



WEG CFW500 AC DRIVES SERIAL COMMUNICATIONS QUICK-START GUIDE

NOTE: This Quick-Start guide is intended for the sole purpose of establishing communications connections between WEG CFW500 AC Drives and AutomationDirect programmable controllers, or between the CFW500 and the USB port of a personal computer. Please refer to WEG CFW500 documents for specifications and instructions for using the WEG CFW500 AC Drives.

TABLE OF CONTENTS

Communications Parameters Summary	1-2
Serial Communication Parameters	1-2
Explanation of Scaling/Count Frequency Command/Feedback	1-7
Connecting PC to CFW500 Using AutomationDirect Cable USB-485M.	1-7
Connecting Communication Cables to CFW500 AC Drives	1-8
AutomationDirect PLCs as Modbus Master	1-10
Communication Cable Connections	1-10
RS-232C to RS-485 Conversion.	1-11
AutomationDirect PLC Cable Connections	1-12

COMMUNICATIONS PARAMETERS SUMMARY

A summary of the WEG CFW500 AC drives Communications Parameters is listed below.

NOTE: Refer to the WEG CFW500 Frequency Inverter Programming Manual and the Modbus RTU User's Manual for a complete listing of all CFW500 AC drives parameters, including details and Modbus addresses.

SERIAL COMMUNICATION PARAMETERS

WEG CFW500 Serial Communication Parameters Summary ¹						
Parameter ²	Range	Setting ³		Modbus Address		
		Comm ⁷	Default	Hex	Modbus RTU ⁴	
1) To read parameters, use Function Code 3; to write parameters, use Function Code 6 or 16						
2) ♦ indicates a parameter that can only be changed when motor is stopped						
3) RO = Read Only						
4) Modicon Modbus addressing for the CFW500 is 40001 + the Parameter Address; Example: P222 Modicon Modbus address would be 40001 + 222 = 40223						
5) The CFW500 accepts Modbus RTU commands from both Local and Remote						
6) Baud rate in the PLC must match the baud rate in the AC drive (19200 bits/s)						
7) Values in the Comm column are a required setting to establish serial communications						
General Parameters						
P000	Access to Parameters	0 to 9999		0m, nb.	0000h	40001
P001	Speed Reference	0 to 9999	RO	RO	0001h	40002
P002	Output Speed (Motor)	0 to 9999	RO	RO	0002h	40003
P003	Motor Current	0.0 to 40.0 A	RO	RO	0003h	40004
P004	DC Link Voltage (Ud)	0 to 524V	RO	RO	0004h	40005
P005	Output Frequency (Motor)	0.0 to 400.0 Hz	RO	RO	0005h	40006
P105	1st/2nd Ramp Selection	0 = 1st ramp 1 = 2nd ramp 2 = Dlx 3 = Serial/USB 4 = Reserved 5 = CO/DN/PB/Eth 6 = Soft/PLC	3	2	0069h	40106
P148	V/f Action	0 = Standard V/f 1 = Soft-Starter (voltage)		0	0094h	40149
♦ P200	Password	0 = Inactive 1 = Active 2 to 9999 = New Password		0	00C8h	40201
Parameters necessary to communicate with the drive using module CFW500-CRS485-B						
♦ P220	LOC/REM Selection Source ⁵⁾	0 = Always Local 1 = Always Remote 2 = HMI Key (LOC) 3 = HMI Key (REM) 4 = Dlx 5 = Serial/USB (LOC) 6 = Serial/USB (REM) 7 = not used 8 = not used 9 = CO/DN/PB/Eth (LOC) 10 = CO/DN/PB/Eth (REM) 11 = SoftPLC	5	2	00DCh	40221
(table continued next page)						

WEG CFW500 Serial Communication Parameters Summary ¹ – (continued)						
Parameter ²	Range	Setting ³		Modbus Address		
		Comm ⁷	Default	Hex	Modbus RTU ⁴	
1) To read parameters, use Function Code 3; To write parameters, use Function Code 6 or 16 2) ♦ indicates a parameter that can only be changed when motor is stopped 3) RO = Read Only 4) Modicon Modbus addressing for the CFW500 is 40001 + the Parameter Address; <i>Example: P222 Modicon Modbus address would be 40001 + 222 = 40223</i> 5) The CFW500 accepts Modbus RTU commands from both Local and Remote 6) Baud rate in the PLC must match the baud rate in the AC drive (19200 bits/s) 7) Values in the Comm column are a required setting to establish serial communications						
♦P221	LOC Reference Sel.	0 = HMI Keys 1 = AI1 2 = AI2 3 = AI3 4 = FI 5 = AI1 + AI2 > 0 6 = AI1 + AI2 7 = E.P. 8 = Multispeed 9 = Serial/USB 10 = not used 11 = CO/DN/PB/Eth 12 = SoftPLC 13 = not used 14 = AI1 > 0 15 = AI2 > 0 16 = AI3 > 0 17 = FI > 0	9	0	00DDh	40222
♦P222	REM Reference Selection	0 = HMI Keys 1 = AI1 2 = AI2 3 = AI3 4 = FI 5 = AI1 + AI2 > 0 6 = AI1 + AI2 7 = E.P. 8 = Multispeed 9 = Serial/USB 10 = not used 11 = CO/DN/PB/Eth 12 = SoftPLC 13 = not used 14 = AI1 > 0 15 = AI2 > 0 16 = AI3 > 0 17 = FI > 0	9	1	00DEh	40223
P223	LOC Rotation Sel.	0 = Clockwise 1 = Counterclockwise 2 = HMI Key (FWD) 3 = HMI Keys (REV) 4 = DIx 5 = Serial/USB (FWD) 6 = Serial/USB (REV) 7 = not used 8 = not used 9 = CO/DN/PB/Eth (FWD) 10 = CO/DN/PB/Eth (REV) 11 = not used 12 = SoftPLC	5 or 6	2	00DFh	40224
(table continued next page)						

WEG CFW500 Serial Communication Parameters Summary¹ – (continued)						
Parameter²	Range	Setting³		Modbus Address		
		Comm⁷	Default	Hex	Modbus RTU⁴	
1) To read parameters, use Function Code 3; To write parameters, use Function Code 6 or 16 2) ♦ indicates a parameter that can only be changed when motor is stopped 3) RO = Read Only 4) Modicon Modbus addressing for the CFW500 is 40001 + the Parameter Address; <i>Example: P222 Modicon Modbus address would be 40001 + 222 = 40223</i> 5) The CFW500 accepts Modbus RTU commands from both Local and Remote 6) Baud rate in the PLC must match the baud rate in the AC drive (19200 bits/s) 7) Values in the Comm column are a required setting to establish serial communications						
P224	LOC Run/Stop Sel.	0 = HMI Keys 1 = Dlx 2 = Serial/USB 3 = not used 4 = CO/DN/PB/Eth 5 = SoftPLC	2	0	00E0h	40225
P225	LOC JOG Selection	0 = Disable 1 = HMI Keys 2 = Dlx 3 = Serial/USB 4 = not used 5 = CO/DN/PB/Eth 6 = SoftPLC	3	1	00E1h	40226
♦ P226	REM Rotation Selection	0 = Clockwise 1 = Counterclockwise 2 = HMI Key (FWD) 3 = HMI Keys (REV) 4 = Dlx 5 = Serial/USB (FWD) 6 = Serial/USB (REV) 7 = not used 8 = not used 9 = CO/DN/PB/Eth (FWD) 10 = CO/DN/PB/Eth (REV) 11 = not used 12 = SoftPLC	5 or 6	4	00E2h	40227
♦ P227	REM Run/Stop Selection	0 = HMI Keys 1 = Dlx 2 = Serial/USB 3 = not used 4 = CO/DN/DP 5 = SoftPLC	2	1	00E3h	40228
P228	REM JOG Selection	0 = Disable 1 = HMI Keys 2 = Dlx 3 = Serial/USB 4 = not used 5 = CO/DN/PB/Eth 6 = SoftPLC	3	2	00E4h	40229
P229	Stop Mode Selection	0 = Ramp to Stop 1 = Coast to Stop 2 = Quick Stop		0	00E5h	40230
♦ P308	Serial Address	1 to 247		1	0134h	40309
♦ P310	Serial Baud Rate ⁶⁾	0 = 9600 bits/s 1 = 19200 bits/s 2 = 38400 bits/s		1	0136h	40311
♦ P311	Serial Interface Byte Configuration	0 = 8 bits, np, 1 stop bit 1 = 8 bits, even, 1 stop bit 2 = 8 bits, odd, 1 stop bit 3 = 8 bits, np, 2 stop bits 4 = 8 bits, even, 2 stop bits 5 = 8 bits, odd, 2 stop bits		1	0137h	40312

(table continued next page)

WEG CFW500 Serial Communication Parameters Summary ¹ – (continued)						
Parameter ²	Range	Setting ³		Modbus Address		
		Comm ⁷	Default	Hex	Modbus RTU ⁴	
1) To read parameters, use Function Code 3; To write parameters, use Function Code 6 or 16 2) ♦ indicates a parameter that can only be changed when motor is stopped 3) RO = Read Only 4) Modicon Modbus addressing for the CFW500 is 40001 + the Parameter Address; <i>Example: P222 Modicon Modbus address would be 40001 + 222 = 40223</i> 5) The CFW500 accepts Modbus RTU commands from both Local and Remote 6) Baud rate in the PLC must match the baud rate in the AC drive (19200 bits/s) 7) Values in the Comm column are a required setting to establish serial communications						
♦P312	Serial Protocol (1)(2)	0 = HMI (1) 1 = SymbiNet (1) 2 = Modbus RTU (1) 3 = BACnet (1) 4 = Reserved 5 = Master RTU (1) 6 = HMI (1) + Modbus RTU (2) 7 = Modbus RTU (2) 8 = HMI (1) + BACnet (2) 9 = BACnet (2) 10 = Reserved 11 = Reserved 12 = HMI (1) / RTU Master (2) 13 = RTU Master (2) 14 = HMI(1) / SymbiNet (2) 15 = SymbiNet (2)	2 or 6 or 7	2	0138h	40313
P313	Action for Comm Error	0 = Inactive 1 = Ramp Stop 2 = General Disable 3 = Go to LOC 4 = LOC Keep Enable 5 = Cause Fault		1	0139h	40314
♦P314	Serial Watchdog	0.0 to 999.0		0.0	013Ah	40315
P316	Serial Interface Status	0 = Inactive 1 = Active 2 = Watchdog Error		RO	013Ch	40317
P680	Logical Status	0 to FFFF (hex) Bit 0 = STO Bit 1 = Run Command Bit 2 = Fire Mode Bit 3 = reserved Bit 4 = Quick Stop Bit 5 = 2nd Ramp Bit 6 = Config. Status Bit 7 = Alarm Bit 8 = Running Bit 9 = Enabled Bit 10 = Forward Bit 11 = JOG Bit 12 = Remote Bit 13 = Undervoltage Bit 14 = reserved Bit 15 = Fault		RO	02A8h	40681
P681	Motor Speed in 13 bits	0 to FFFF (hex)		RO	02A9h	40682

(table continued next page)

WEG CFW500 Serial Communication Parameters Summary¹ – (continued)

Parameter ²	Range	Setting ³		Modbus Address		
		Comm ⁷	Default	Hex	Modbus RTU ⁴	
1) To read parameters, use Function Code 3; To write parameters, use Function Code 6 or 16 2) ♦ indicates a parameter that can only be changed when motor is stopped 3) RO = Read Only 4) Modicon Modbus addressing for the CFW500 is 40001 + the Parameter Address; <i>Example: P222 Modicon Modbus address would be 40001 + 222 = 40223</i> 5) The CFW500 accepts Modbus RTU commands from both Local and Remote 6) Baud rate in the PLC must match the baud rate in the AC drive (19200 bits/s) 7) Values in the Comm column are a required setting to establish serial communications						
P682	Serial//USB Control	0 to FFFF (hex) Bit 0 = Ramp Enable Bit 1 = General Enable Bit 2 = Run Forward Bit 3 = JOG Enable Bit 4 = Remote Bit 5 = 2nd Ramp Bit 6 = Quick Stop Bit 7 = Fault Reset Bit 8 to 15 = reserved		RO	02AAh	40683
P683	Serial/USB Speed Reference	0 to FFFF (hex)		RO	02ABh	40684

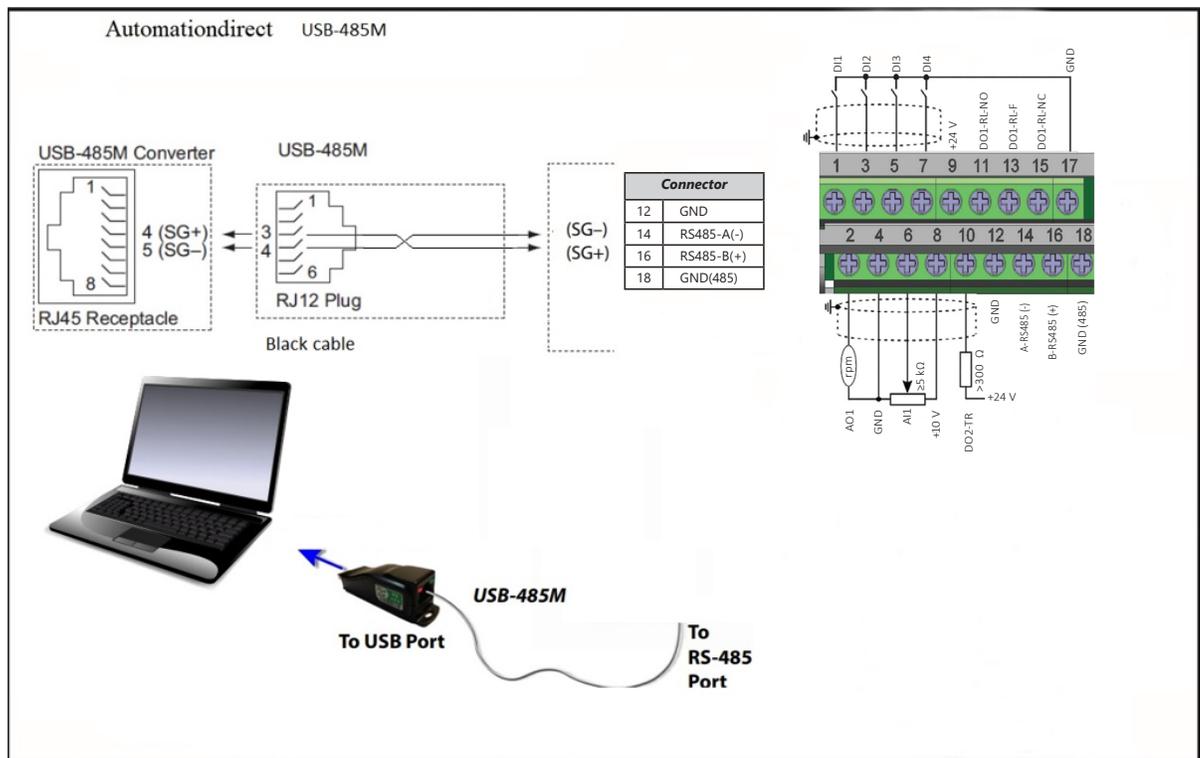
EXPLANATION OF SCALING/COUNT FREQUENCY COMMAND/FEEDBACK

- When using WEG CFW500 drives, speed/frequency is shown in counts. In order to convert to Hz/ rpm, it is needed to know that the Base Frequency (P403) is equivalent to 8192 (2¹³). Also, the Motor Rated speed (P402) can be scaled using the same method.
- Actual Frequency (P681) and Command Frequency (P683) can be calculated using that ratio.
- For instance: $P681 = 2048(\text{dec})$.
- $\text{Freq} = 2048 * 60.00 / 8192 = 15.00 \text{ Hz}$
- $\text{RPM} = 2048 * 1740 / 8192 = 435.00 \text{ rpm}$

CONNECTING PC TO CFW500 USING AUTOMATIONDIRECT CABLE USB-485M

An AutomationDirect cable, part number USB-485M, provides a quick and easy method of communicating to a WEG CFW500 AC Drive from a PC which has WEG CFW-WPS software installed.

NOTE: Refer to the WEG WPS Software User Manual for information and instructions regarding using the WPS software to configure CFW500 AC Drives.



CONNECTING COMMUNICATION CABLES TO CFW500 AC DRIVES

Communication cables can be connected to the CFW500 AC drive using either the built-in CFW500-IOS module or the optional CFW500-RS485 module.

CFW500-IOS BUILT-IN COMMUNICATIONS MODULE

The control connections (analog input/output, digital input/output and interface RS485) must be performed according to the specification of the connector of the plug-in module connected to the CFW500. Refer to the plug-in module guide included in the product package. The typical functions and connections for the CFW500-IOS standard plug-in module are shown below.

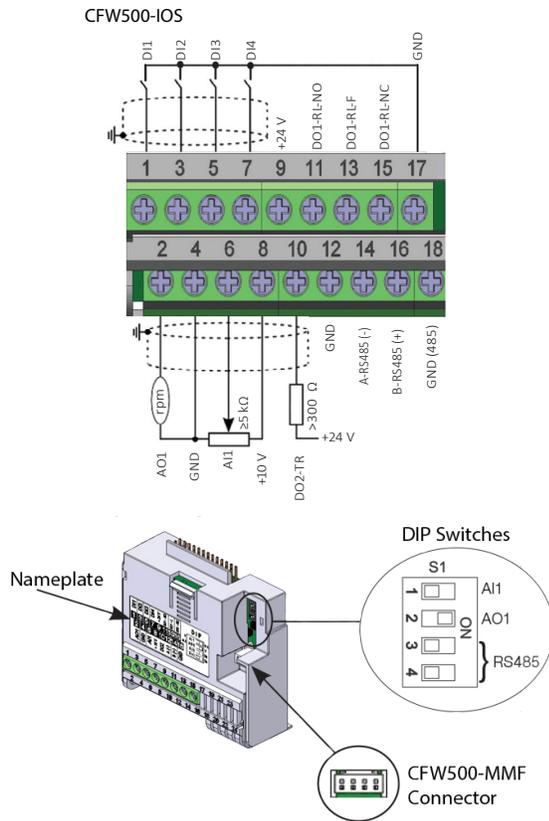


Figure A2: CFW500-IOS connector and switch locations

1 SAFETY INFORMATION

1.1 SAFETY WARNINGS

NOTE!

- Read the CFW500 user's manual before operating this module.
- The content of this guide provides important information for the full understanding and proper operation of this module.

1.2 PRELIMINARY RECOMMENDATIONS

ATTENTION!

- Always disconnect the general power supply before connecting or disconnecting the accessories of the CFW500 frequency inverter.
- Wait for at least 10 minutes for the full discharge of the inverter.

5 CONFIGURATIONS

The RS485 interface connections must be done on the connector as per [Table 1](#)

Table 1: Connector signals of the RS485 interface

Connector	Description
1	DI1 Digital input 1
3	DI2 Digital input 2*
5	DI3 Digital input 3
7	DI4 Digital input 4
9	+24V Power supply +24VDC
11	DO1-RL-NO Digital output 1 (NO)
13	DO1-RL-C Digital output 1 (common)
15	DO1-RL-NC Digital output 1 (NC)
17	GND Reference 0V
2	AO1 Analog output 1
4	GND Reference 0V
6	AI1 Analog input 1
8	+10V Reference +10VDC
10	DO2-TR Digital output 2
12	GND Reference 0V
14	RS485: A RS485 (Terminal A)
16	RS485: B RS485 (Terminal B2)
18	GND (485) Ground (RS485)

(*DI2 can also be used as input in frequency (F)). For further details, refer to the CFW00 programming manual.

The location of the DIP switch to select the RS485 network termination can be better viewed in [Figure A2](#), and it must be configured as per [Table 2](#).

Table 2: Configuration of the switches to configure the RS485

Communication	Switch	Switch Setting	Option
RS485	S1(*)	S1.3 = OFF and S1.4 = OFF	RS485 terminal off
		S1.3 = ON and S1.4 = ON	RS485 terminal on

(*)Any other combination of the switches is not allowed.

The CFW500-IOS module has the necessary resources to perform setting, command and monitoring of the inverter by means of the WPS software - WEG Programming Suite (www.automationdirect.com). For further details, refer to chapter 7 of the user's manual of the CFW500.



The CFW500-CRS485-B drive communication module includes a DIP switch that will switch in a 120Ω terminating resistor for the RS-485 network. An external terminating resistor is not required for the drive end. An external termination resistor may be required on the other end of the RS-485 network, especially on long runs. Select resistors that match the impedance of the cable (between 100Ω and 500Ω).

The CFW500 serial communication port is an RS-485 input. Please note that terminals A(-) and B(+) are shared with the USB connector. CFW500 to CFW500 serial connections can be accomplished with standard RS-485 cable (L19827-1 or similar). RS-232 signals can be converted to RS-485 by using a separate converter (see the FA-ISOCAN drawings on page 1-11).

CFW500-CRS485-B SERIAL COMMUNICATIONS MODULE (OPTIONAL - REPLACES CFW500-IOS MODULE)

Depending on the plug-in module installed, the CFW500 features up to two simultaneous serial interfaces. Serial (1) is the standard serial interface present in all plug-in modules. The CFW500-CRS485-B also has a Serial (2) interface. Note that both interfaces and their corresponding grounds are isolated from each other.

CFW500-CRS485

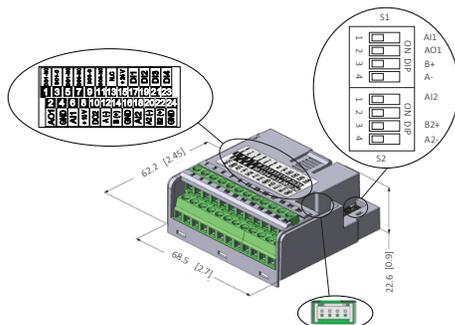
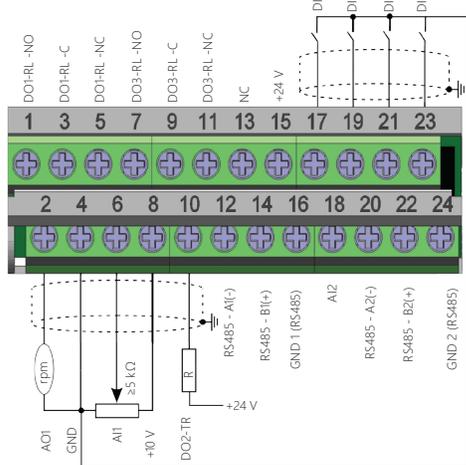


Figure A2: CFW500-CRS485-B dimensions in mm [in] and connectors location

NOTE! The CFW500-CRS485 plug-in module has Serial (1) interface through RS-485 port as terminals 12(A-) and 14(B+), as well as the Serial (2) interface through another RS-485 port at terminals 20(A2+) and 22(B2+). Also note that GND1 on terminal 16 and GND2 on terminal 24 are isolated from each other as well as from GND on terminal 4.

Parameters P308 to P316 together with P682 and P683 characterize the serial interface which is active for commands and/or reference.



Recommended RS-485 cable: Belden 9842, AutomationDirect L19954 series, or equivalent.

1 SAFETY INFORMATION

1.1 SAFETY WARNINGS

NOTE!

- Only use the RS485 module (CFW500-CRS485-B) on WEG CFW500 series drives.
- Please read the CFW500 user's manual before installing or operating this accessory.
- The content of this guide provides important information for the full understanding and proper operation of this module.

1.2 PRELIMINARY RECOMMENDATIONS

ATTENTION!

- Always disconnect the general power supply before connecting or disconnecting the accessories of the CFW500 frequency drive.
- Wait for at least 10 minutes for the full discharge of the drive.

5 CONFIGURATIONS

The RS485 interface connections must be made on the connector as per Table 1

Table 1: Connector signals of the RS485 interface

Connector	Description
12	RS485: A(-) RS485 (Terminal A(-))
14	RS485: B(+)
16	GND1 Reference 0 V
20	RS485: A2(-) RS485 (Terminal A2(-))
22	RS485: B2(+)
24	GND2 Reference 0 V

The location of the DIP switch to select the RS485 network termination can be better viewed in Figure A2, and it must be configured as per Table 2.

Table 2: Configuration of the switches to configure the RS485

Communication	Switch	Switch Setting	Option
RS485	S1(*)	S1.3 = OFF and S1.4 = OFF	RS485 termination off
		S1.3 = ON and S1.4 = ON	RS485 termination on(**)
RS485(2)	S2(*)	S2.3 = OFF and S2.4 = OFF	RS485(2) termination off
		S2.3 = ON and S2.4 = ON	RS485(2) termination on(**)

(*) Any other combination of the switches is not allowed.
 (**) It is recommended to use this termination with cables longer than 3m (9.84 ft).

The CFW500-CRS485-B module has the necessary resources to perform setting, command and monitoring of the drive by means of the WPS software - WEG Programming Suite (www.automationdirect.com). For further details, refer to chapter 7 of the WEG CFW500 user manual.

AUTOMATIONDIRECT PLCs AS MODBUS MASTER

COMMUNICATION CABLE CONNECTIONS

Serial Modbus-capable AutomationDirect PLCs can communicate with CFW500 drives which have an optional communication card installed.

Serial Modbus control is easier to accomplish from a PLC that supports dedicated Modbus messaging. [Older PLCs may require programming to construct the Modbus strings.] We recommend PLCs with dedicated Modbus serial commands: CLICK (with RS-485 ports), P1000, P2000, P3000, BRX/Do-more, DirectLogic (DL06 or D2-260). For other PLC-drive connectivity, please refer to the “Typical ADC PLC to CFW500 Serial Connectivity Matrix” below.

Typical ADC PLC to WEG CFW500 RS-485 Serial Communications Connectivity

Typical ADC PLC to WEG CFW500 RS-485 Serial Communications Connectivity Matrix					
Recommended PLC Connectivity			Communication	Direct Cable	CFW500 Port Type
PLC	Port #	Port Type			
CLICK	3	3 screw terminals	RS-485	L19954 cable	CFW500-IOS (included with the CFW500 drive)
D2-260	2	HD15	RS-485	D2-DSCBL-2	
DL06	2	HD15	RS-485	D2-DSCBL-2	
BRX/Do-more	RS-485	3 screw terminals	RS-485	L19954 cable	
Do-more H2-DM1	RS-232	RJ12	RS-232 to RS-485	FA-ISOCAN with L19954 cable	
P2-550	RS-485	3 screw terminals	RS-485	L19954 cable	
P3-530	RS-485	3 screw terminals	RS-485	L19954 cable	
P3-550	RS-485	3 screw terminals	RS-485	L19954 cable	
P3-550E	RS-485	3 screw terminals	RS-485	L19954 cable	
Other PLC Connectivity			–	–	
D2-250-1	2	HD15	RS-485	D2-DSCBL-2	CFW500-CRS485-B
D4-450/D4-454	1	DB25	RS-232 to RS-485	FA-ISOCAN with L19954 cable	Screw terminals
DL05	2	RJ12	RS-232 to RS-485	FA-ISOCAN with L19954 cable	A(-) B(+) GND
DL06 + DCM	2	HD15	RS-485	D2-DSCBL-2	
Do-more H2-DM1 + H2-SERIO-4	3	5 screw terminals	RS-485	L19954 cable	
Do-more T1H-DM1	RS-232	RJ12	RS-232 to RS-485	FA-ISOCAN with L19954 cable	
P2-SCM	4	4 screw terminals	RS-485	L19954 cable	
P3-SCM	4	4 screw terminals	RS-485	L19954 cable	

RS-232C TO RS-485 CONVERSION

Many AutomationDirect PLCs only have RS-232C communication ports and require an FA-ISOCOCON (RS-232C to RS-422/485 network adapter) in order to make an RS-485 connection.



If an FA-ISOCOCON module is used, set the module dipswitches as required. Refer to the FA-ISOCOCON manual for more detailed information.

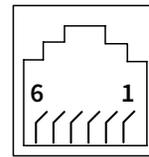
FA-ISOCOCON Switch Settings:

- S21–S23: OFF, ON, ON (19200 baud)
- S24–S27: OFF (Automatic Network Transmit Enable)
- Terminate: ON (end-of-run termination resistors)
- Bias (2): ON (end-of-run bias resistors)
- 1/2 DPX (2): ON (RS-485 TXD/RXD jumpers)

Helpful Hint: Some applications require the FA-ISOCOCON baud rate be set faster than the drive/network baud rate.

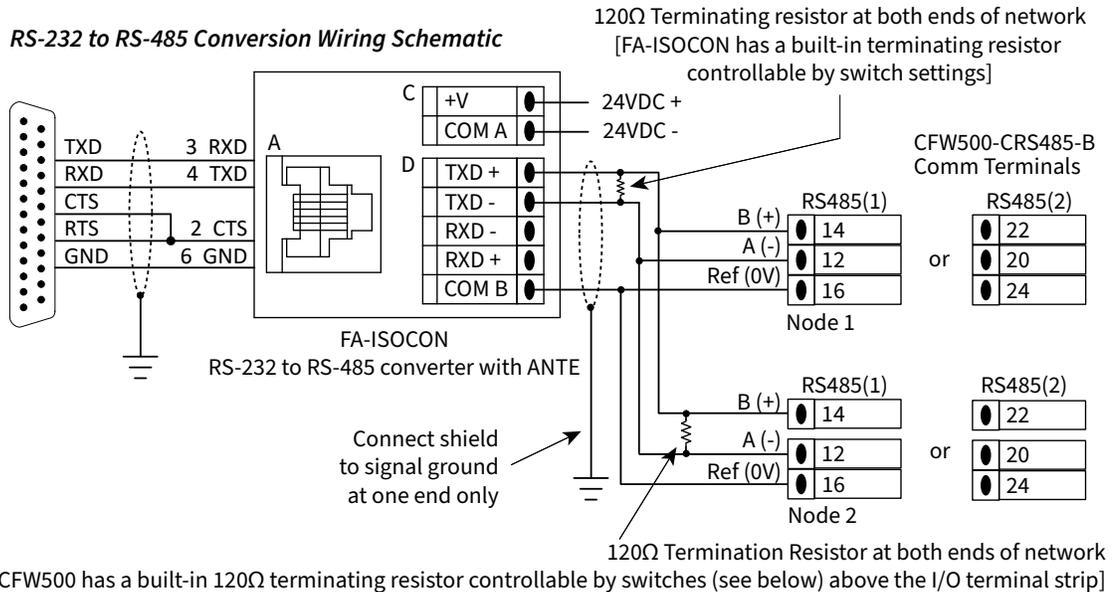
FA-ISOCOCON Wiring

FA-ISOCOCON RJ-12 Serial Comm Port A RS-232 Input Port



- 1: Signal Ground
- 2: CTS (input)
- 3: RXD (input)
- 4: TXD (output)
- 5: +5VDC in
- 6: Signal Ground

RS-232 to RS-485 Conversion Wiring Schematic



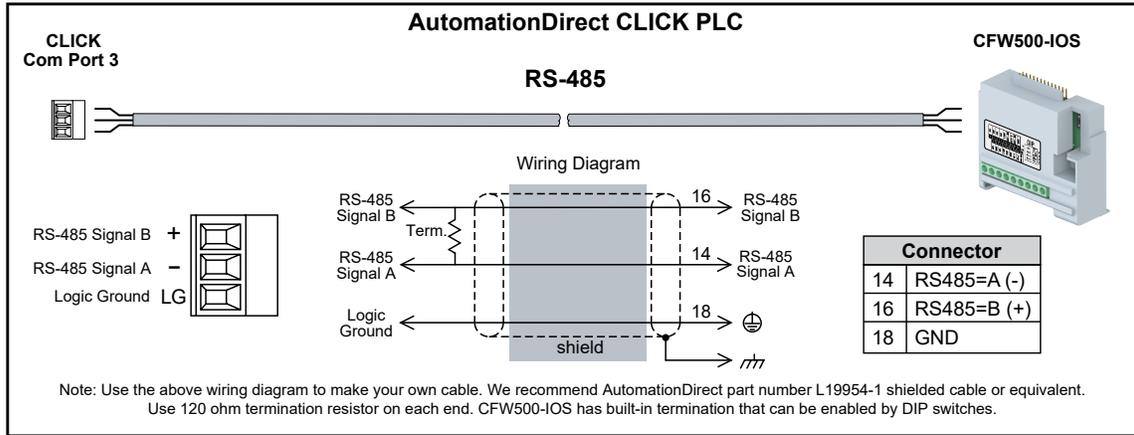
	CFW-IOS	CFW500-CRS485-B [RS485 (1)]	CFW500-CRS485-B [RS485 (2)]
Switch 1	S1.3	S1.3	S2.3
Switch 2	S1.4	S1.4	S2.4



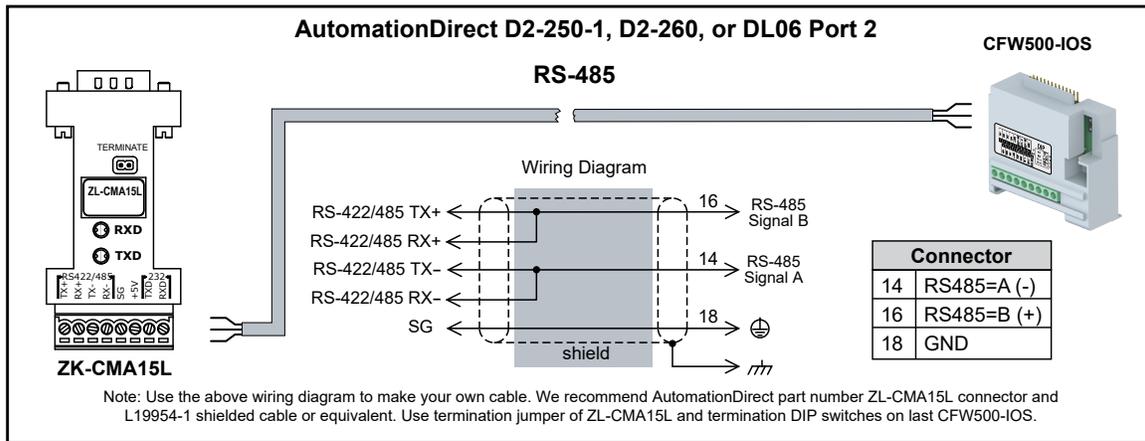
For information regarding configuration of AutomationDirect PLCs or other PLCs, please refer to the applicable PLC user manual for your application.

AUTOMATIONDIRECT PLC CABLE CONNECTIONS

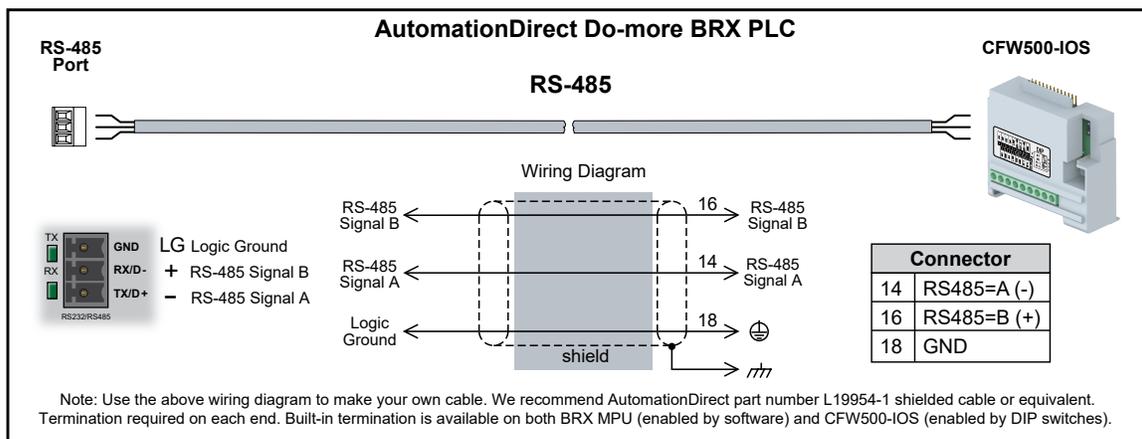
CLICK SERIES PORT 3 VIA RS-485



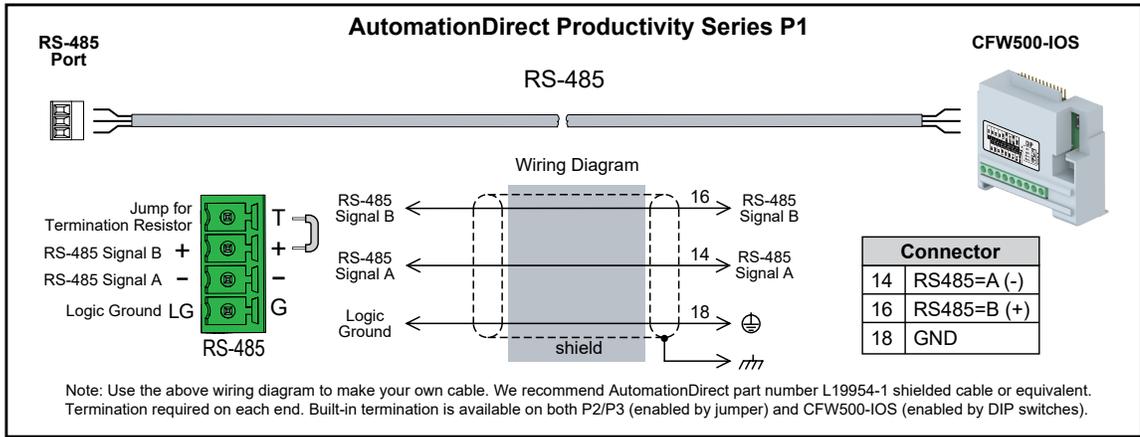
DIRECTLOGIC SERIES D2-250-1, D2-260, DL06 PORT 2 VIA RS-485



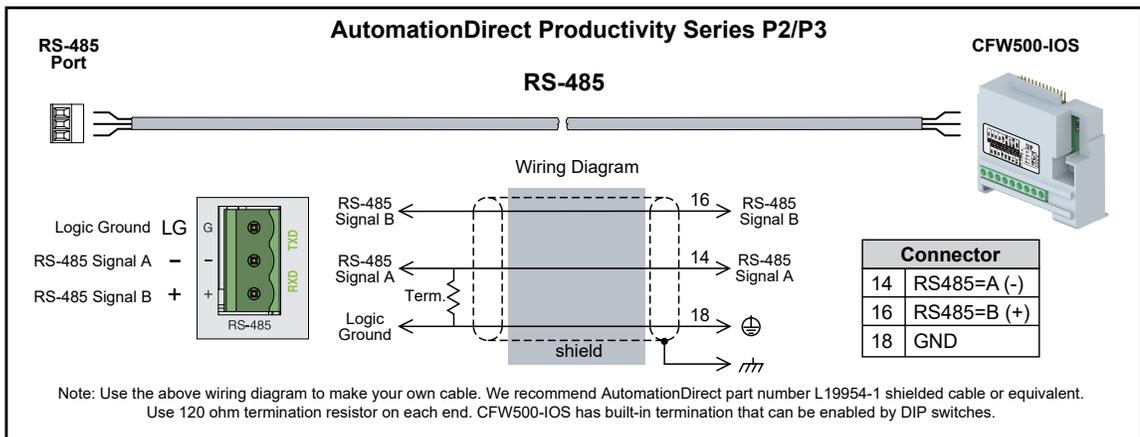
DO-MORE BRX SERIES VIA RS-485



PRODUCTIVITY SERIES P1 VIA RS-485



PRODUCTIVITY SERIES P2/P3 VIA RS-485



Blank Page