

# SOFT STARTER



# Ex9QR5

## Soft starter

### Ex9QR5 Product Overview

## Features

Ex9QR5 is a solid-state reduced voltage (SSRV) motor starter used in the control and protection of 3-phase electric motors. Its multiple starting modes control the voltage and current applied to the motor to provide soft start, speed ramp and soft stop capability. The Ex9QR5 has built-in motor overload protection in class 10, 20 and 30, along with advanced protection such as phase loss/phase unbalance, undervoltage and more. It is the ideal solution for energy savings and torque control in applications like fans, blowers, pumps, compressors, ball mills, crushers and many other loads.

#### Ex9QR5 Features:

- Seven unique starting modes
- Automatic light-load energy savings
- Low-speed forward and reverse
- Programmable kickstart mode
- Soft stop and braking
- Sequential, multiple motor starting
- Programmable digital inputs and analog output
- Built-in RS-485 communication interface and standard Modbus protocol
- Separately mountable LCD display with user-friendly interface

#### Certifications:

- UL 508 Listed, File No. E533416; UL 60947-4-2
- CSA C22.2 No. 14; CSA C22.2 No. 60947-4-2

#### Ex9QR5 Ratings:

- 200Vac to 690Vac
- Ampacity ratings from 15A through 1000A in five frame sizes
- Input frequency range from 35 Hz to 60 Hz

#### Motor Protection Functions:

- Phase loss/phase unbalance
- Starting current limit timeout
- Undervoltage/Overvoltage
- Output phase loss
- Motor overload
- Load locked/short circuit
- Multi-start lockout

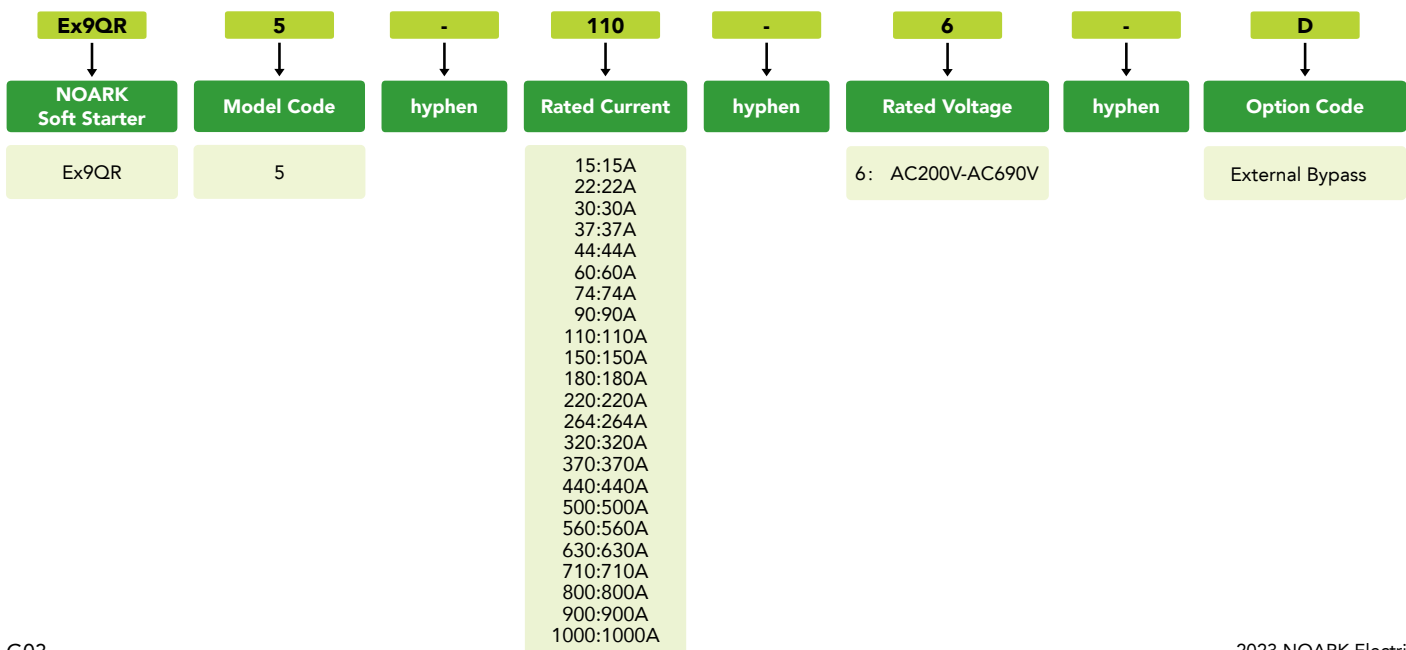
## Soft starter Ex9QR5 Product Selection

### Label



1. Product Selection
2. Brand
3. Display screen
4. Operation panel
5. Control terminals
6. Main power terminals

### Product Selection Guide



## Soft starter

### Ex9QR5 Product Selection



Rated Current	Product	Part Number	Description
15A	Ex9QR5-15-6-D	1720000	Soft Starters, Ex9QR5, 15A, 200-690Vac, 100~240 Vac control, Non-Bypassed
22A	Ex9QR5-22-6-D	1720001	Soft Starters, Ex9QR5, 22A, 200-690Vac, 100~240 Vac control, Non-Bypassed
30A	Ex9QR5-30-6-D	1720002	Soft Starters, Ex9QR5, 30A, 200-690Vac, 100~240 Vac control, Non-Bypassed
37A	Ex9QR5-37-6-D	1720003	Soft Starters, Ex9QR5, 37A, 200-690Vac, 100~240 Vac control, Non-Bypassed
44A	Ex9QR5-44-6-D	1720004	Soft Starters, Ex9QR5, 44A, 200-690Vac, 100~240 Vac control, Non-Bypassed
60A	Ex9QR5-60-6-D	1720005	Soft Starters, Ex9QR5, 60A, 200-690Vac, 100~240 Vac control, Non-Bypassed
74A	Ex9QR5-74-6-D	1720006	Soft Starters, Ex9QR5, 74A, 200-690Vac, 100~240 Vac control, Non-Bypassed
90A	Ex9QR5-90-6-D	1720007	Soft Starters, Ex9QR5, 90A, 200-690Vac, 100~240 Vac control, Non-Bypassed
110A	Ex9QR5-110-6-D	1720008	Soft Starters, Ex9QR5, 110A, 200-690Vac, 100~240 Vac control, Non-Bypassed
150A	Ex9QR5-150-6-D	1720009	Soft Starters, Ex9QR5, 150A, 200-690Vac, 100~240 Vac control, Non-Bypassed
180A	Ex9QR5-180-6-D	1720010	Soft Starters, Ex9QR5, 180A, 200-690Vac, 100~240 Vac control, Non-Bypassed
220A	Ex9QR5-220-6-D	1720011	Soft Starters, Ex9QR5, 220A, 200-690Vac, 100~240 Vac control, Non-Bypassed
264A	Ex9QR5-264-6-D	1720012	Soft Starters, Ex9QR5, 264A, 200-690Vac, 100~240 Vac control, Non-Bypassed
320A	Ex9QR5-320-6-D	1720013	Soft Starters, Ex9QR5, 320A, 200-690Vac, 100~240 Vac control, Non-Bypassed
370A	Ex9QR5-370-6-D	1720014	Soft Starters, Ex9QR5, 370A, 200-690Vac, 100~240 Vac control, Non-Bypassed
440A	Ex9QR5-440-6-D	1720015	Soft Starters, Ex9QR5, 440A, 200-690Vac, 100~240 Vac control, Non-Bypassed
500A	Ex9QR5-500-6-D	1720016	Soft Starters, Ex9QR5, 500A, 200-690Vac, 100~240 Vac control, Non-Bypassed
560A	Ex9QR5-560-6-D	1720017	Soft Starters, Ex9QR5, 560A, 200-690Vac, 100~240 Vac control, Non-Bypassed
630A	Ex9QR5-630-6-D	1720018	Soft Starters, Ex9QR5, 630A, 200-690Vac, 100~240 Vac control, Non-Bypassed
710A	Ex9QR5-710-6-D	1720019	Soft Starters, Ex9QR5, 710A, 200-690Vac, 100~240 Vac control, Non-Bypassed
800A	Ex9QR5-800-6-D	1720020	Soft Starters, Ex9QR5, 800A, 200-690Vac, 100~240 Vac control, Non-Bypassed
900A	Ex9QR5-900-6-D	1720021	Soft Starters, Ex9QR5, 900A, 200-690Vac, 100~240 Vac control, Non-Bypassed
1000A	Ex9QR5-1000-6-D	1720022	Soft Starters, Ex9QR5, 1000A, 200-690Vac, 100~240 Vac control, Non-Bypassed

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## Soft starter Ex9QR5 Specifications

### Technical Data

Technical data		
Rated Insulation Voltage Ui	800 Vac	
Rated operational voltage Ue	200Vac- 690Vac (-10%~+10%)	
Rated frequency	Current mode(suggested)	35Hz~60Hz
	Other starting mode	50Hz ± 2Hz and 60Hz ± 2Hz
Rated control supply voltage Us	100Vac-240Vac (-10%~+10%)	
Rated control frequency	50Hz ± 2Hz、60Hz ± 2Hz	
Rated Impulse Withstand Voltage Uimp (kV)	8kV	
Initial voltage	30%Ue~70%Ue	
Current Limitation	50%Ie~500%Ie	
General information		
Class of pollution	Level 3	
EMC equipment level	Class A (industrial grade) Level 3	
Shock resistance	less than 0.5g	
Overload class	10A, 10, 20 and 30	
Main circuit		
Built-in bypass	No	
Cooling system	fan cooled	
Ambient temperature		
Storage	-25°C to +70°C	
Working	-10°C to +40°C	full performance
	40°C to +50°C	the current derates 2% for every 1°C
Relative humidity	Not exceed 95%(+20°C to +65°C)	
Altitude ft (m)		
< 1,000m	full performance	
1,000m - 3000m	the current derated 0.5% for every 100m	
> 3,000m	contact Noark for customization	
Control I/O		
Signal relays		
K1	Bypass relay	
K2	Programmable status relay	
K3	Programmable fault relay	
Optional I/O		
IN1	Programmable input terminal	
IN2	Programmable input terminal	
Analog output	Four output types: 4mA~20mA, 0mA~20mA, 2mA~10mA and 0mA~10mA.	
Analog input	Motor Temperature Input (PTC Thermistor)	
Control Inputs		
RUN	Start Input (NO dry contact)	
STOP	Stop Input (NC dry contact)	
EMS	Emergency Stop (NC dry contact)	

\* PTC: Positive Temperature Coefficient thermistor

# Soft starter

## Ex9QR5 Specifications

### UL Motor Ratings

SKU	Item Number	Rated Amps	Short Circuit Withstand (kA)	Maximum Motor Ratings (UL)										Protection and Bypass Components		
				200Vac		208Vac		240Vac		480Vac		600Vac		Circuit Protection		Bypass Contactor
				FLA	HP	FLA	HP	FLA	HP	FLA	HP	FLA	HP	MCCB	Fuse	
Ex9QR5-15-6-D	1720000	15	5	11	3	11	3	9.6	3	14	10	10	11	M1S40T3L	60A,600V, K5	Ex9C18F11K
Ex9QR5-22-6-D	1720001	22	5	18	5	17	5	22	7.5	21	15	20	22	M1S60T3L	80A,600V, K5	Ex9C25F11K
Ex9QR5-30-6-D	1720002	30	5	25	7.5	24	7.5	28	10	27	20	25	27	M1S80T3L	100A,600V, K5	Ex9C32F11K
Ex9QR5-37-6-D	1720003	37	5	32	10	31	10	28	10	34	25	30	32	M1S100T3L	125A,600V, K5	Ex9C40F11K
Ex9QR5-44-6-D	1720004	44	5	32	10	31	10	42	15	40	30	40	41	M1S125T3L	150A,600V, K5	Ex9C50F11K
Ex9QR5-60-6-D	1720005	60	5	48	15	59	20	54	20	52	40	50	52	M1S150T3L	150A,600V, K5	Ex9C65F11K
Ex9QR5-74-6-D	1720006	74	10	62	20	59	20	68	25	65	50	60	62	M2S250T3L	250A,600V, K5	Ex9C80F11K
Ex9QR5-90-6-D	1720007	90	10	78	25	88	30	80	30	77	60	75	77	M2S250T3L	250A,600V, K5	Ex9C115F22K
Ex9QR5-110-6-D	1720008	110	10	92	30	88	30	104	40	96	75	100	99	M2S250T3L	350A,600V, K5	Ex9C115F22K
Ex9QR5-150-6-D	1720009	150	10	150	50	143	50	130	50	124	100	150	144	M2S250T3L	350A,600V, K5	Ex9C150F22K
Ex9QR5-180-6-D	1720010	180	10	177	60	169	60	154	60	180	150	150	144	M3S400T3L	400A,600V, K5	Ex9C185F22K
Ex9QR5-220-6-D	1720011	220	10	177	60	169	60	192	75	180	150	200	192	M3S400T3L	400A,600V, K5	Ex9C225F22K
Ex9QR5-264-6-D	1720012	264	18	221	75	211	75	248	100	240	200	250	242	M3S400T3L	A4BQ601	Ex9C265F22K
Ex9QR5-320-6-D	1720013	320	18	285	100	273	100	312	125	302	250	300	289	M4S600T3L	A4BQ750	Ex9C300F22K
Ex9QR5-370-6-D	1720014	370	18	359	125	343	125	360	150	361	300	350	336	M4S600T3L	A4BQ800	Ex9C400F22K
Ex9QR5-440-6-D	1720015	440	18	414	150	396	150	360	150	414	350	450	412	M5S800T3L	A4BQ1000	Ex9C500F22K
Ex9QR5-500-6-D	1720016	500	30	414	150	396	150	480	200	477	400	500	472	M5S800T3L	A4BQ1200	Ex9C500F22K
Ex9QR5-560-6-D	1720017	560	30	552	200	528	200	480	200	515	450	550	529	M6N1200E3L	A4BQ1400	Ex9C630F22K
Ex9QR5-630-6-D	1720018	630	30	552	200	528	200	604	250	590	500	600	577	M6N1200E3L	A4BQ1600	Ex9C630F22K
Ex9QR5-710-6-D	1720019	710	42	690	250	667	250	604	250	660	550	650	625	M6N1200E3L	A4BQ1600	Ex9C800F22K
Ex9QR5-800-6-D	1720020	800	42	794	300	766	300	722	300	780	650	750	722	M6N1200E3L	A4BQ2000	Ex9C1000F22K
Ex9QR5-900-6-D	1720021	900	42	892	350	866	350	828	350	900	750	850	817	M6N1200E3L	A4BQ2000	2*Ex9C1000F22K
Ex9QR5-1000-6-D	1720022	1000	42	892	350	866	350	954	400	960	800	900	866	M6N1200E3L	A4BQ2000	2*Ex9C1000F22K

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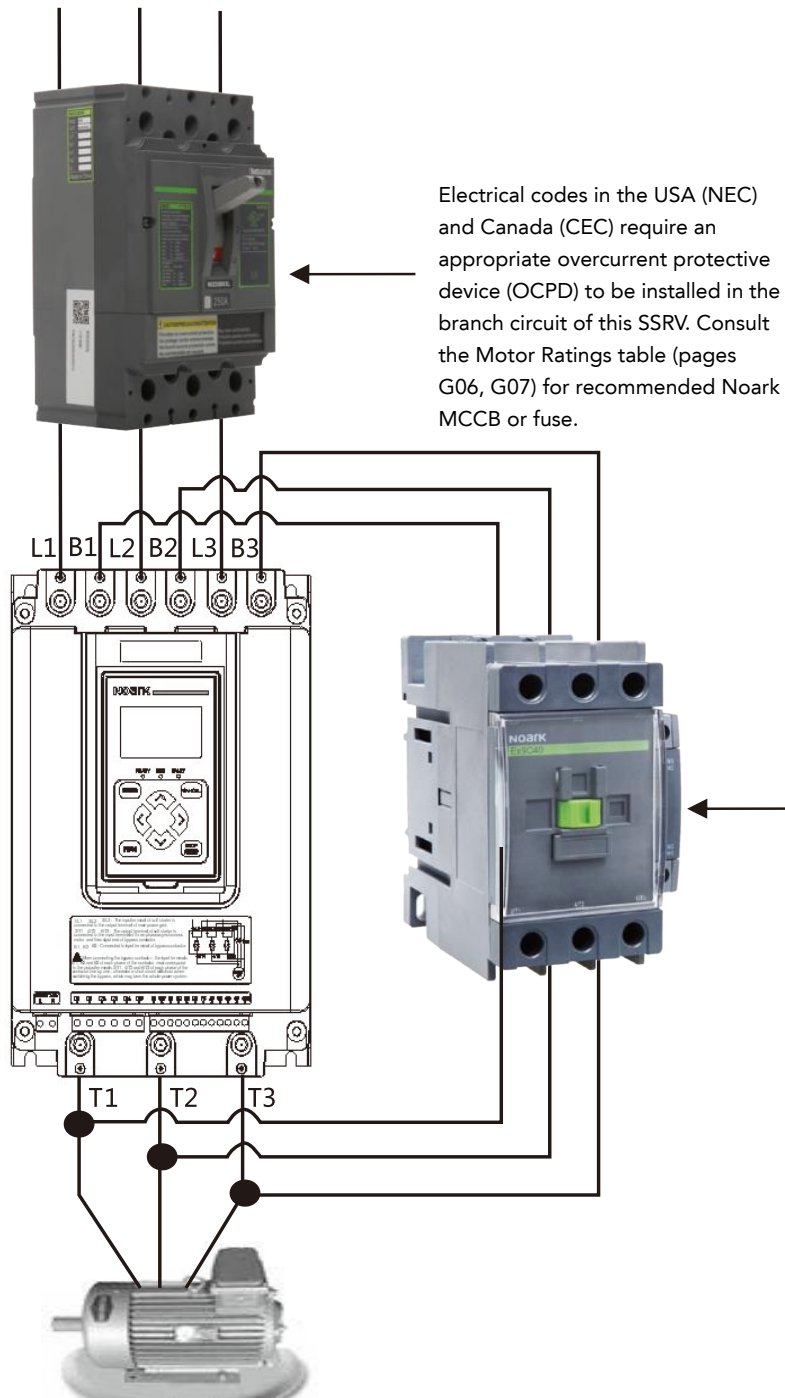
## Soft starter

### Ex9QR5 Specifications

#### IEC Motor Ratings

SKU	Item Number	Rated Amps	Short Circuit Withstand (kA)	Maximum Motor Ratings (IEC)										Protection and Bypass Components		
				220Vac		380Vac		460Vac		575Vac		690Vac		Circuit Protection		Bypass Contactor
				FLA	kW	FLA	kW	FLA	kW	FLA	kW	FLA	kW	MCCB	Fuse	
Ex9QR5-15-6-D	1720000	15	5	15	4	15	7.5	15	9	15	11	15	11	M1S40T3L	60A,600V, K5	Ex9C18F11K
Ex9QR5-22-6-D	1720001	22	5	22	5.5	22	11	22	15	22	18.5	22	18.5	M1S60T3L	80A,600V, K5	Ex9C25F11K
Ex9QR5-30-6-D	1720002	30	5	29	7.5	29	15	29	18.5	29	22	29	22	M1S80T3L	100A,600V, K5	Ex9C32F11K
Ex9QR5-37-6-D	1720003	37	5	36	11	36	18.5	36	22	36	30	36	30	M1S100T3L	125A,600V, K5	Ex9C40F11K
Ex9QR5-44-6-D	1720004	44	5	42	11	42	22	42	30	42	30	42	37	M1S125T3L	150A,600V, K5	Ex9C50F11K
Ex9QR5-60-6-D	1720005	60	5	57	15	57	30	57	37	57	45	57	55	M1S150T3L	150A,600V, K5	Ex9C65F11K
Ex9QR5-74-6-D	1720006	74	10	70	18.5	70	37	70	45	70	55	70	75	M2S250T3L	250A,600V, K5	Ex9C80F11K
Ex9QR5-90-6-D	1720007	90	10	84	22	84	45	84	55	84	75	84	90	M2S250T3L	250A,600V, K5	Ex9C115F22K
Ex9QR5-110-6-D	1720008	110	10	103	30	103	55	103	75	103	75	103	110	M2S250T3L	350A,600V, K5	Ex9C115F22K
Ex9QR5-150-6-D	1720009	150	10	140	37	140	75	140	90	140	110	140	132	M2S250T3L	350A,600V, K5	Ex9C150F22K
Ex9QR5-180-6-D	1720010	180	10	167	45	167	90	167	110	167	132	167	160	M3S400T3L	400A,600V, K5	Ex9C185F22K
Ex9QR5-220-6-D	1720011	220	10	207	55	207	110	207	132	207	160	207	200	M3S400T3L	400A,600V, K5	Ex9C225F22K
Ex9QR5-264-6-D	1720012	264	18	248	75	248	132	248	150	248	185	248	250	M3S400T3L	A4BQ601	Ex9C265F22K
Ex9QR5-320-6-D	1720013	320	18	300	90	300	160	300	185	300	250	300	315	M4S600T3L	A4BQ750	Ex9C300F22K
Ex9QR5-370-6-D	1720014	370	18	349	110	349	185	349	220	349	280	349	355	M4S600T3L	A4BQ800	Ex9C400F22K
Ex9QR5-440-6-D	1720015	440	18	404	110	404	220	404	250	404	315	404	400	M5S800T3L	A4BQ1000	Ex9C500F22K
Ex9QR5-500-6-D	1720016	500	30	459	132	459	250	459	280	459	355	459	400	M5S800T3L	A4BQ1200	Ex9C500F22K
Ex9QR5-560-6-D	1720017	560	30	514	160	514	280	514	315	514	400	514	500	M6N1200E3L	A4BQ1400	Ex9C630F22K
Ex9QR5-630-6-D	1720018	630	30	579	160	579	315	579	355	579	450	579	560	M6N1200E3L	A4BQ1600	Ex9C630F22K
Ex9QR5-710-6-D	1720019	710	42	634	200	634	355	634	400	634	500	634	630	M6N1200E3L	A4BQ1600	Ex9C800F22K
Ex9QR5-800-6-D	1720020	800	42	720	200	720	400	720	450	720	560	720	710	M6N1200E3L	A4BQ2000	Ex9C1000F22K
Ex9QR5-900-6-D	1720021	900	42	810	250	810	450	810	560	810	630	810	800	M6N1200E3L	A4BQ2000	2*Ex9C1000F22K
Ex9QR5-1000-6-D	1720022	1000	42	900	250	900	500	900	560	900	800	900	900	M6N1200E3L	A4BQ2000	2*Ex9C1000F22K

# Soft starter Ex9QRS Application



Electrical codes in the USA (NEC) and Canada (CEC) require an appropriate overcurrent protective device (OCPD) to be installed in the branch circuit of this SSRV. Consult the Motor Ratings table (pages G06, G07) for recommended Noark MCCB or fuse.

For maximum design flexibility and long term reliability, this SSRV employs an external bypass contactor. Consult the Motor Ratings table (pages G06, G07) for the appropriate Noark contactor.

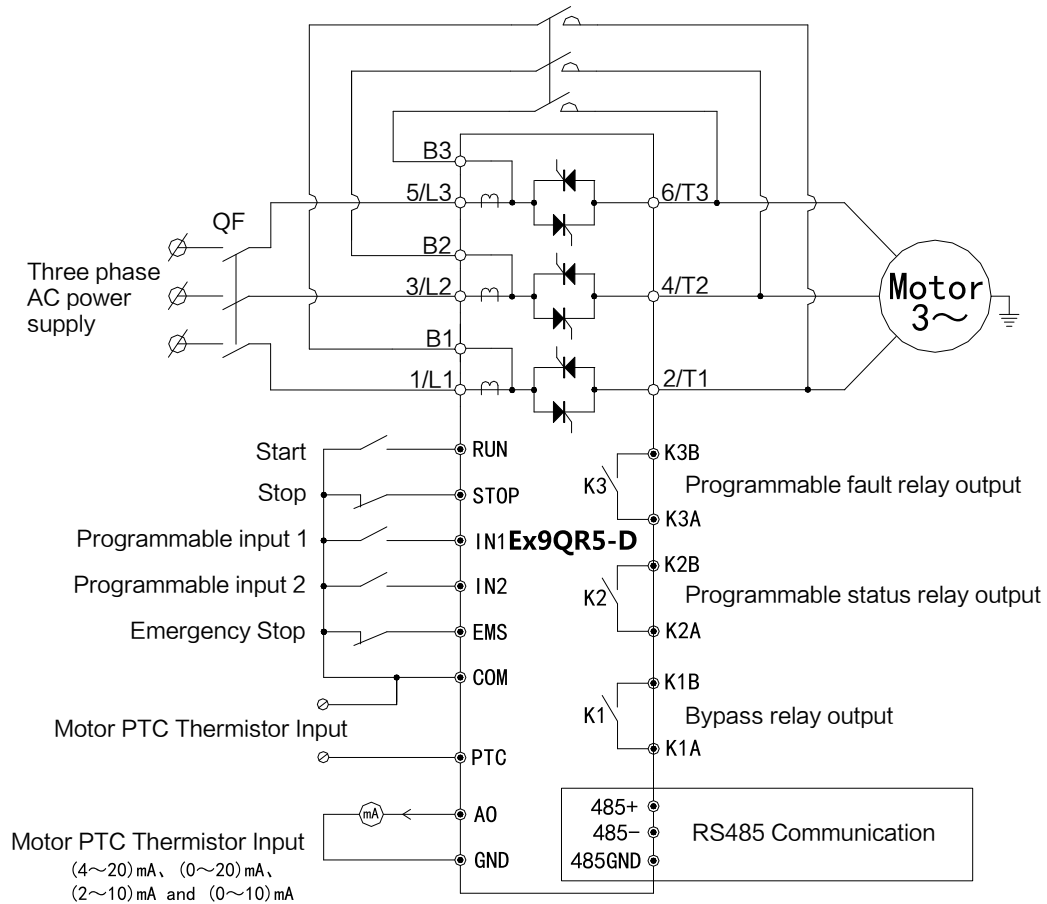




## Soft starter

### Ex9QR5 Basic Wiring

## Wiring and Terminal Function

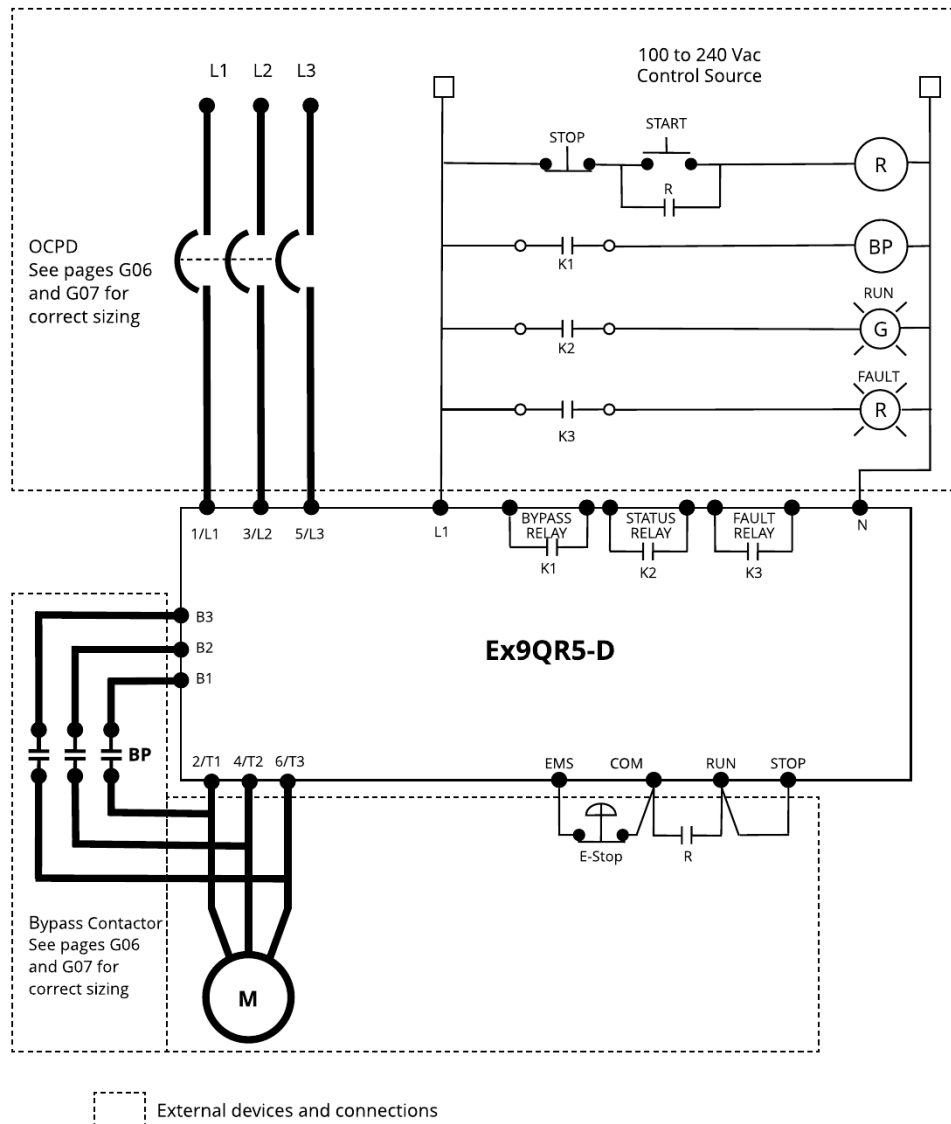


Terminal Number	Function
L	Control power input L
N	Control power input N
K1A, K1B	Bypass relay K1 Normally Open (5A max)
K2A, K2B	Programmable state relay K2 Normally Open
K3A, K3B	Programmable fault relay K3 Normally Open
RUN	Start Input (NO dry contact only)
STOP	Stop Input (NC dry contact only)
IN1	Programmable Input (dry contact only)
IN2	Programmable Input (dry contact only)

Terminal Number	Function
EMS	Emergency Stop Input (NC dry contact only)
COM	Common
PTC	Motor Temperature Sensor Input (PTC Thermistor)
AO	Analog Output
GND	Analog Output Ground
485+	RS485 Plus
485-	RS485 Minus
485GND	RS485 Communications Ground

# Soft starter Ex9QR5 Wiring Diagram

## Typical Wiring for Start/Stop Control



Note 1: Bypass Relay has a maximum rating of 5A at 120Vac.

Note 2: An external Overload Relay is not required in a single motor application. The Ex9QR5 provides electronic overload protection, Class 10A, 10, 20, 30.

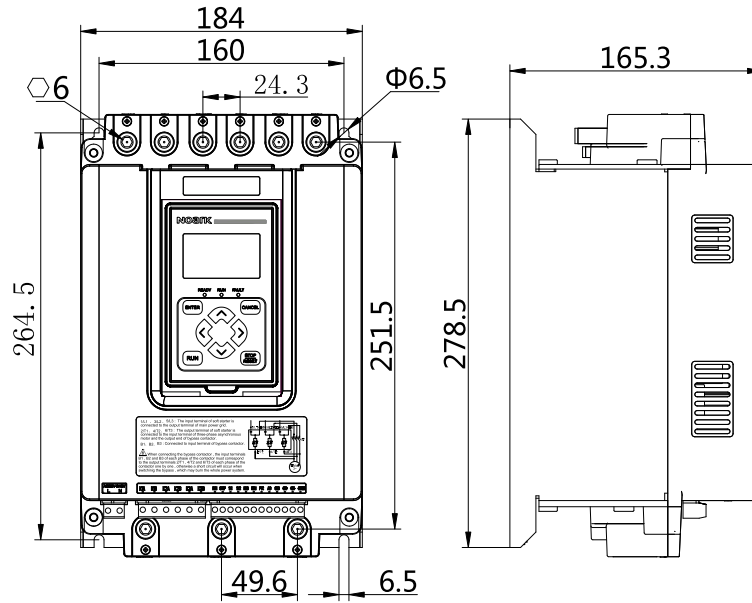
## Soft starter

### Ex9QR5 Dimensions

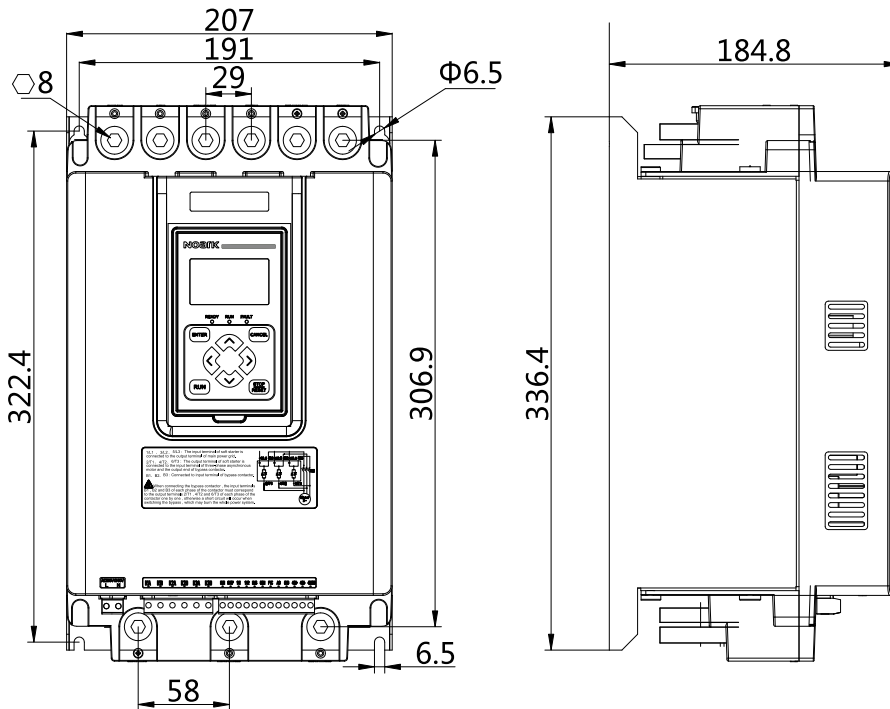
#### Ex9QR5

Unit: in. [mm]

#### 15A-90A



#### 110A-150A



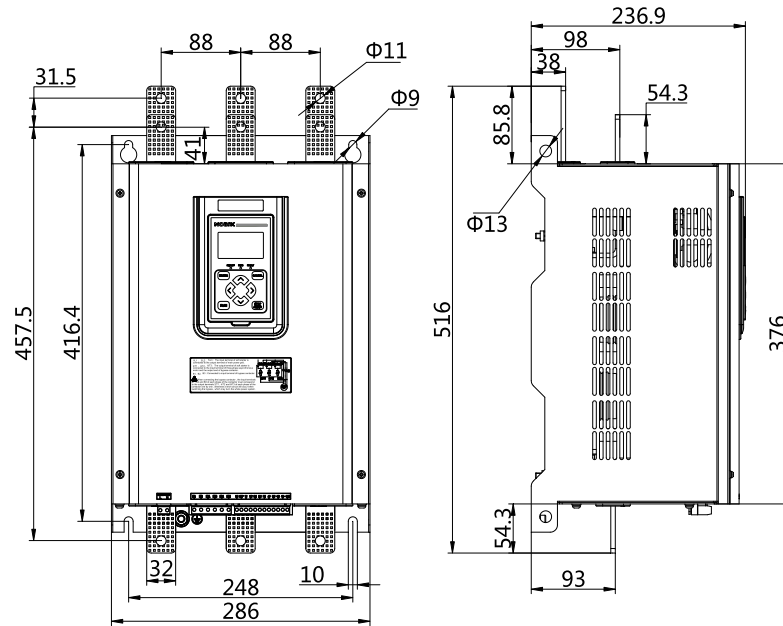
# Soft starter

## Ex9QR5 Dimensions

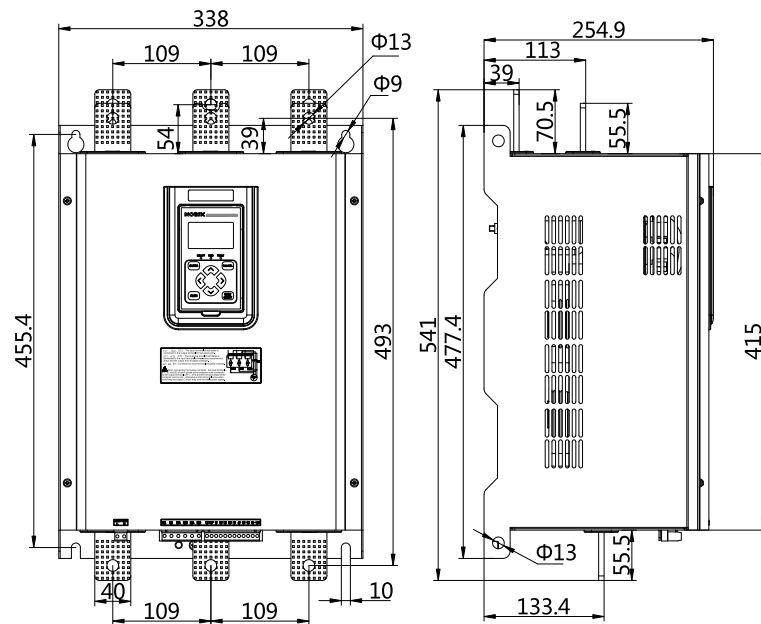
### Ex9QR5

Unit: in. [mm]

#### 180A-370A



#### 440A-630A



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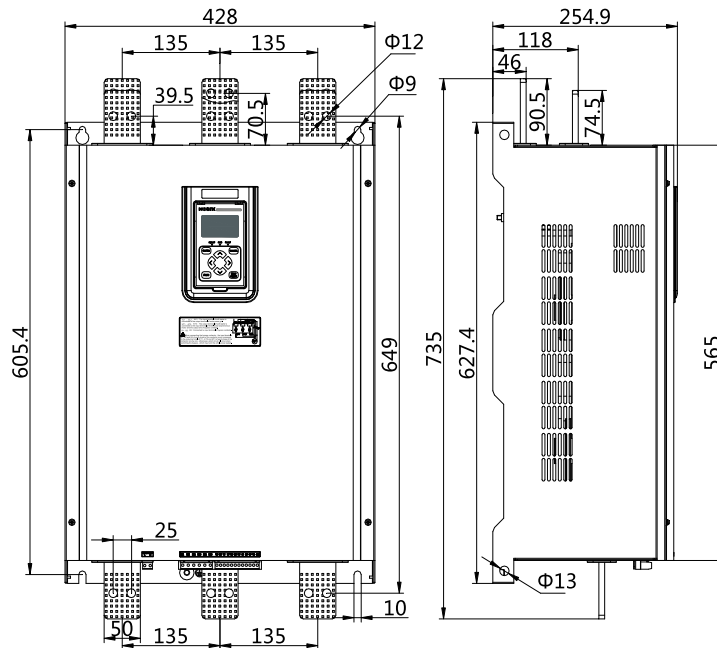
## Soft starter

### Ex9QR5 Dimensions

#### Ex9QR5

Unit: in. [mm]

#### 710A-1000A



## Weight and Dimensions

Catalog Number	Rated Current Range	Net weight	Dimension(mm)
Ex9QR5-15-6-D~Ex9QR5-90-6-D	15A-90A	6kg	145×268×190
Ex9QR5-110-6-D~Ex9QR5-150-6-D	110A-150A	11kg	210×310×215
Ex9QR5-180-6-D~Ex9QR5-370-6-D	180A-370A	23kg	253×529×241
Ex9QR5-440-6-D~Ex9QR5-630-6-D	440A-630A	32kg	300×564×253
Ex9QR5-710-6-D~Ex9QR5-1000-6-D	710A-1000A	52kg	444×752×250

## Installation Specification

SKU	Lugs / Lug Pad Dimensions	Connection Type screw size	Lug / Screw Torque (N·m)	Control Circuit wire size(AWG)	Control Circuit screw size	Control Circuit torque specs(N·m)
Ex9QR5-15-6-D~Ex9QR5-90-6-D	14-6 AWG	Built In Lugs	5	13	M3	0.5
Ex9QR5-110-6-D~Ex9QR5-150-6-D	4-3/0 AWG	Built In Lugs	10			
Ex9QR5-180-6-D~Ex9QR5-370-6-D	3 AWG-300 Kcmil	Built In Lugs	26	13	M3	0.5
Ex9QR5-440-6-D~Ex9QR5-630-6-D	32mm × 5mm	M10 *	26	13	M3	0.5
Ex9QR5-710-6-D~Ex9QR5-1000-6-D	40mm × 6mm	M12*	45	13	M3	0.5
Ex9QR5-1000-6-D~Ex9QR5-1000-6-D	50mm × 8mm	M10 x 2 *	26	13	M3	0.5

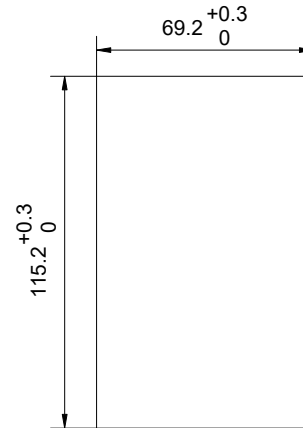
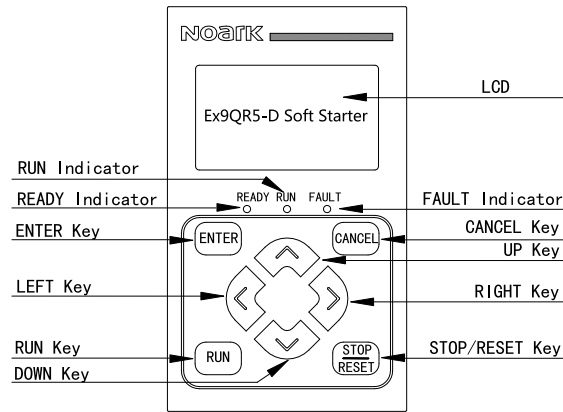
\* Cable lugs not included.

# Soft starter

## Ex9QRS Dimensions

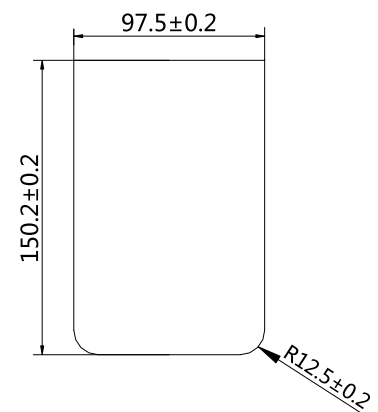
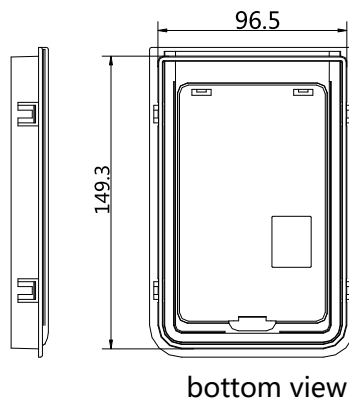
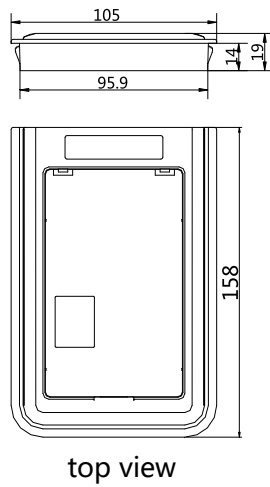
### Keypad Controls

Unit: mm



### Remote Keypad Mounting Adapter

Unit: mm




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