AUTOMATE

ARC Serial Protocol via RS485

AUTOMATE | Pulse supports bi-directional third party system integration via RS485 serial communication. These instructions outline the fundamentals of the ARC serial protocol, enabling system programmers to communicate to ARC motors by sending simple ASCII strings from their systems to the Automate Pulse hub.

FEATURES:

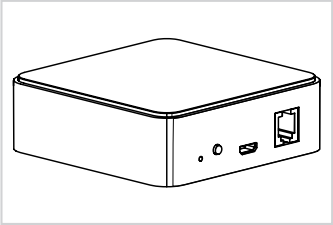
- RS 485 2 wire communication
- Simple, intuitive protocol features 3 character motor addressing
- Individual or group control capability
- Supports all ARC control and configuration functionality
- Control of up to 32 Pulse hubs on one line
- Each Pulse Hub can control up to 15 motorized window treatments
- Facilitates ARC (Automate Radio Communication) 433 MHz Bi-Directional RF Communication from virtually any automation/control system

NOTES

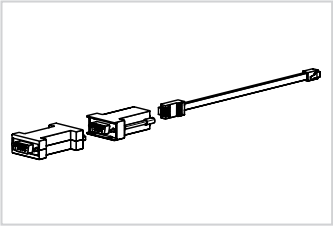
CONTENTS

1 REQUIREMENTS

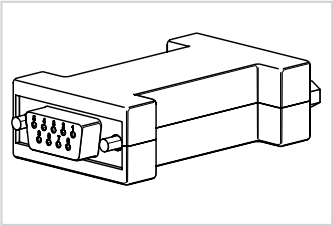
1.1 Hardware



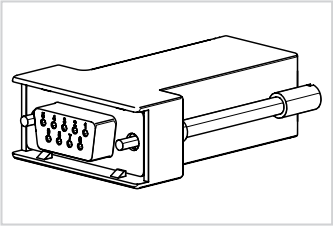
Region	Description	Part Number
AU	AUTOMATE PULSE	WI-FI HUB-AU	MTRF-PULSE-AU
UK	AUTOMATE PULSE	WI-FI HUB-UK	MTRF-PULSE-EU
EU	AUTOMATE PULSE	WI-FI HUB-EU	MTRF-PULSE-UK
US	ARC Wi-Fi to 433 MHz	MTRF-WIFIBRIDGE-KIT



Region	Description	Part Number
GL	SERIAL CONNECTOR KIT	MT02-0406-000001



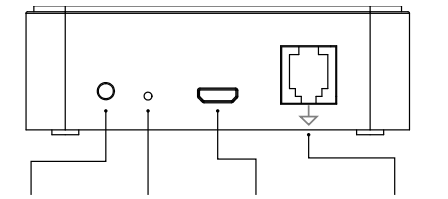
Region	Description
GL	SERIAL ADAPTER	RS385 TO RS232



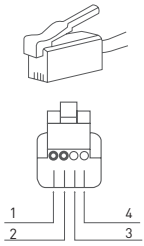
Region	Description
GL	SERIAL CONNECTOR	DB9 TO RJ45

1.2 Wiring

The Pulse hub supports RS485 communication over a 2 wire configuration.



Data Cable: RJ9



1: SIGNAL GND

2: -

3: - RS485

4: + RS485

Many control systems have only RS232 ports - in this case, a 232>485 converter will be required. Always refer to control system pinout diagram for correct communication wiring.

1.3 Connection Parameters

The serial connection parameters are shown in the below table.

Communication Parameter	
Protocol	asynchronous UART
Baud Rate	9600 bps
Data Bit	8
Parity Bits	N
Stop Bit	1

2 COMMUNICATION MESSAGES

Uplink - Messages from ARC motors relayed to the Controller/PC via a Pulse Hub

Downlink - Messages from a Controller/PC relayed to ARC motors via the Pulse Hub

2.1 Hub Configuration

Downlink messages to a Pulse Hub are constructed with an exclamation point (!) as the header followed by a hub address, a command character, data then a semicolon (;) as the carriage return.
(See 3.1 for list commands)

Start Character	Address	Command	Data	End Charaacter
!	3 Byte ASCII	1 Byte ASCII	(Optional)	;
	0-9 & A-Z, broadcast address 000 for query, range 001-ZZZ	non-numerical ASCII	"?" for inquiry of motor status	

The address "000" is reserved for global commands. The Pulse Hub has a default address of 245.

2.2 Motor Configuration

Each ARC motor is paired to a discrete Pulse Hub. Therefore, a downlink message to configure an ARC motor includes the hub address with a delimiter character of "D", as shown in the table below.
(See 3.2 for list of commands)

Start Character	Pulse Hub Address	Delimiter Character	Motor Address	Command	Data	End Charaacter
!	3 Byte ASCII	D	3 Byte ASCII	1 Byte ASCII	(Optional)	;
	0-9 & A-Z, broadcast address 000 for query, range 001-ZZZ		0-9 & A-Z, broadcast address 000 for query, range 001-ZZZ	non-numerical ASCII	"?" for inquiry of motor status	

Example downlink messages:

Start Character	Pulse Hub Address	Delimiter Character	Motor Address	Command	Data	End Charaacter
!	111	D	100	@	123	;
!	111	D	123	r	?	;

Example uplink messages (reply to above):

Downlink messgae	Uplink message	Comments
!111D123v?;	!111D123vA21;	Request to motor 123 under hub 111 for version; the motor responds with version as "A21".
!111D123m100;	!111D123U;	No movement
	!111D123<09b00;	Move from 9%, direction "<" (UP)
	!111D123r100b180;	Responds at 100% when finished moving

2.3 Global Commands

A downlink message with an address of "000" is considered a global message – the Pulse hub and all networked device will receive the message and provide an uplink message in response. The Pulse hub will only reply to version request – otherwise it will simply pass the uplink/downlink messages.

Downlink messgae	Uplink message	Comments
!000V?;	!XXXV;!XXXV;...	All hubs and motors respond with version

The system manages communication traffic, however there is a possibility of buffer overflow if large amounts of messages are being transmitted in a short amount of time (in response to global commands).

3 TABLE OF COMMANDS

3.1 Pulse Hub Commands

No.	Command function	Downlink message				
		Start charcter	Hub address (XXX)	Command keyword	Data	End character
1	Query pulse hub address	!	000	V		;
2	Modify pulse hub address	!	XXX	G	ZZZ	;
3	Test pulse hub	!	XXX	T		;

3.2 Reset Hub

No.	Command function	Downlink message					
		Start charcter	Hub address (XXX)	Delimiter	Motor Adress (YYY)	Command keyword	Data
1	Module reset	!	XXX	D	000	*	

3.3 Pair

No.	Command function	Downlink message					
		Start charcter	Hub address (XXX)	Delimiter	Motor Adress (YYY)	Command keyword	Data
1	Pair	!	XXX	D	000	&	
2		!	XXX	D	000	&	YYY
3	Unpair (need motor feedback)	!	XXX	D	YYY	#	
4	Modify motor address under pulse hub	!	XXX	D	YYY	@	ZZZ
5	Delete the corresponding address in the module	!	XXX	D	YYY	$	

	Uplink message Feedback example	Bytes	Remark
	!XXXV, !XXYV,	0	Broadcast command, get all pulse hubs on the network. (XXX), (XXY) are the pulse hub address
	!ZZZA;	3	Change pulse hub address from XXX to ZZZ
	!XXXA;	0	Hub flash 6 times

	End character	Uplink message Feedback example	Bytes	Remark
	;	!XXXD000A;	0	Reset all data of pulse hub

	End character	Uplink message Feedback example	Bytes	Remark
	;	!XXXDYYYA;	0	A random address is generated by the Pulse Hub and assigned to the motor / device being paired. Motor feedback !XXXDYYYA; pair successful, YYY is a random ascii address "
	;	!XXXDYYYA;	0	Pair the motor with address YYY
	;	!XXXDYYYA;	0	Motor feedback !XXXDYYYA; unpair successful
	;	!XXXDZZZA;	3	Change address from YYY to ZZZ
	;	!XXXDYYYA;	0	Motor feedback: !XXXDYYYA; delete successful

3.4 Operations

No.	Command function	Downlink message						
		Start charcter	Hub address (XXX)	Delimiter	Motor Adress (YYY)	Command keyword	Data	
1	Open/Up	!	XXX	D	YYY	o		
2	Close/Down	!	XXX	D	YYY	c		
3	Stop	!	XXX	D	YYY	s		
4	Jog open/Up	!	XXX	D	YYY	oA		
5	Jog close/Down	!	XXX	D	YYY	cA		

Continued onto next page

	Uplink message	Bytes	Remark
End character	Feedback example		
;	!XXXDYYYU;	2	Stroke not set
	or		
	!XXXDYYY<DD1bDD2;		Start to run, return the present position; DD1 is travel percentage and DD2 is rotation percentage in degrees (0-180)
	or		
	!XXXDYYYrDD1bDD2;		Finish the movement, return the final position; DD1 is travel percentage and DD2 is rotation percentage in degrees (0-180)
;	!XXXDYYYU;	2	Stroke not set
	or		
	!XXXDYYY<DD1bDD2;		Start to run, return the present position; DD1 is travel percentage and DD2 is rotation percentage in degrees (0-180)
	or		
	!XXXDYYYrDD1bDD2;		Finish the movement, return the final position; DD1 is travel percentage and DD2 is rotation percentage in degrees (0-180)
;	!XXXDYYYU;	2	No stroke set
	or		
	!XXXDYYYrDD1bDD2;		Stop the movement, return the final position; DD1 is travel percentage and DD2 is rotation percentage in degrees (0-180)
;	!XXXDYYYU;	1	No position feedback
	or		
	!XXXDYYY<DD1bDD2;		Jog starting position; DD1 is travel percentage and DD2 is rotation percentage in degrees (0-180)
	or		
	!XXXDYYYrDD1bDD2;		Jog stop position; DD1 is travel percentage and DD2 is rotation percentage in degrees (0-180)
;	!XXXDYYYU;	1	No position feedback
	or		
	!XXXDYYY<DD1bDD2;		Jog starting position; DD1 is travel percentage and DD2 is rotation percentage in degrees (0-180)
	or		
	!XXXDYYYrDD1bDD2;		Jog stop position; DD1 is travel percentage and DD2 is rotation percentage in degrees (0-180)

No.	Command function	Downlink message						
		Start charcter	Hub address (XXX)	Delimiter	Motor Adress (YYY)	Command keyword	Data	
6	Move by percentage	!	XXX	D	YYY	m	(DDD)	
7	rotate angle by percentage	!	XXX	D	YYY	b	(DDD)	
8	Move to preferred limit position/3rd position	!	XXX	D	YYY	f		

	Uplink message	Bytes	Remark
End character	Feedback example		
;	!(XXX)D(YYY)U;	2	No movement
	or		
	!(XXX)D(YYY)<(DD1)b(DD2);		Start to run, return the present position; DD1 is travel percentage and DD2 is rotation percentage in degrees (0-180)
	or		
	!(XXX)D(YYY)r(DDD)b(DD2);		Finish the movement, return the final position; DDD is percent and DD2 is degree
;	!(XXX)D(YYY)U;	2	No position feedback
	or		
	!(XXX)D(YYY)<(DD1)b(DD2);		Start to run, return the present position; DD1 is travel percentage and DD2 is rotation percentage in degrees (0-180)
	or		
	!(XXX)D(YYY)r(DD1)b(DDD);		Finish the movement, return the final position; DD1 is percent and DDD is degree. Note: DD1 can be ignored in this case.
;	NULL	2	[no preset preferred limit,no feedback]
	or		
	!(XXX)D(YYY)r(DD1)b(DD2);		[preferred limit is set,feedback stop position]

3.5 Queries

No.	Command function	Downlink message						
		Start charcter	Hub address (XXX)	Delimiter	Motor Adress (YYY)	Command keyword	Data	
1	Request motor parameter	!	XXX	D	YYY	N?		
2	Request current position	!	XXX	D	YYY	r?		
3	Request current position	!	XXX	D	YYY	f?		
4	Request motor speed	!	XXX	D	YYY	pSc?		
5	Request motor voltage	!	XXX	D	YYY	pVc?		
6	Request version	!	XXX	D	YYY	v?		
7	Request position limit setting	!	XXX	D	YYY	pP?		

	End character	Uplink message Feedback example	Bytes	Remark
	;	!(XXX)D(YYY)N(DDDDDDDD);	1	Motor parameters: (DDDDDDDD);
	;	!(XXX)D(YYY)U;	1	No top and bottom limits
		or		
		!(XXX)D(YYY)r(DD1)b(DD2);		Current position
	;	!(XXX)D(YYY)U;	1	No 3rd position setting
		or		
		!(XXX)D(YYY)r(DD1)b(DD2);		3rd position setting, feedback position
	;	!(XXX)D(YYY)pSc(DDD);	1	Request current speed, motor feedback (DDD)rpm
	;	!(XXX)D(YYY)pVc(DDD);	1	Request motor voltage, feedback (DDD)V
	;	!(XXX)D(YYY)vA(DD);	1	(DD) version
			3	T = type
				= A AC motor
				= C Curtain motor
				= D DC motor
				= S socket
				= L lighting devices
				VV = version
				= (V.V) version
	;	!(XXX)D(YYY)pP(HH);	variable	"P = Keyword, indicate position HH=00 all limits of motor are not set; HH=01 Upper and lower limits are set; HH=03 Upper, lower limits and 3rd position are set."

3.6 Parameters

No.	Command function	Downlink message						
		Start charcter	Hub address (XXX)	Delimiter	Motor Adress (YYY)	Command keyword	Data	
1	Set motor limit	!	XXX	D	YYY	pEoH		
		!	XXX	D	YYY	pEcH		
		!	XXX	D	YYY	pEoA		
		!	XXX	D	YYY	pEcA		
		!	XXX	D	YYY	pEaC		
		!	XXX	D	YYY	pEmH		
		!	XXX	D	YYY	pEmC		
2	Modify position limit setting	!	XXX	D	YYY	pP	HH	
3	Modify speed relation setting	!	XXX	D	YYY	pGc+		
		!	XXX	D	YYY	pGc-		
		!	XXX	D	YYY	pGd+		
		!	XXX	D	YYY	pGd-		
		!	XXX	D	YYY	pGa+		
		!	XXX	D	YYY	pGa-		
		!	XXX	D	YYY	pGr+		
		!	XXX	D	YYY	pGr-		
4	Modify motor running mode	!	XXX	D	YYY	pM01		
		!	XXX	D	YYY	pM02		
		!	XXX	D	YYY	pM04		
		!	XXX	D	YYY	pM08		
		!	XXX	D	YYY	pM10		
5	Reset to factory default mode	!	XXX	D	YYY	pR*		

	Uplink message	Bytes	Remark
End character	Feedback example		
;	!(XXX)D(YYY)pEoH;	3	Set the current position as upper limit
;	!(XXX)D(YYY)pEcH;		Set the current position as lower limit
;	!(XXX)D(YYY)pEoA;		Adjust upper limit
;	!(XXX)D(YYY)pEcA;		Adjust lower limit
;	!(XXX)D(YYY)pEaC;		Cancel all limits
;	!(XXX)D(YYY)pEmH;		Set the current position as favorite position
;	!(XXX)D(YYY)pEmC;		Cancel favorite position
;	!(XXX)D(YYY)pP(HH);	variable	"P = keyword, indicate position HH=00 all limits of motor are not set; HH=01 Upper and lower limits are set; HH=03 Upper, lower limits and 3rd position are set."
;	!(XXX)D(YYY)pGc+;	3	Increase one speed level for contiuous running
;	!(XXX)D(YYY)pGc-;		Decrease one speed level for contiuous running
;	!(XXX)D(YYY)pGd+;		Increase one speed level for jogging
;	!(XXX)D(YYY)pGd-;		Decrease one speed level for jogging
;	!(XXX)D(YYY)pGa+;		Increase angle coefficient by one
;	!(XXX)D(YYY)pGa-;		Decrease angle coefficient by one
;	!(XXX)D(YYY)pGr+;		Increase jog distance by one unit
;	!(XXX)D(YYY)pGr-;		Decrease jog distance by one unit
;	!(XXX)D(YYY)pM01;	3	Switch motor mode between jog and contiuous running
;	!(XXX)D(YYY)pM02;		Motor rotation direction change
;	!(XXX)D(YYY)pM04;		Motor angle direction change
;	!(XXX)D(YYY)pM08;		The motor is set to slow-start and slow-stop mode
;	!(XXX)D(YYY)pM10;		The motor is set to full-speed start-up mode
;	!(XXX)D(YYY)pR*;	1	Reset to factory default mode

ROLLEASE ACMEDA
AUSTRALIA
110 Northcorp Boulevard,
Broadmeadows VIC 3047
T +61 3 9355 0100 | F +61 3 9355 0110

Queensland Branch
Unit 2/62 Borthwick Avenue,
Murarrie QLD 4172

ROLLEASE ACMEDA
USA
200 Harvard Avenue
Stamford, CT 06902 6320
T +1 203 964 1573 | F +1 203 964 0513

ROLLEASE ACMEDA
EUROPE
Via Conca Del Naviglio 18, Milan
(Lombardia) Italy
T +39 02 8982 7317 | F +39 02 8982 7317

info@rolleaseacmeda.com
rolleaseacmeda.com

ROLLEASE ACMEDA
PRECISION IN MOTION