Spyder Model 5
WEB-RxxN ROOM CONTROLLERS

Figure 1: WEB-RxxN (without optional covers)

GENERAL

The Honeywell Spyder Model 5 (WEB-RxxN) family of unitary controllers provide flexible, freely programmable, demand-led control that delivers tangible benefits to reduce energy spends while driving new levels of functionality and efficiency in today's buildings. These scalable and freely programmable BACnet MS/TP-based unitary controllers utilize smart engineering & commissioning tools and Sylk bus technology. The Spyder Model 5 controllers integrate with WEB-8000, CIPer Model 50 or CIPer Model 10 controllers for connecting to the building automation system and the internet.

FEATURES

- Designed for general equipment control including: small air handlers, terminal units, 2 and 4 pipe fan coil units, chilled ceiling systems, hydronic applications, general ventilation, and indoor air quality.
- Support for 1-3 stage fans, variable speed drives (VSDs), thermal, floating, and proportional actuators.
- Auto-baud rate adaption for BACnet MS/TP communication supported.
- Fast binary I/O points.
- Auto Mac addressing.
- BACnet BTL®-Listed as Application Specific Controllers (B-ASC) rev 1.14.
- Two housing sizes and I/O versions to match your individual needs.
- 24 VAC.
- Universal mounting options and color-coded terminals.
- Sylk bus two-wire polarity insensitive interface connects to Honeywell Sylk wall modules without using I/O points.
- WEB-RL6N and WEB-RS5N have a real-time clock, a supercapacitor for 72 Hours data retention.
- Modbus RTU interface for enhanced applications— provides integration of Modbus field devices (for example: Wall Modules, Light and Blind I/O, General Purpose I/O, Sensors, and other communication interfaces such as DALI 2).
- Supports offline and online programming. Online programming enables quick application optimization using single tool.
- Bulk commissioning of similar rooms (Master-Follower concept).
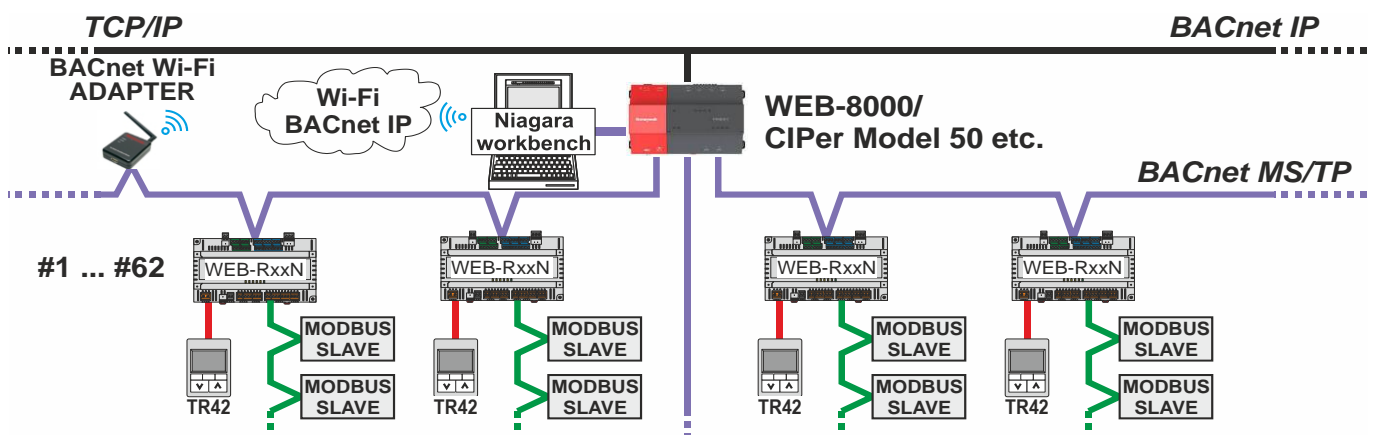
SYSTEM OVERVIEW

Figure 2: System Overview

Table 1. Overview of models

	OS no.:	Power supply	AOs	UIs	BIs	Relays[a]	Triacs[b]	Total no. of I/Os	Remarks
Large housing (W x L x H) 4–5/16 x 7–13/16 x 2–5/16 (110 x 198 x 59 mm)	WEB-RL6N	24 VAC	6	10	0	4	4	24	72 hours data retention
Small housing (W x L x H) 4–5/16 x 6–3/8 x 2–5/16 (110 x 162 x 59 mm)	WEB-RS5N	24 VAC	4	4	0	4	2	14	72 hours data retention
[a] See also section "Relay Outputs" on pg.9. [b] See also section "Triac Current Limitations" on pg. 9.									

CPU: 32-bit MK24FN Freescale Kinetis Cortex M4

DIMENSIONS AND MOUNTING
Housings

The controller is available in two housing sizes, both conforming to IP20:

- WEB-RL6N (large housing): W x L x H = 4-5/16 x 7-13/16 x 2-5/16 (110 x 198 x 59 mm) and
- WEB-RS5N (small housing): W x L x H = 4-5/16 x 6-3/8 x 2-5/16 (110 x 162 x 59 mm)

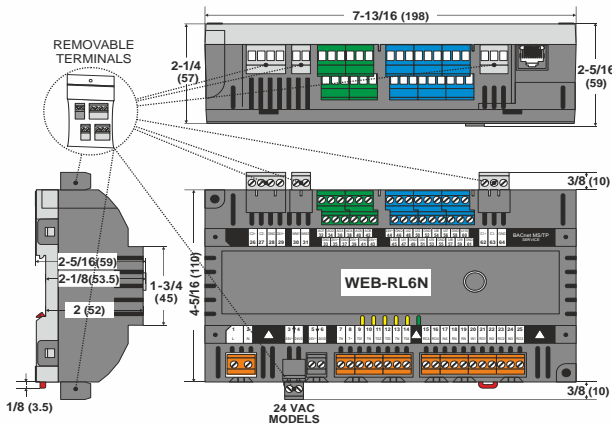See also Figure 3 and Figure 4.
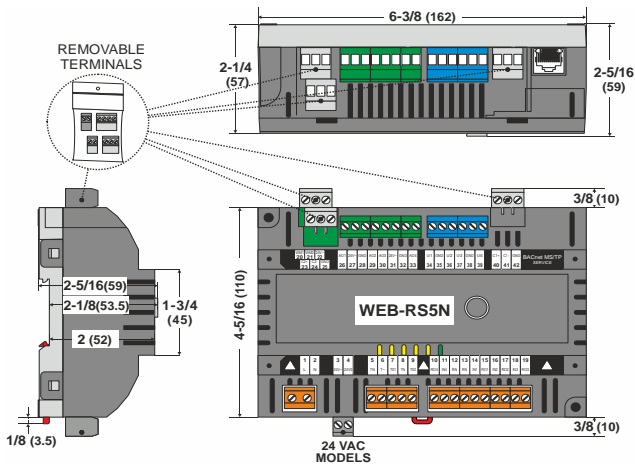

Figure 3: WEB-RL6N dimensions in inch (mm)

Figure 4: WEB-RS5N dimensions in inch (mm)

The unit is suitable for mounting on a standard rail, on walls, as well as in wiring cabinets or fuse boxes.

NOTE: IP20 provides, Ingress Protection against solid objects over 1/2 inch (12.5 mm) for example, hands, large tools. No protection against liquids.

Terminal Protection Covers for IP30

In the case of controllers mounted outside of a cabinet, before applying power to the device, Terminal Protection Covers (10H-pc. bulk packs, order no.: IRM-RLC for WEB-RL6N and IRM-RSC for WEB-RS5N) must be mounted to provide IP30.
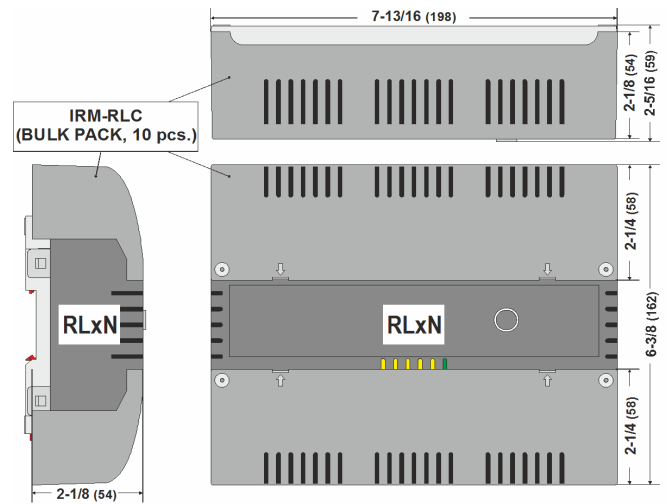

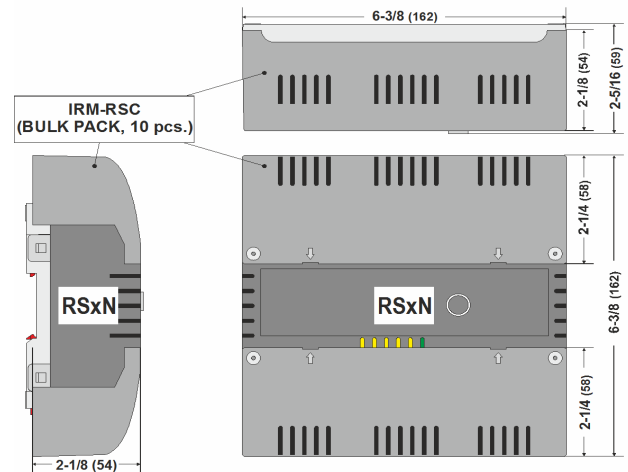**Figure 5: Large housing WEB-RL6N, with terminal protection covers, dimensions in inch (mm)**

Figure 6: Small housing WEB-RS5N, with terminal protection covers, dimensions in inch (mm)

NOTE: IP30 provides, Ingress Protection against solid objects over 1/8 inch (2.5 mm) for example, wire, small tools. No protection against liquids.

TERMINAL ASSIGNMENT
General

For a complete list of all terminals and a description of their functions, see Table 2 on pg.4 and Table 6 on pg.6.

Communication Interfaces

All models of the controller feature the following communication interfaces:

- A Sylk bus interface for connection to Honeywell TR40x/42x Wall Modules.
- A BACnet MS/TP interface.
- An RJ45 connector for future use with BACnet Wi-Fi Adapter.
- A second RS485 interface to use with Modbus.

Table 2. WEB-RS5N Room Controller: Overview of terminals and functions

Term.	Printing	Function	WEB-RS5N
1, 2	--	--	--
3, 4	24V~, 24V0	Aux. output voltage (24 VAC) for all triacs	X
5	TN	Aux. term. for triac neutral wiring (internally connected with terminal 8)	X
6	T~	Triac input voltage (24 VAC) for all triacs; triac-switched	X
7	TO1	Triac-switched output	X
8	TN	Aux. term. for triac neutral wiring (internally connected with terminal 5)	X
9	TO2	Triac-switched output	X
10, 11	RO4, IN4	Output of Relay 4, Input for Relay 4	Type 2
12, 13	RN, RN	Aux. terminals for relay neutral wiring	X
14, 15	IN1, RO1	Input for Relay 1, Output of Relay 1	Type 1
16, 17	IN2, RO2	Input for Relay 2, Output of Relay 2	Type 1
18, 19	IN3, RO3	Input for Relay 3, Output of Relay 3	Type 1
20, 21	WM1, WM2	Removable interface for Sylk bus	X
22, 25	24V~, 24V0	Removable aux. power (24 VAC ±20%, 50/60 Hz)	X
23, 24, 25	C2+, C2-, 24V0	Removable RS485 Modbus interface and corresponding GND	X
26	AO1	Analog Output 1	Type 2
27	24V~	24 VAC power for field devices	X
28	GND	Ground for AOs	X
29	AO2	Analog Output 2	Type 1
30	AO3	Analog Output 3	Type 1
31	24V~	24 VAC power for field devices	X
32	GND	Ground for AOs	X
33	AO4	Analog Output 4	Type 1
34	UI1	Universal Input 1	Type 1
35	GND	Ground for UIs	X
36	UI2	Universal Input 2	Type 1
37	UI3	Universal Input 3	Type 1
38	GND	Ground for UIs	X
39	UI4	Universal Input 4	Type 1
40, 41, 42	C1+, C1-, GND	Removable BACnet MS/TP interface and corresponding GND	X

Relay output types: See Table 3. Universal input types: See Table 4. Analog output types: See Table 5 pg.5.

-- : Terminal not used.

X : Terminal used or available.

Type x: Type of an I/O as per its characteristic. Mode details given on each type in following tables.

Table 3. Relay output types and characteristics

	Type 1 (Standard)	Type 2 (High in-rush current)
Corresponding ROs of WEB-RS5N	RO1, RO2, RO3	RO4
Corresponding ROs of WEB-RL6N	RO2, RO3	RO1, RO4
Contact	N.O.	N.O.
Minimum load	5 VAC, 100 mA	24 VAC, 40 mA
Switching voltage range	15 - 253 VAC	15 - 253 VAC
Maximum continuous load at 250 VAC (cos φ = 1)	4 A	10 A
Maximum continuous load at 250 VAC (cos φ = 0.6)	4 A	10 A
In-rush current (20 ms)	--	80 A
Usage	Fan motor	Fan motor

NOTE: The maximum sum load of all relay currents at the same time is 14 A.

Table 4. Universal input types and characteristics

	Type 1	Type 2
	UI1, UI2, UI3, UI4, UI5, UI6	UI7, UI8, UI9, UI10
Dry contact (closed: res. <10 kΩ; open: res. > 20 kΩ; maximum 0.2 Hz; pull-up voltage: 10 V)	X	X
Dry contact (closed: res. <10 kΩ; open: res. > 20 kΩ; maximum 0.2 Hz; pull-up voltage: 24 V)	--	--
Fast binary (counter) input with below characteristics. (Maximum 30 Hz; pulse ON = minimum 16 ms; pulse OFF = minimum 16 ms; closed: voltage < 1 V; open: voltage > 5 V; pull-up voltage: 10 V)	X	X
Fast binary (=counter) input with below characteristics. (Maximum 30 Hz; pulse ON = minimum 16 ms; pulse OFF = minimum 16 ms; closed: voltage < 1 V; open: voltage > 5 V; pull-up voltage: 24 V)	--	--
0(2) - 10 V	X	X
NTC20kΩ	X	--
Setpoint and FanSpdSW	X	--
NTC10kΩ (Type II)	X	--
PT1000 + Ni1000TK5000	--	X

Table 5. Analog output types and characteristics

	Type 1	Type 2	Type 3
Output voltage	0-11 V		
Output current	0-1 mA	0-5 mA	0-10 mA
Minimum accuracy	±150 mV		
Maximum ripple	±100 mV		
Accuracy at zero point	0-200 mV		

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Table 6. WEB–RL6N Room Controllers: Overview of terminals and functions (by model)

| Term.	Printing	Function	WEB–RL6N
1, 2	--	--	--
3, 4	24V~, 24V0	Removable 24 V power supply input	X
5, 6	24V~, 24V0	Aux. output voltage (24 VAC) for all triacs	X
7	TN	Aux. terminal for triac neutral wiring (internally connected with terminals 10 and 13)	X
8	T~	Triac input voltage (24 VAC) for all triacs; triac-switched	X
9	TO1	Triac-switched output	X
10	TN	Aux. terminal for triac neutral wiring (internally connected with terminals 7 and 13)	X
11	TO2	Triac-switched output	X
12	TO3	Triac-switched output	X
13	TN	Aux. terminal for triac neutral wiring (internally connected with terminals 7 and 10)	X
14	TO4	Triac-switched output	X
15	RC4	Not used	--
16, 17	RO4, IN4	Output of Relay 4, Input for Relay 4	Type 2
18	RN	Aux. terminal for relay neutral wiring	X
19	RN	Aux. terminal for relay neutral wiring	X
20, 21	IN1, RO1	Input for Relay 1, Output of Relay 1	Type 2
22, 23	IN2, RO2	Input for Relay 2, Output of Relay 2	Type 1
24, 25	IN3, RO3	Input for Relay 3, Output of Relay 3	Type 1
26, 27, 28	C2+, C2-, 24V0	Removable RS485 Modbus interface and corresponding GND	X
28, 29	24V0, 24V~	Removable aux. power (24 VAC ±20%, 50/60 Hz)	X
30, 31	WM1, WM2	Removable interface for Sylk bus	X
32	AO1	Analog Output 1	Type 3
33	GND	Ground for AOs	X
34	AO2	Analog Output 2	Type 3
35	24V~	24 VAC power for field devices	X
36	AO3	Analog Output 3	Type 1
37	GND	Ground for AOs	X
38	AO4	Analog Output 4	Type 1
39	24V~	24 VAC power for field devices	X
40	AO5	Analog Output 5	Type 1
41	GND	Ground for AOs	X
42	AO6	Analog Output 6	Type 1
43	24V~	24 VAC power for field devices	X
44	24V~	24 VAC power for field devices	--
45	LED	Output to LED of T7460x	--
46	GND	Ground for UIs	X
47	UI1	Universal Input 1	Type 1
48	UI2	Universal Input 2	Type 1
49	GND	Ground for UIs	X
50	UI3	Universal Input 3	Type 1
51	UI4	Universal Input 4	Type 1
52	GND	Ground for UIs	X
53	UI5	Universal Input 5	Type 1
54	UI6	Universal Input 6	Type 1
55	GND	Ground for UIs	X
56	UI7	Universal Input 7	Type 2
57	UI8	Universal Input 8	Type 2
58	GND	Ground for UIs	X
59	UI9	Universal Input 9	Type 2
60	UI10	Universal Input 10	Type 2
61	GND	Ground for UIs	X
62, 63, 64	C1+, C1-, GND	Removable BACnet MS/TP interface and corresponding GND	X
Relay output types: See Table 3. Universal input types: See Table 4. Analog output types: See Table 5 on pg.5.			
-- : Terminal not used.			
X : Terminal used or available.			
Type x: Type of an I/O as per its characteristic. Mode details given on each type in the above tables.			
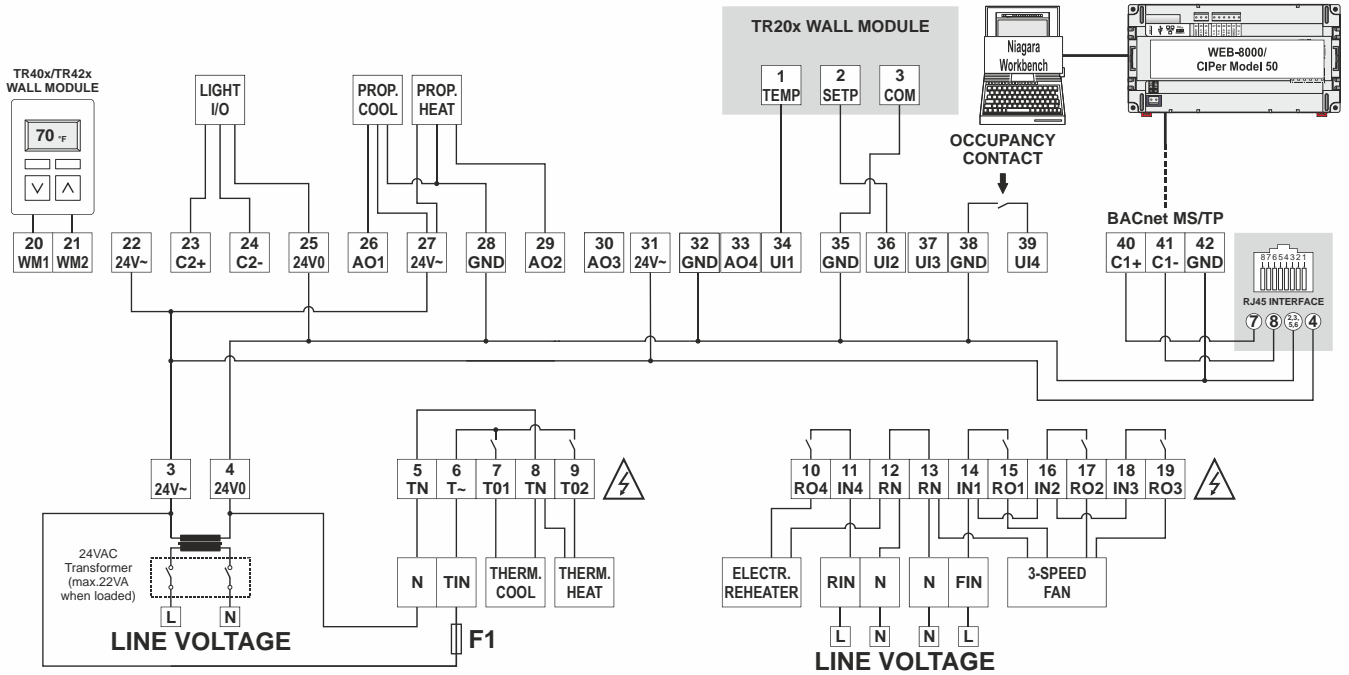
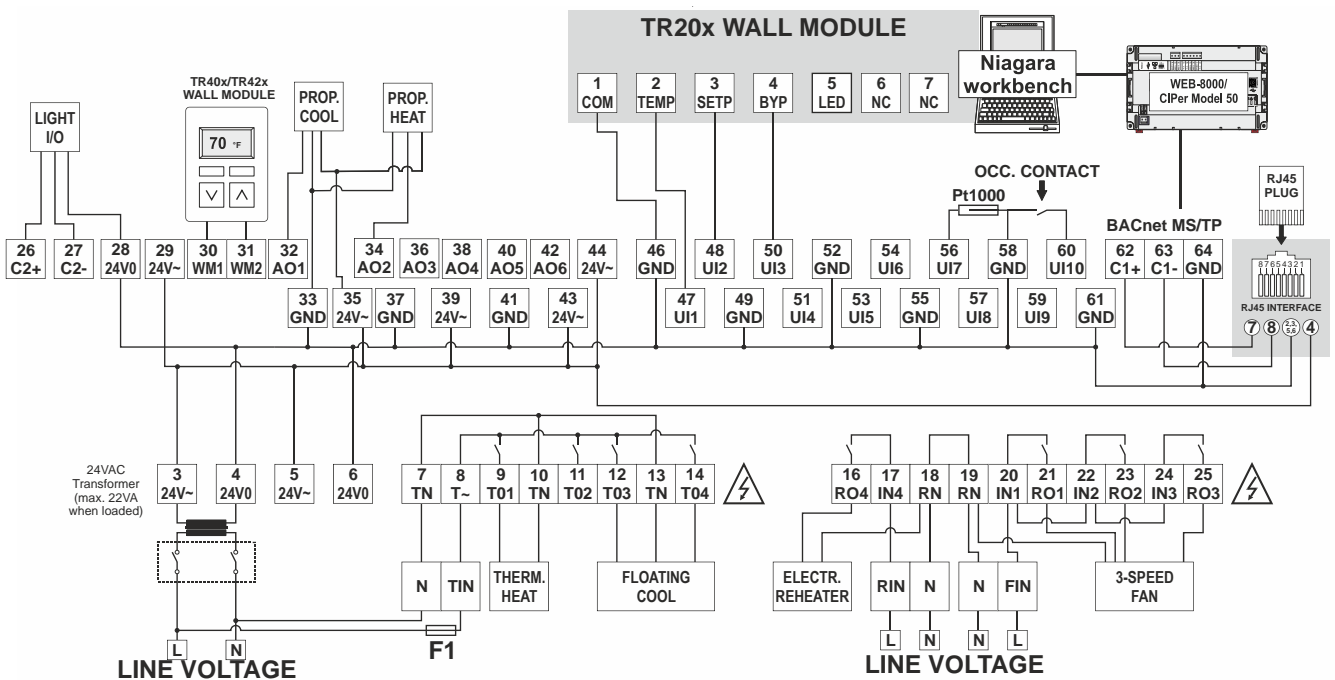Figure 7: WEB-RS5N (24 VAC models) example wiring

Figure 8: WEB-RL6N (24 VAC models) example wiring

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ELECTRICAL DATA
WEB-RL6N, WEB-RS5N (24 VAC)

Power via terminals 3 and 4: 24 VAC ±20%, 50/60 Hz.

Maximum current consumption (when unloaded): 300 mA.

Maximum current consumption (when loaded): 900 mA.

A 24 VAC model is "loaded" when – besides the inherent load (300 mA) – an additional sum load resulting from maximum **600 mA** is applied to the 24 VAC output terminals. The maximum unloaded output voltage at terminals 3 and 4 (WEB-RS5N) or terminals 5 and 6 (WEB-RL6N), respectively, is identical with the output voltage of the external supplying transformer. A maximum 22 VA rating transformer is needed when loaded.

FREELY PROGRAMMABLE APPLICATIONS

All models can be used with applications which the engineer can freely program for each controller. This process is performed on a PC on which the Niagara software program has been installed (see also Table 9 on pg. 10) through a WEB-8000, CIPer Model 50 or CIPer Model 10.

Supported Actuators

The application supports a variety of actuators.

- Analog 0(2) - 10 VDC
- Floating
- PWM
- Staged actuators
- 6-way valve actuators

Supported Sensors

A variety of sensors (for example, room temperature sensors, supply temperature sensors, condensation switch, window sensors, occupancy sensors, etc.) may be used to optimize control quality.

COMMISSIONING
Automatic MAC Addressing

In contrast to many other MS/TP controllers, the WEB-RxxN controller features automatic MAC addressing. Therefore, manual MAC address setting is not required.

OPERATOR INTERFACES LEDs

The controller features the following LEDs:

Figure 9: Controller LEDs

Table 7. Description of LED behaviors

Symbol	Color	Function, Description
T2	Yellow	Not used
R2	Yellow	Not used
T1	Yellow	LED indicating transmission of communication signals via the BACnet MS/TP interface
R1	Yellow	LED indicating reception of communication signals via the BACnet MS/TP interface.
⚠	Yellow	Status LED indicating firmware problems, hardware problems, etc.
⏻	Green	Power LED indicating firmware problems, hardware problems, etc.

Service Button

The controller's Service Button is used to trigger dedicated events.
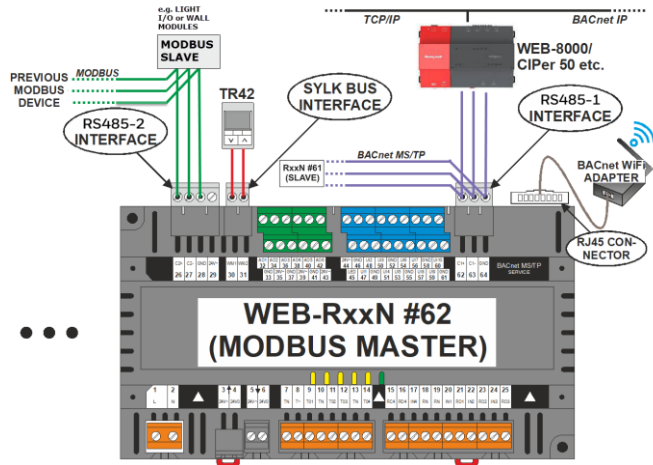
COMMUNICATION INTERFACES

Figure 10: System Overview (example: RLxN)

BACnet MS/TP Interface

The controller features an RS485 interface (WEB-RL6N: terminals 62, 63, and 64; WEB-RS5N: terminals 40, 41, and 42) suitable for BACnet MS/TP communication. The terminal block containing it is black. The cable length affects the baud rate. See Table 8 on pg.8.

Table 8. Baud rate vs. maximum cable length

Baud rate	Maximum cable length (L)
9.6, 19.2, **38.4**, 57.6, and 76.8 kbps	3600 ft (1200 m)

The controller supports auto-baud rate adaption for BACnet MS/TP communication at all of the aforementioned baud rates (the default is: 38.4 kbps).

For information on wire gauge, maximum permissible cable length, possible shielding and grounding requirements, and the maximum number of devices which can be connected to a bus, refer to standard EIA-485.

Modbus Interface

The controller features a non-isolated RS485 interface suitable for Modbus communication:

- WEB-RL6N: terminals 26, 27, and 28 (GND);
- WEB-RS5N: terminals 23, 24, and 25 (GND).

The controller can function only as a Modbus Master. In general, the RS485 wiring rules must be followed.

NOTE: The GND is internally connected with 24V0 (terminal 4 and terminal 6 for WEB-RLxN and terminal 4 for WEB-RSxN).

Addressing and wiring rules:

- Use only one Spyder Model 5 (IRM) controller per Modbus network.
- Recommended limit of Modbus devices that should be added to controller is 35. (Overloading will impact performance of Modbus).
- Recommended limit of Modbus points that should be added to controller is 100-150. (More the points, slower will be performance of Modbus).
- Recommended limit of high priority read registers in an application is 6-8. (Performance of Modbus will be impacted beyond the recommended limit).

Wall Modules

The TR40x / TR42x / TR20x Wall Modules can be used in conjunction with the controller to perform room temperature sensing, setpoint adjustment, fan speed manual override, and occupancy override. The wall modules supported by the WEB-RS5N and WEB-RL6N are; TR40, TR40-H, TR40-CO2, TR40-H-CO2, TR42-H, TR42-CO2, TR42-H-CO2. Additionally, TR2x series of wall modules are also supported. At a time three wall modules can be used.

I/O TERMINALS

⚠ CAUTION

Failure to observe the following maximum permissible current outputs of the power output terminals will result in damage to the device.

Maximum Current Output of Power Output Terminals of 24 VAC Controllers

The 24 VAC power output terminals of the 24 VAC WEB-RL6N controllers are terminals 3, 5, 29, 35, 39, 43, and 44 plus pin 4 of the controller's RJ45 interface.

The 24 VAC power output terminals of the 24 VAC WEB-RS5N controllers are terminals 3, 22, 27, and 31 plus pin 4 of the controller's RJ45 interface.

The maximum permissible combined current output of these 24 VAC power output terminals is 300 mA.

Relay Outputs

⚠ CAUTION

Mixing line voltage and low voltage within the relay block is not allowed.

The terminal blocks containing the controller's relay outputs are orange. Relay output types: See Table 3.

NOTE: Connecting inductive components to relay switching more than once every two minutes can cause interference in radio and television signal reception. To avoid it appropriate measure must be taken in accordance to EN 45014.

Triac Outputs

NOTE: Recommended fuse (F1): 1.25 A time-lag fuse (IEC). User must consider the correct voltage and maximum breaking capacity or interrupting rate (line voltage urgently requires high breaking capacity or interrupting rate).

The terminal blocks containing the controller's triac outputs are orange.

These triac outputs can be used for a variety of different functions, for example, for connection to either a floating drive or to a thermal actuator. Once the triac outputs have been programmed, the corresponding devices can then be connected to them directly.

NOTE: The VC6983 actuator is intended for use at relay outputs, only and must not be used at the controller's triac outputs.

Triac Current Limitations

The maximum allowed current with which the ensemble of a controller's triacs may be loaded is dependent upon whether the given model is powered with 24 VAC, upon whether the outputs are supplied by the controller's internal transformer or by an external current supply). Specifically:

- In the case of 24 VAC models, the ensemble of a controller's triacs may be loaded with 600 mA.

However, regardless of whether the triacs are supplied internally or externally, a single triac must never be loaded with a current of more than 300 mA (320 mA for maximum 2 minutes).

Nevertheless, the ensemble of triacs can be loaded for very short periods of time (on the order of milliseconds) with a current on the order of 2500 mA typically encountered when switching on multiple thermal actuators.

Universal Inputs

The terminal blocks containing the controller's universal inputs are blue. Universal input types: See Table 4.

The universal inputs are protected against voltages of maximum 29 VAC and 30 VDC (due to, for example, miswiring).

Bias Resistors

Each universal input is equipped with one bias resistor.

Analog Outputs

The terminal blocks containing the controller's analog outputs are green. Analog output types: See Table 5.

The analog outputs of the WEB-RL6N controllers (large housing) are protected against voltages of maximum 29 VAC and 30 VDC (due to, for example, miswiring).

ACCESSORIES
Terminal Protection Cover

Required for wall mounting. Bulk pack set of ten covers.

- WEB-RL6N order no.: **IRM-RLC**
- WEB-RS5N, order no.: **IRM-RSC**

APPROVALS, CERTIFICATIONS, AND STANDARDS
Approvals and Certifications

- UL 60730-1, Standard for Automatic Electric Controls for Household and Similar Use, Part 1: General Requirements;
- CAN/CSA-E60730-1:02, Standard for Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements;
- Complementary listing for UL916, CSA C22.2 No. 205;
- BTL-listed, BACnet B-ASC profile;
- CE-approved;
- FCC part 15B-compliant;
- RoHS Conformity.

Classification according to EN 60730-1

EN 60730 sub part	EN 60730-2-9
Environmental conditions	For use in home (residential, commercial, and light-industrial) environments
Construction	Independently mounted electronic control unit with fixed wiring:panel-mounted on DIN rail.
Action	Type 1.C
Rated impulse voltage	24 V circuits: 500 V
Pollution degree	2
Protection against shock	Class 0 (without terminal cover) Class II (with terminal cover)
Software class	A

Classification according to EN 60529

(Degree of protection provided by enclosures)

IP20. In the case of controllers mounted outside of a cabinet, before applying power to the device, Terminal Protection Covers (10-pc. bulk packs, order no.: IRM-RLC for large housings and IRM-RSC for small housings) must be mounted so as to provide IP30.

Ambient Environmental Limits

24VAC Models (5 to 95% RH., non-condensing)
Operating temperature: +32 to +122 °F (0 to +50 °C)
Storage temperature: -4 to +158 °F (-20 to +70 °C)

Related Technical Literature

Table 9. Related Technical Literature

Title	Product Lit. no.
Spyder Model 5 Mounting Instructions	31-00276
Spyder Model 5 Installation Guide	31-00281
Spyder Model 5 User Guide	31-00282
TR40x/TR42x – Specification Data	63-1389
TR40x/TR42x – Installation Instructions	62-0467
TR40x/TR42x – Operating Guide	63-2741
TR2x Series – Specification Data	63-1321
TR2x Series – Installation Instructions	62-0267
TR120 – Specification Data	31-00312
TR120 – Installation Instructions	31-00275
TR120 – Operating Guide	63-2719
Ciper Model 50 Product data	31-00197
Ciper Model 50 Installation and Commissioning instructions	31-00233
Ciper Model 50 Mounting Instructions	31-00234

Trademark Information

BACnet™ is a trademark of ASHRAE Inc.

Sylk™ is a trademark of Honeywell International Inc.

Honeywell