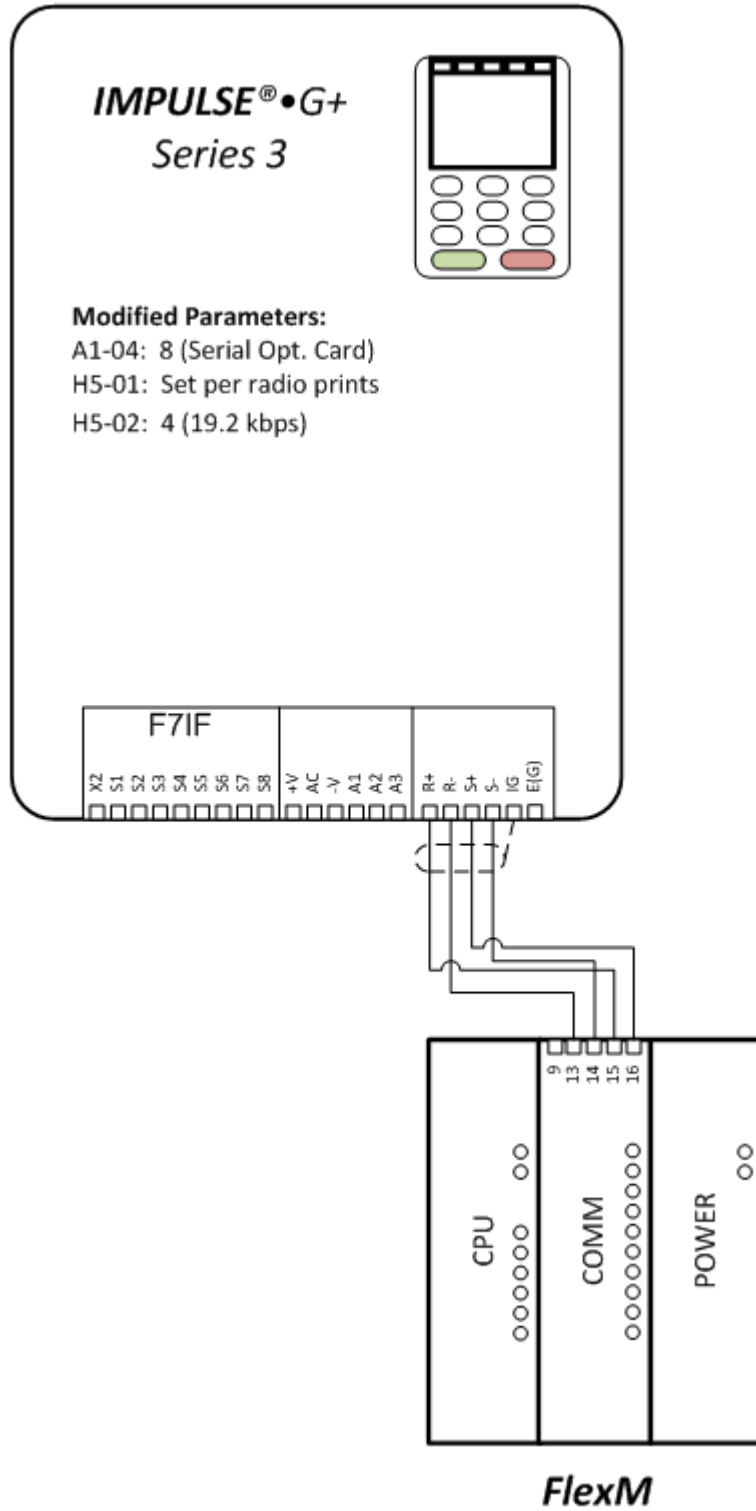


Figure 6: Basic RDSI Wiring Diagram for Stepless RDSI Using an IMPULSE®•G+ & VG+ Series 3 Drive

2.2.6 Stepless RDSI Using an IMPULSE®•G+ & VG+ Series 3 Drive and Stepped Pendant Switchover

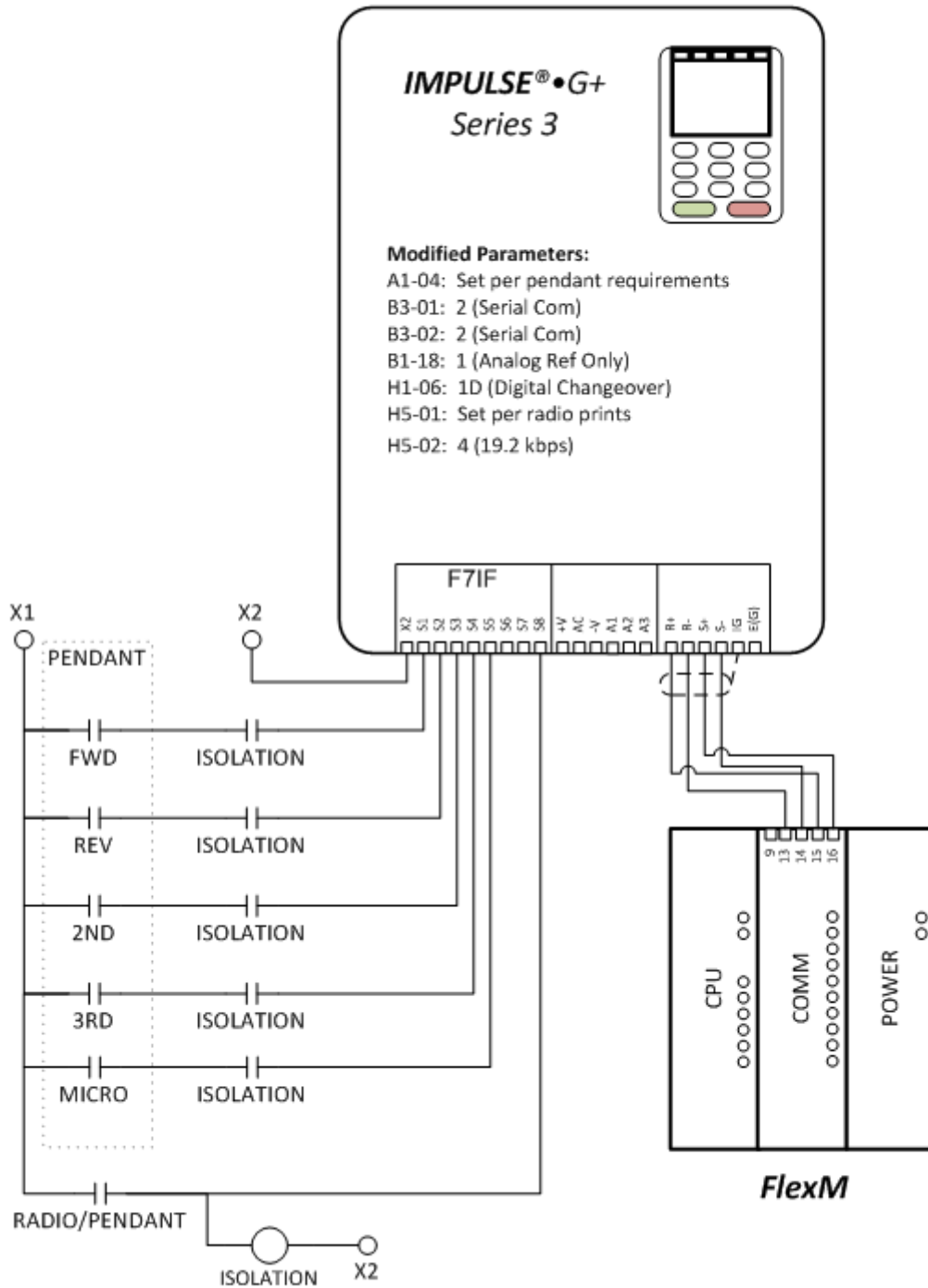


Figure 7: Basic RDSI Wiring Diagram for Stepless RDSI Using an IMPULSE®•G+ & VG+ Series 3 Drive and Stepped Pendant Switchover

2.2.7 Stepped or Infinitely Variable RDSI Using an IMPULSE®•G+ & VG+ Series 3 Drive and Stepped Pendant Switchover

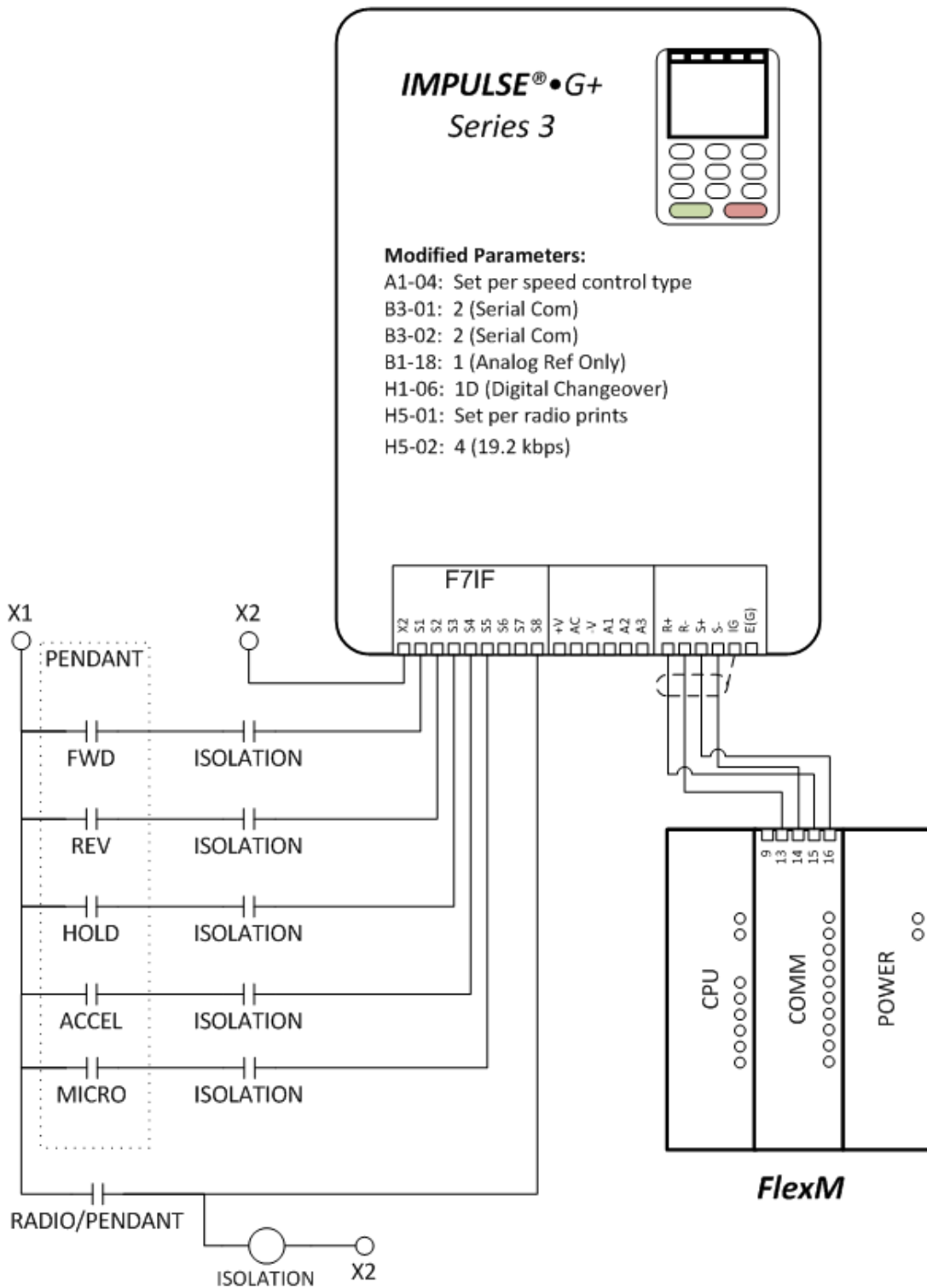


Figure 8: Basic RDSI Wiring Diagram for Stepped or Infinitely Variable RDSI Using an IMPULSE®•G+ & VG+ Series 3 Drive with Pendant Switchover

2.2.8 Stepless RDSI Using an IMPULSE®•G+ & VG+ Series 3 Drive and Stepless Pendant Switchover

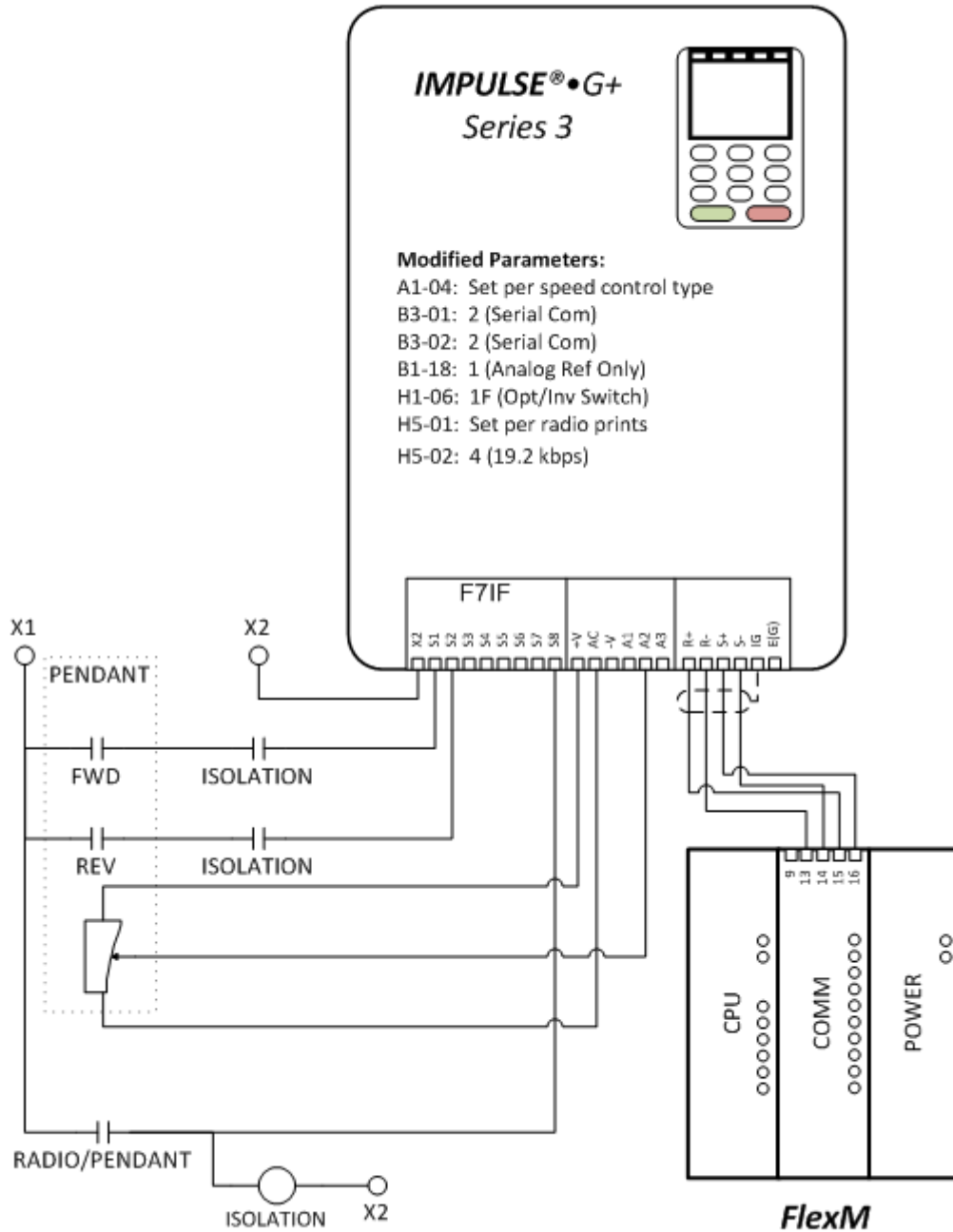


Figure 9: Basic RDSI Wiring Diagram for Stepless RDSI Using an IMPULSE®•G+ & VG+ Series 3 Drive with Stepless Pendant Switchover

2.2.9 Stepless RDSI Using an IMPULSE®•G+ & VG+ Series 4 Drive

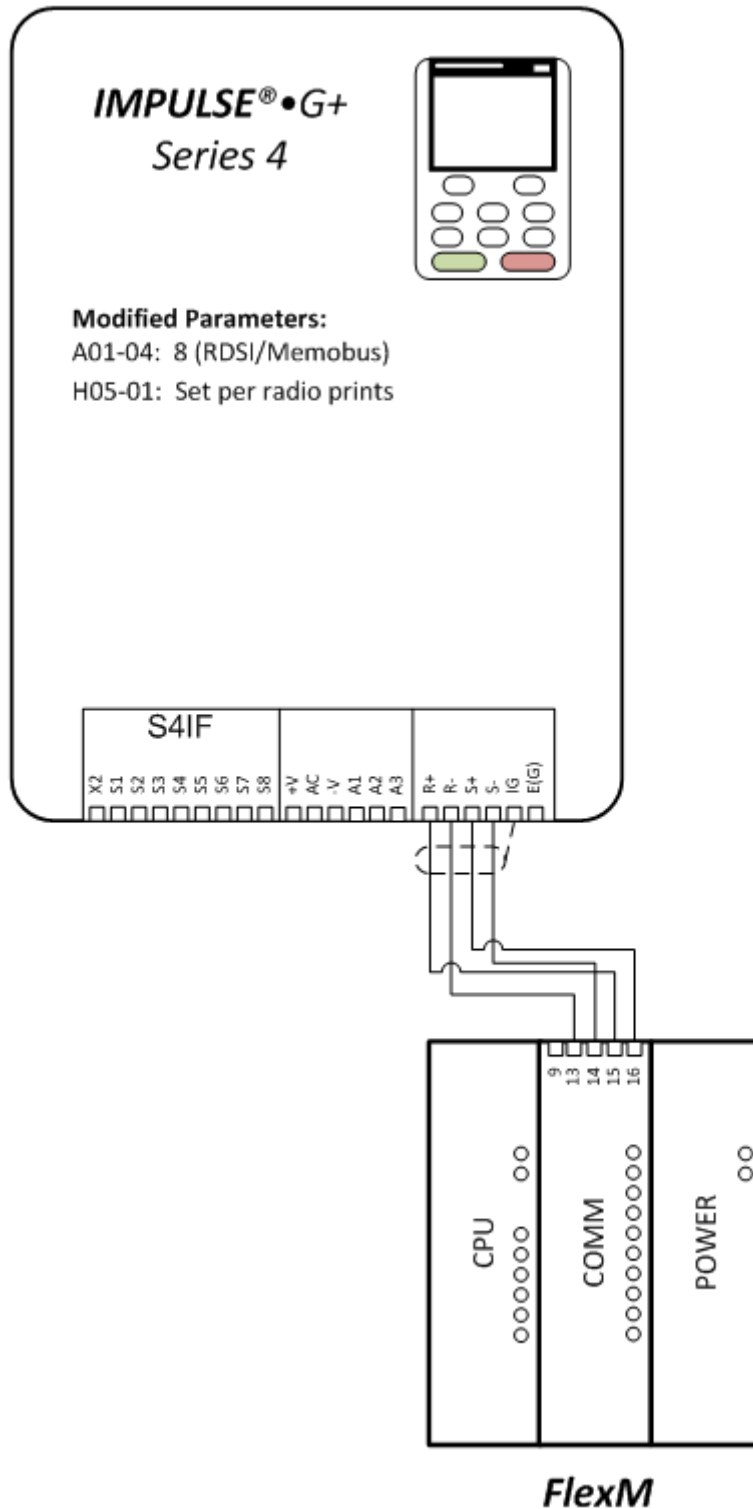


Figure 10: Basic RDSI Wiring Diagram for Stepless RDSI Using an IMPULSE®•G+ & VG+ Series 4 Drive

2.2.10 Stepless RDSI Using an IMPULSE®•G+ & VG+ Series 4 Drive and Stepped Pendant Switchover

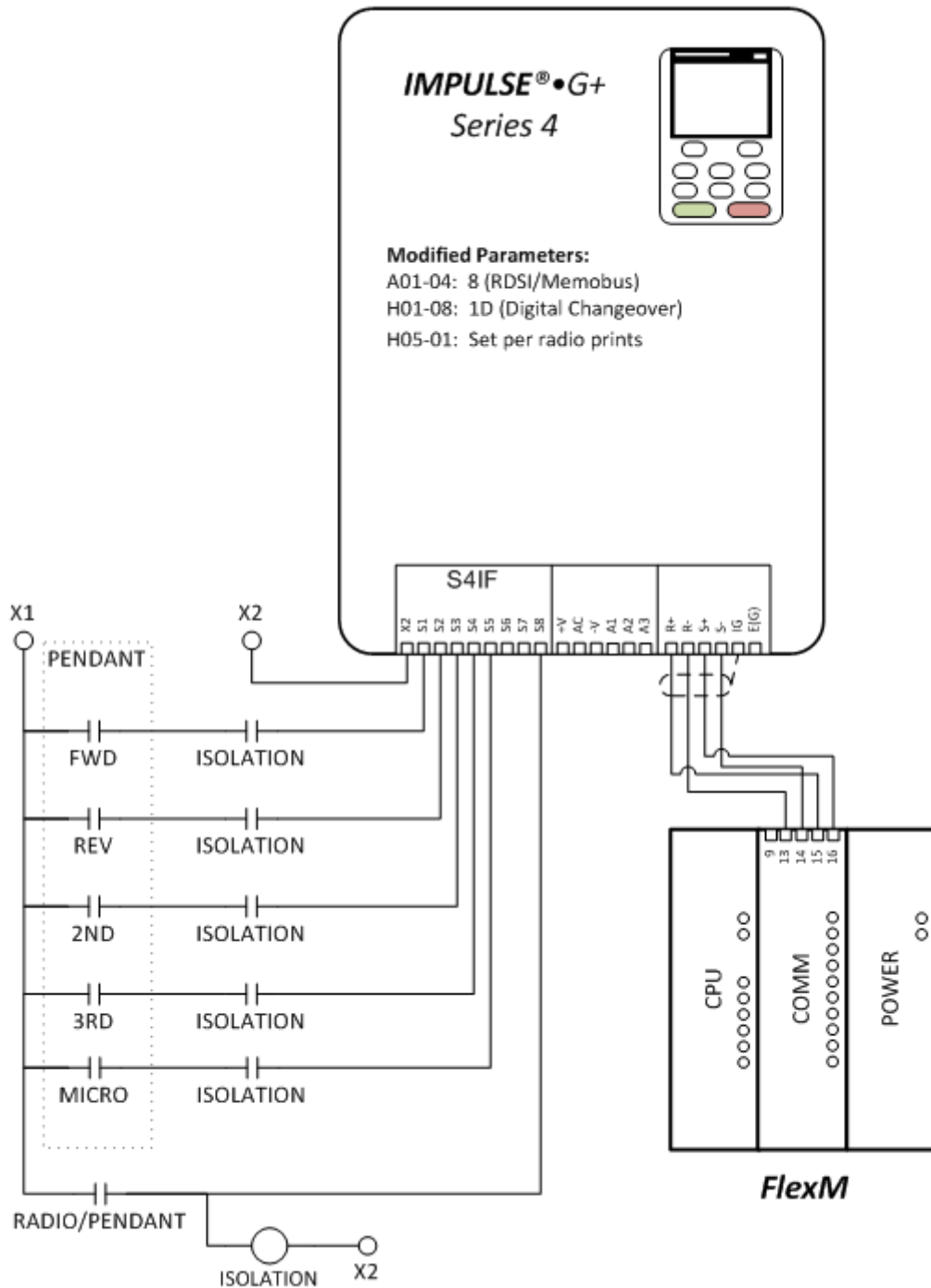


Figure 11: Basic RDSI Wiring Diagram for Stepless RDSI Using an IMPULSE®•G+ & VG+ Series 4 Drive and Stepped Pendant Switchover

2.2.11 Stepped or Infinitely Variable RDSI Using an IMPULSE®•G+ & VG+ Series 4 Drive and Stepped Pendant Swichover

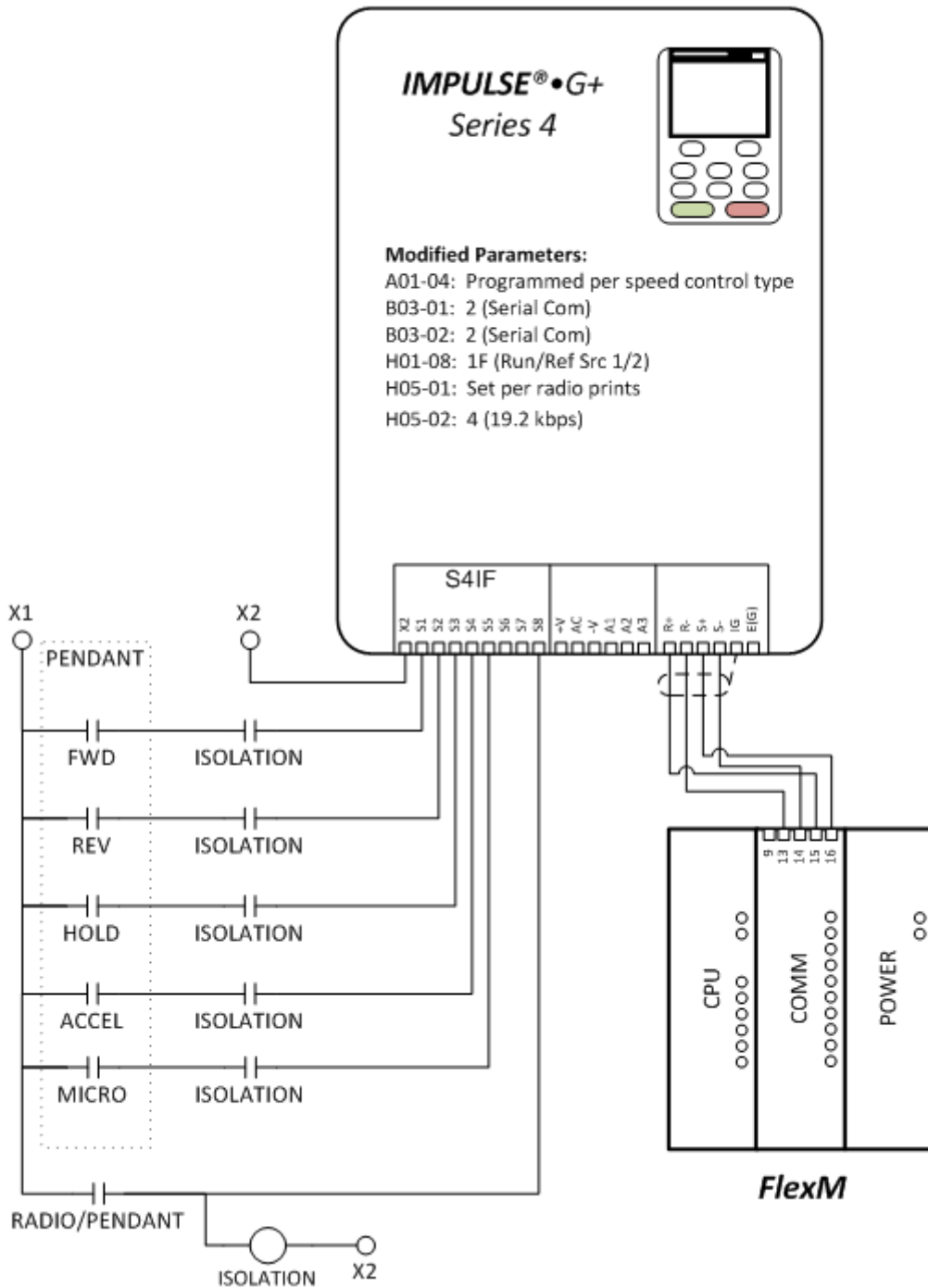


Figure 12: Basic RDSI Wiring Diagram for Stepped or Infinitely Variable RDSI Using an IMPULSE®•G+ & VG+ Series 4 Drive with Pendant Swichover

2.2.12 Stepless RDSI Using an IMPULSE®•G+ & VG+ Series 4 Drive and Stepless Pendant Switchover

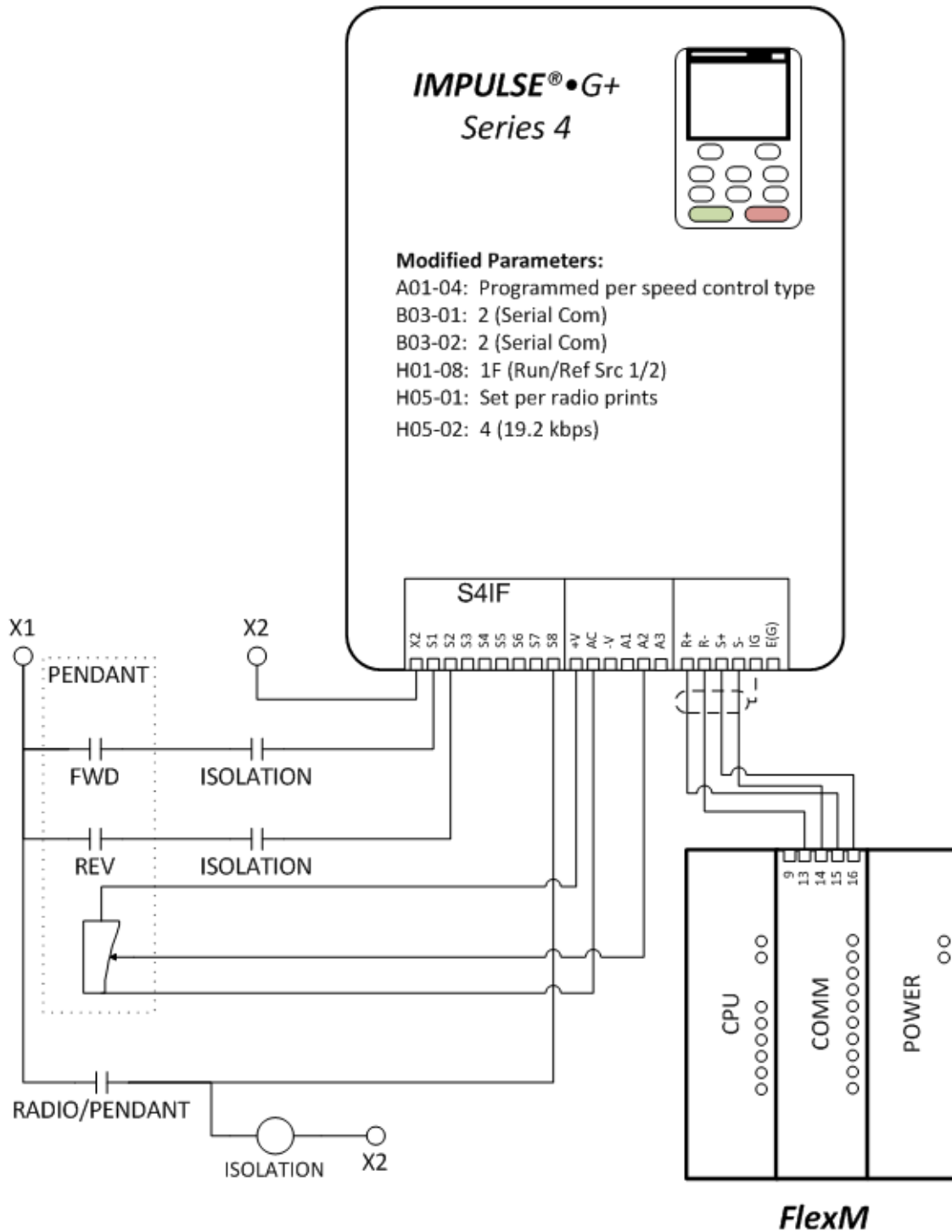


Figure 13: Basic RDSI Wiring Diagram for Stepless RDSI Using an IMPULSE®•G+ & VG+ Series 4 Drive with Stepless Pendant Switchover

2.3 DRIVE PARAMETER SETTINGS

The following sections provide general drive parameter settings for RDSI setup based on drive type and pendant switchover options.

NOTE: Reference the system drawings provided by the factory for detailed drive parameter settings for your application.

2.3.1 IMPULSE®•G+ Mini Series Drive RDSI General Parameter Settings

The following parameters must be set to have RDSI function properly, regardless of using proportional or discrete speed RDSI:

Parameter Code	Function	Parameter Setting
B03.01	Reference Source	Must be set to 2 (Serial Communications)
B03.02	Run Source	Must be set to 2 (Serial Communications)
H05.01	Drive Serial Communication Address	Memobus address of each drive and is the unique identifier the Flex-M receiver uses to determine which drive is communicating on a communication network (refer to radio system drawings provided by the factory for specific drive address settings for your application).
H05.02	Serial Baud Rate	Must be set to 4 (19200 Baud)

The following parameter must be set if NOT using a pendant switchover (radio control of drive only):

A01.04	Speed Reference	Must be set to 8 (RDSI/Memobus reference only, which sets all terminals to "not used").
--------	-----------------	---

The following parameter must be set if using a pendant switchover:

A01.04	Speed Reference	When using a Multi-Step or Infinitely Variable reference, refer to the drive manual for the correct parameter setting and its associated X-Press Programming parameters (refer to system drawings provided by the factory for parameter setting for your application or refer to the IMPULSE®•G+ MINI Series Drive manual).
B01.18	Reference Priority	Refer to system drawings provided by the factory for parameter settings for your application or refer to the IMPULSE®•G+ MINI Series Drive manual.

The following parameter must be set if using stepless RDSI with a stepped pendant switchover:

H01.07	Input terminal S7 select	Typically set to 1D, used for digital changeover input
--------	--------------------------	--

The following parameter must be set if using stepped/infinitely variable RDSI with a stepped pendant switchover:

H0.07	Input terminal S7 select	Typically set to 1F (Run/Ref SRC 1/2)
-------	--------------------------	---------------------------------------

The following parameter must be set if using stepless RDSI with a stepless pendant switchover:

H01.07	Input terminal S7 select	Typically set to 1F (Run/Ref SRC 1/2)
--------	--------------------------	---------------------------------------

NOTE: These settings are for referencing only the drive run inputs from the serial communication input as a default. The digital changeover will have the drive reference the run inputs from the discrete inputs to the drive instead. Note that when the drive parameter B01.18 is set to 2 the drive will always be monitoring both the serial communication and the discrete inputs for the speed reference, and these settings will have the drive apply the higher speed reference to the drive should both sources of control be providing a speed reference at the same time.

2.3.2 IMPULSE®•G+ & VG+ Series 3 Drive RDSI General Parameter Settings

The following parameters must be set to have RDSI function properly, regardless of using proportional or discrete speed RDSI:

Parameter Code	Function	Parameter Setting
B3-01	Reference Source	Must be set to 2 (Serial Communications)
B3-02	Run Source	Must be set to 2 (Serial Communications)
H5-01	Drive Serial Communication Address	Memobus address of each drive and is the unique identifier the Flex-M receiver uses to determine which drive is communicating on a communication network (refer to radio system drawings provided by the factory for specific drive address settings for your application).
H5-02	Serial Baud Rate	Must be set to 4 (19200 Baud)

The following parameter must be set if NOT using a pendant switchover (radio control of drive only):

A1-04	Speed Reference	Must be set to 8 (RDSI/Memobus reference only; sets all terminals to "not used")
-------	-----------------	--

The following parameters must be set if using proportional speed RDSI with a pendant switchover:

B2-01	Reference Upper Limit	Adjust as needed (typically set to 100.0, but can be set from 0.0 to 110.0%)
E1-04	Maximum Frequency	Adjust as needed (typically set to 60.0, but can be set from 40.0 to 150.0 Hz)

The following parameters must be set if using discrete (stepped) speed RDSI (or discrete speed pendant switchover):

B1-01	First speed frequency	Adjust as needed (typically set to 6.00 for 5 Speed pendant and/or RDSI)
B1-02	Second speed frequency	Adjust as needed (typically set to 15.00 for 5 Speed pendant and/or RDSI)
B1-03	Third speed frequency	Adjust as needed (typically set to 30.00 for 5 Speed pendant and/or RDSI)
B1-04	Fourth speed frequency	Adjust as needed (typically set to 45.00 for 5 speed pendant and/or RDSI)
B1-05	Fifth speed frequency	Adjust as needed (typically set to 60.00 for 5 speed pendant and/or RDSI)

The following parameters must be set if using a pendant switchover:

A1-04	Speed Reference	When using a Multi-Step or Infinitely Variable reference, refer to the drive manual for the correct parameter setting and its associated X-Press Programming parameters (refer to system drawings provided by the factory for the parameter settings for your application, or refer to the IMPULSE®•G+ & VG+ Series 3 Drive manual).
H1-18	Reference Priority	Refer to system drawings provided by the factory for parameter settings for your application, or refer to the IMPULSE®•G+ & VG+ Series 3 Drive manual.
H1-01	Input terminal S3 select	*NOTE: Refer to system drawings provided by the factory for the parameter settings for your application, or refer to IMPULSE®•G+ & VG+ Series 3 Drive manual.
H1-02	Input terminal S4 select	
H1-03	Input terminal S5 select	
H1-04	Input terminal S6 select	
H1-06	Input terminal S8 select	
		(Typically set to 1D, used for digital changeover input)

NOTE: IMPULSE®•G+ & VG+ Series 3 drive software must be at revision level 8001.7a or later for these parameter settings to function properly. See the drive manual for details on how to find flash ROM software ID number.

NOTE: These settings are for referencing only the drive run inputs from the serial communication input as a default. The digital changeover will have the drive reference the run inputs from the discrete inputs to the drive instead. Note that when the drive parameter B1-18 is set to 2 the drive will always be monitoring both the serial communication and the discrete inputs for the speed reference, and these settings will have the drive apply the higher speed reference to the drive should both sources of control be providing a speed reference at the same time.

2.3.3 IMPULSE®•G+ & VG+ Series 4 Drive RDSI General Parameter Settings

The following parameters must be set to have RDSI function properly, regardless of using proportional or discrete speed RDSI:

Parameter Code	Function	Parameter Setting
B03-01	Reference Source	Must be set to 2 (Serial Communications)
B03-02	Run Source	Must be set to 2 (Serial Communications)
H05-01	Drive Serial Communication Address	Memobus address of each drive and is the unique identifier the Flex-M receiver uses to determine which drive is communicating on a communication network (refer to the radio system drawings provided by the factory for specific drive address settings for your application).
H05-02	Serial Baud Rate	Must be set to 4 (19200 Baud)

The following parameter must be set if NOT using a pendant switchover (radio control of drive only):

A01-04	Speed Reference	Must be set to 8 (RDSI/Memobus reference only; sets all terminals to "not used")
--------	-----------------	--

The following parameters must be set if using proportional speed RDSI with a pendant switchover:

B02-01	Reference Upper Limit	Adjust as needed (typically set to 100.0, but can be set from 0.0 to 110%)
E01-04	Maximum Frequency	Adjust as needed (typically set to 60.0, but can be set from 40.0 to 150.0 Hz)

The following parameters must be set if using discrete speed RDSI (or discrete speed pendant switchover):

B01-01	First speed frequency	Adjust as needed (typically set to 6.00 for 5 Speed pendant and/or RDSI)
B01-02	Second speed frequency	Adjust as needed (typically set to 15.00 for 5 Speed pendant and/or RDSI)
B01-03	Third speed frequency	Adjust as needed (typically set to 30.00 for 5 Speed pendant and/or RDSI)
B01-04	Fourth speed frequency	Adjust as needed (typically set to 45.00 for 5 speed pendant and/or RDSI)
B01-05	Fifth speed frequency	Adjust as needed (typically set to 60.00 for 5 speed pendant and/or RDSI)

The following parameter must be set if using a pendant switchover:

A01-04	Speed Reference	When using a Multi-Step or Infinitely Variable reference refer to the drive manual for the correct parameter setting and its associated X-Press Programming parameters (refer to system drawings provided by the factory for the parameter settings for your application, or refer to the IMPULSE®•G+ & VG+ Series 4 Drive manual).
B01-18	Reference Priority	Refer to system drawings provided by the factory for the parameter settings for your application, or refer to IMPULSE®•G+ & VG+ Series 4 Drive manual.
H01-01	Input terminal S1 select	Typically set to 80 – Forward
H01-02	Input terminal S2 select	Typically set to 81 – Reverse
H01-03	Input terminal S3 select	*NOTE: Refer to system drawings provided by the factory for the parameter settings for your application, or refer to the IMPULSE®•G+ & VG+ Series 4 Drive manual.
H01-04	Input terminal S4 select	
H01-05	Input terminal S5 select	
H01-06	Input terminal S6 select	
H01-08	Input terminal S8 select	

NOTE: These settings are for referencing only the drive run inputs from the serial communication input as a default. The digital changeover will have the drive reference the run inputs from the discrete inputs to the drive instead. Note that when the drive parameter B01-18 is set to 2 the drive will always be monitoring both the serial communication and the discrete inputs for the speed reference, and these settings will have the drive apply the higher speed reference to the drive should both sources of control be providing a speed reference at the same time.

2.4 FLEX-M INSTALLATION NOTES

1. **Be sure to mount the receiver antenna in direct line-of-sight of the operator and free from all obstructions.** Do not enclose the antenna in steel. For best reception, keep all metal objects away from the antenna. **Consult the factory for more information regarding your application.**
2. Do not mount the receiver near high levels of electric noise, such as an unshielded variable frequency drive, as it may cause minor interference. When mounting the Flex-M near an unshielded variable frequency drive, **Magnetek typically recommends that the Flex-M and all antenna cable routing be mounted a minimum of 24 inches away from all unshielded variable frequency drives.**
3. The supply power to the Flex-M system must have a master disconnect and should be fused.
4. The relay module in the Flex-M radio receiver system can handle line current up to 5A. Some situations may require the use of an intermediate relay to handle currents greater than the 5A rating of the Flex-M relay module. Typically the main line for crane applications requires the use of an intermediate relay. The main line current requirements should be reviewed, and an intermediate relay installed if required, prior to applying power to the Flex-M system for the first time.

NOTE: Magnetek strongly recommends the use of external fuses and circuit disconnects for all Flex Modules. Consult factory for more information.

2.4.1 Flex-M Serial Communications Module Wiring Schematic

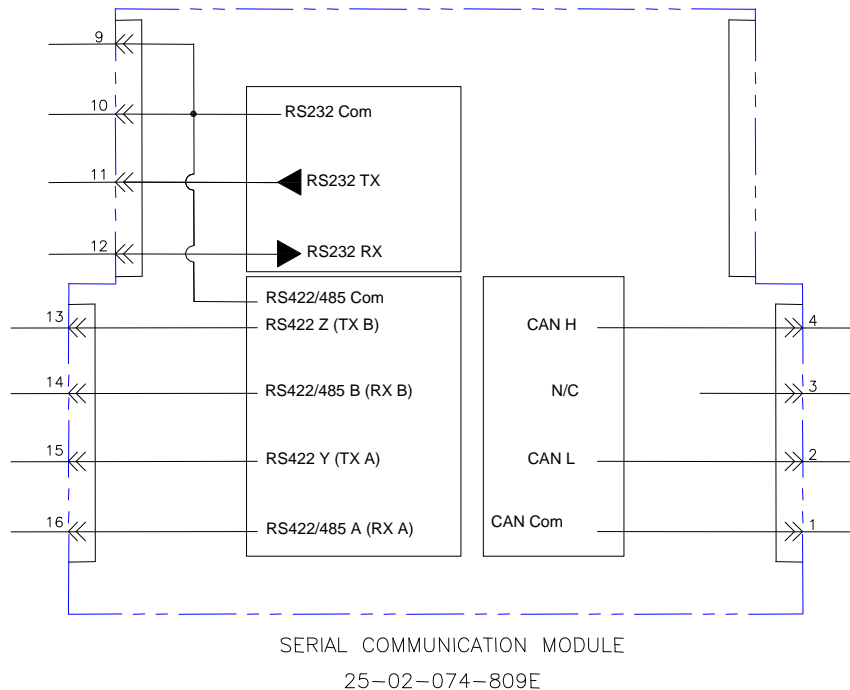


Figure 14: Typical Serial Communications Module Wiring



WARNING

PRIOR TO PLACING ANY MOTION INTO SERVICE THE DIRECTION OF EACH MOTION SHOULD BE VERIFIED. IF THE DIRECTION OF THE MOTION IS INCORRECT, PLEASE REFER TO THE DRAWINGS PROVIDED WITH THE SYSTEM TO DETERMINE WHICH DIP SWITCH SHOULD BE CHANGED TO REVERSE THE DIRECTION. IF THERE ARE NO NOTES ON THE DRAWING, PLEASE CONTACT THE FACTORY.

2.5 RADIO TRANSMITTER SETUP NOTES

NOTE: Refer to the radio transmitter manual and the system drawings provided by the factory for detailed setup instructions.

For RDSI function information to be displayed on the radio transmitter's graphic user interface display, follow the steps to enter the setup menu in the radio transmitter's manual. After entering the setup mode, use the motion controls described in the manual to scroll through the setup options until Drive Stat 1 is displayed.

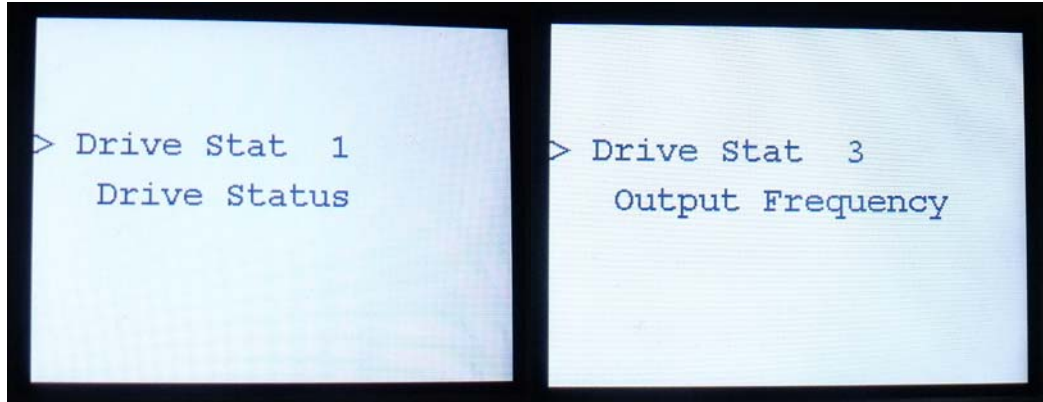


Figure 15: Typical Radio Transmitter Drive Status Setup Display Screens

The operator can use the transmitter motion control to scroll through the following drive status options:

- NONE
- DRIVE STATUS
- FREQUENCY REFERENCE
- OUTPUT FREQUENCY
- OUTPUT VOLTAGE
- OUTPUT CURRENT
- OUTPUT POWER
- OUTPUT TORQUE REFERENCE
- LOAD WEIGHT

NOTE: The load weight function needs to be calibrated on the drive to provide accurate data. Refer to the drive manual for how to calibrate the weight signal.

Use the motion control to select and modify the display parameters for the remaining three status lines (there are a total of four status lines available for each drive attached to the radio system).

NOTE: The display status options will display the same options for all drives attached to the radio system.

After making the display option selections, exit the setup menu using the Save and Exit option to save the drive display status options.

3.0 NORMAL OPERATION

This section describes the features of RDSI under normal operation.

3.1 FLEX-M OPERATION

NOTE: Refer to the Flex-M radio receiver manual for detailed operation details.

During the normal operation of the Flex-M receiver, following the LED indicators will allow observation of the status of the Flex-M receiver.

3.1.1 RF/CPU Module

When the Flex-M system is supplying power to the RF/CPU module, there is a series of LEDs that will indicate the RF/CPU module's status.

- WDG/ONLINE LED – Solid indicates RF communication with transmitter
- 1 Blink indicates normal operating WDG
 - 2 Blinks indicates RF communication loss with transmitter
 - 3 Blinks indicates read/write error to attached relay module

RF MSG LED – radio frequency messages received (typical is 4 to 10 messages per second). Confirms communication between transmitter and receiver

RF SIGNAL LED – measures the strength of the RF communication signal from the transmitter

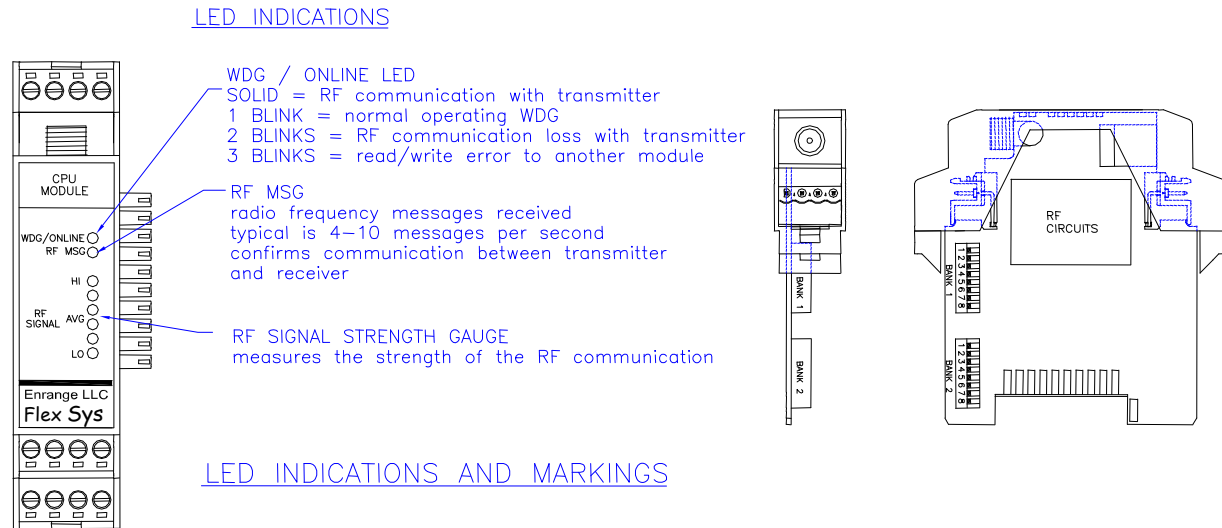


Figure 16: RF/CPU Module Detail View
(For all RF/CPU modules except 900MHz 1W (25-02-074-807E) & 900MHz 200mW (25-02-074-815E))

3.1.2 Serial Communication Module(s)

When the Flex-M system is supplying power to the Serial Communication module, there is an LED that indicates the power and communication status of the Serial Communication module.

- OK LED – Solid indicates module communication with system is good
- 3 Blinks indicates read/write error to attached CPU

Additionally, there are eight LEDs labeled 1 through 8 on the Serial Communication module.

When LED number 3 is blinking, this indicates that the Serial Communication Card is communicating with the attached drive.

When LED number 5 is on steady, this indicates there is a serial communication time-out error. The serial communication was inactive for 1 second. See the Troubleshooting section of the Flex-M manual for additional information.

When LED number 6 is on steady, this indicates that the Serial Communication is in test mode. See the Troubleshooting section of the Flex-M manual for additional information.

NOTE: LED 6 should not illuminate during normal operation. If it does, there is likely a wiring issue between the drive and the Flex-M serial communication module.

When LED number 7 is on steady, this indicates that the CPU module is sending a drive forward command.

When LED number 8 is on steady, this indicates that the CPU module is sending a drive reverse command.

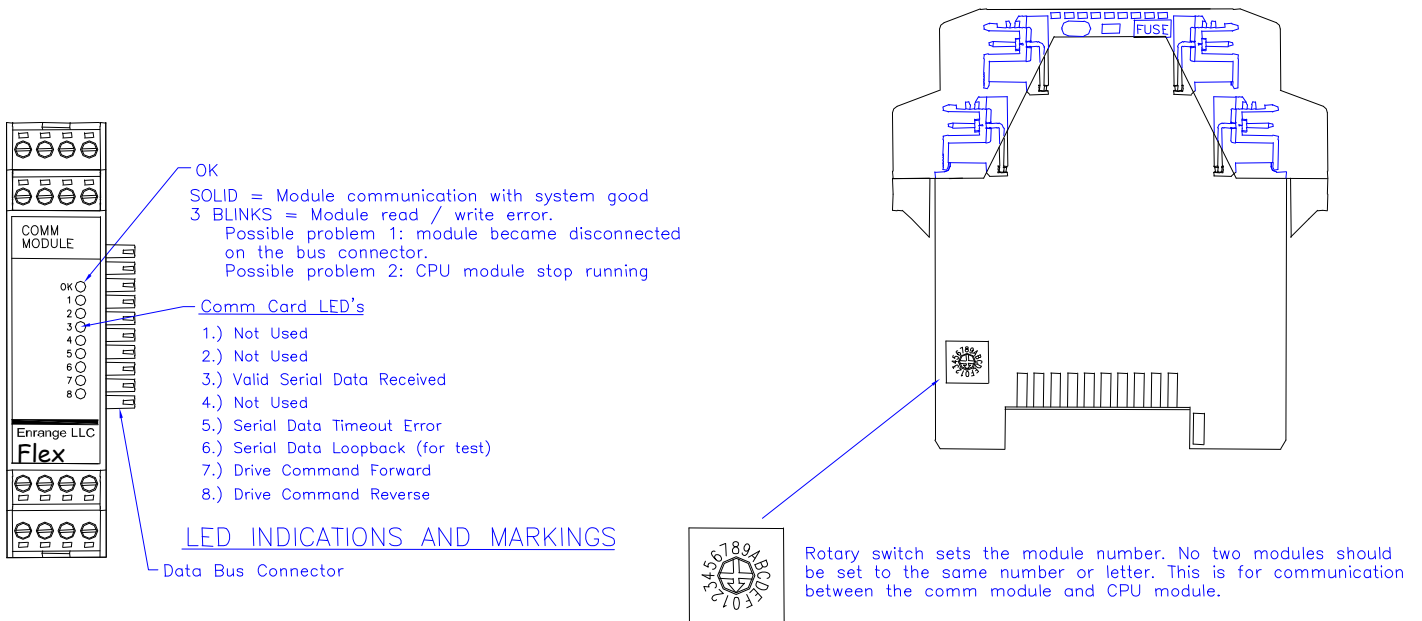


Figure 17: Serial Communications Module Detail View

3.2 RADIO TRANSMITTER OPERATION

NOTE: Refer to the radio transmitter manual for detailed operation details.

During normal operation of the transmitter, the graphic user interface display on the transmitter can display information about the RDSI drive that is under operation. The following display example illustrates the transmitter display screen that is used in normal operation of drives attached by RDSI to the radio system.

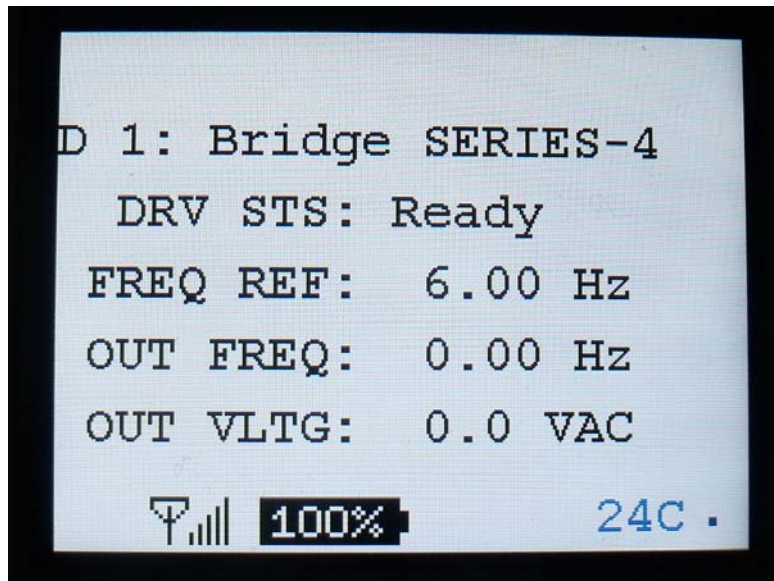


Figure 18: Transmitter Display During RDSI Operation

The first line at the top of the display shows faults or alerts as communicated by the drives (see Section 4.2 for details on how to interpret fault or alert codes).

The second line shows the drive number, function, and what drive model it is.

The third line displays the first drive status line option selected in the setup (see Section 2.5).

The fourth line displays the second drive status line option selected in the setup (see Section 2.5).

The fifth line displays the third drive status line option selected in the setup (see Section 2.5).

The sixth line displays the fourth drive status line option selected in the setup (see Section 2.5).

The seventh line at the bottom of the display shows the radio transmitter status information (see the radio transmitter manual for details on the status icons).

If a drive is not connected or is offline when the transmitter gives the command to pull in the mainline contactor, the drive type will display as "NONE" on the transmitter graphic user interface display and the status lines will display "no data".

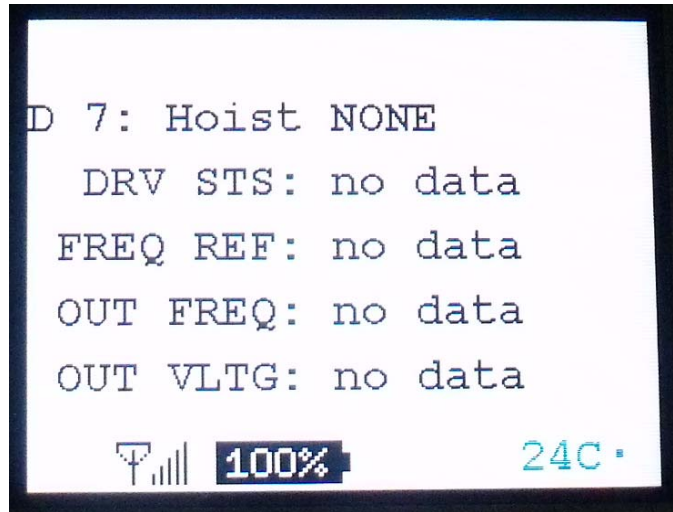


Figure 19: Transmitter Display Example Of Drive Status When Drive Is Not Communicating To Radio System

If communication is lost to a drive via communication timeout or an error during normal operation, the Flex-M receiver will open the mainline contactor. Refer to the Troubleshooting section (Section 4.0) for details to resolve.

NOTE: The Flex-M will only open the mainline contactor when it loses communication with drives that have established a communication link to the Flex-M upon startup. If the drive is offline upon startup, the Flex-M will not establish a communication link.

4.0 TROUBLESHOOTING

NOTE: For detailed troubleshooting information, refer to the manual(s) of the equipment that is not performing normally.

NOTE: Fault and Alert codes displayed by the graphic user display interface on both the drive unit and the radio transmitter can be referenced in the drive unit manual.

4.1 FLEX-M SERIAL COMMUNICATION MODULE LOOPBACK TEST

If the drive is not communicating with the Flex-M serial communication module, verify that the serial communication module hardware is working properly by testing it while isolated from the drive. The following procedure outlines how to place the serial communication module into test mode:

With the power off, disconnect the communication wires from the Flex-M serial communication module that is being checked.

Place a jumper between serial communication module pins 13 and 14, and place another jumper on pins 15 and 16. After powering up the Flex-M, LED 6 on the serial communication module should illuminate, indicating a successful loopback communication signal and that the serial communication module hardware is working properly.

NOTE: Disconnect the drive communication wiring from the Flex-M serial communication module prior to applying the jumpers or there may be incorrect status illumination by LED 6.

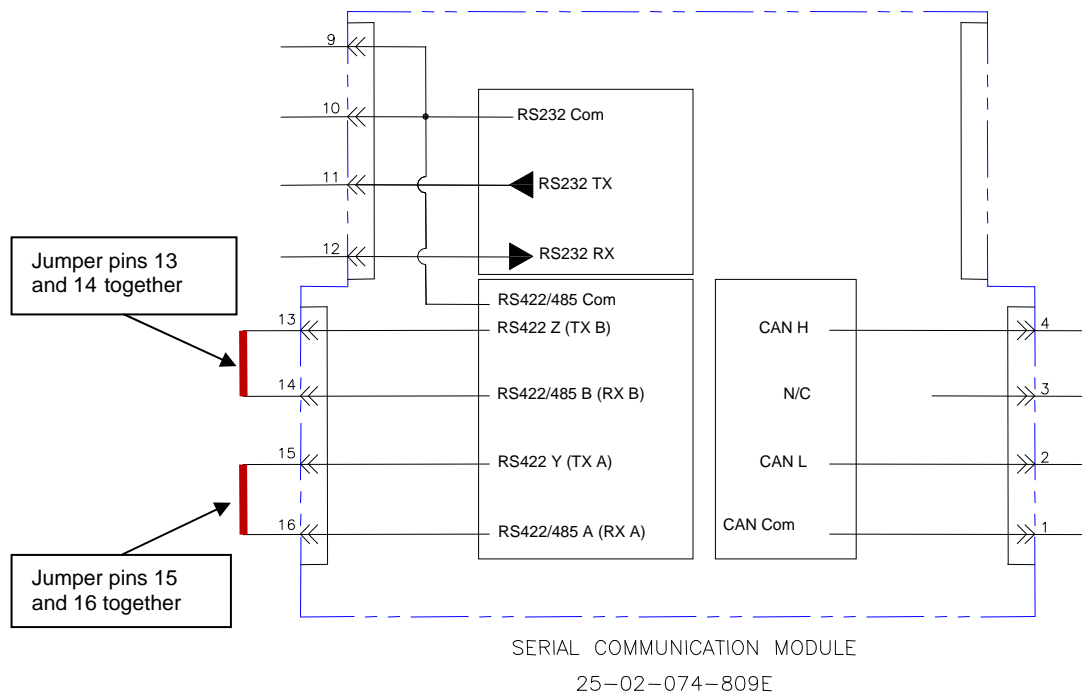


Figure 20: Serial Communications Module Loopback Test Wiring Diagram

Power down the Flex-M radio receiver and replace the loopback jumpers with the drive communication wires per the details in Section 2.2 of this manual or per the system drawings provided by the factory.

If LED 6 does not illuminate during the loopback testing, then replace the serial communication module.

NOTE: LED 6 should not illuminate during normal operation. If it does, there is likely a wiring issue between the drive and the Flex-M serial communication module.

4.2 RADIO TRANSMITTER FAULT/ALERT DISPLAY DETAILS

NOTE: Fault and Alert codes displayed by the graphic user display interface on both the drive unit and the radio transmitter can be referenced in the drive unit manual.

The radio transmitter's graphic user display will display fault and alert codes sent by the drive units that are connected to the Flex-M serial communication modules. The following figure shows an example of a fault code displayed on the graphic user interface display.

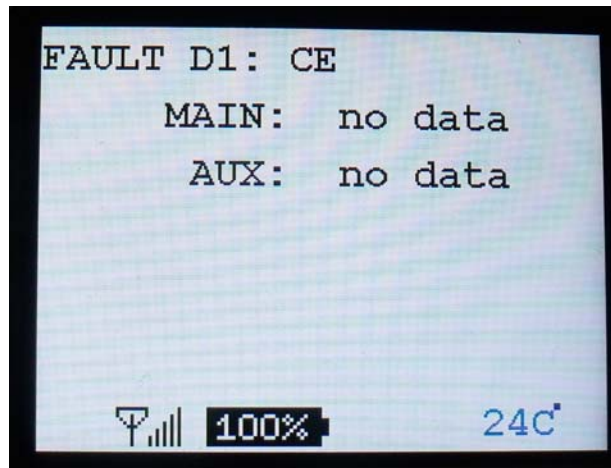



Figure 21: Transmitter Graphic User Interface Fault Display Example

Reference the noted drive manual for a description of the fault code and possible resolutions.

**WARNING**

THE OPERATOR SHOULD NOT ATTEMPT TO REPAIR ANY RADIO CONTROLLER. IF ANY PRODUCT PERFORMANCE OR SAFETY CONCERNS ARE OBSERVED, THE EQUIPMENT SHOULD IMMEDIATELY BE TAKEN OUT OF SERVICE AND BE REPORTED TO THE SUPERVISOR. DAMAGED AND INOPERABLE RADIO CONTROLLER EQUIPMENT SHOULD BE RETURNED TO MAGNETEK FOR EVALUATION AND REPAIR. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN SERIOUS INJURY OR DEATH AND DAMAGE TO EQUIPMENT.

5.0 APPENDIX A – COMPATIBILITY

Table 1: Drive Firmware Compatibility

Drive Model	Firmware Version
IMPULSE G+ Mini (Mini)	All
IMPULSE G+ & VG+ Series 4 (S4)	All
IMPULSE G+ & VG+ Series 3 (S3)	8001.7a or later

RDSI is not intended to be used with Static Stepless Simulation or Clamshell/Bucket Hoist drives.

In general, RDSI can control any drive input function that would be placed on a radio transmitter. Devices are not intended to be wired into Flex-M input option modules to serially control the drive, such as limit switches or klixons.

Table 2: Compatible H01-xx Input Functions

Multi-Step Ref 2	Multi-Step Ref 3	Multi-Step 4	Multi-Step Ref 5
Speed Hold 2	Accel Command	M-Speed Gain 1	M-Speed Gain 2
Load Float 1	SwiftLift Enable	UltraLift Enable	Alt T-Lim Gain*
Forward Jog	Reverse Jog	Forward Inch	Reverse Inch
Inch Repeat	Acc/Dec 2	Acc/Dec 3	Acc/Dec 4
Program Lockout	Load Float 2	ASR Gain Switch	Acc/Dec RampHold
Fault Reset*	Timer Function	Alt F-Ref Up Lmt	Maintenance Reset*
BE6/8 Up Spd Lmt	Weight Measure	Load Float Ext	M-Spd Gn1 & LF-E
Index Enable	Brake Test	Hook Height Home	LC Bypass N.O.*
LC Bypass N.C.*	LL2/UL2 Bypass	LL/UL Bypass	Run FWD
Run REV	Sync Mode Enable**	Clear Sync Error**	Sync Advance**
Sync Retard**	Sync Ration Num 2**	Main Hoist Sel***	Aux Hoist Sel***
CG Offset bit1***	CG Offset bit2***	CG Offset bit3***	CG Offset bit4***
Alt Offset***			

* - Use keyed switch

** - Available with Drive Synchronization firmware option only

*** - Available with Sway Control System – Series 2 firmware option only

6.0 NOTES