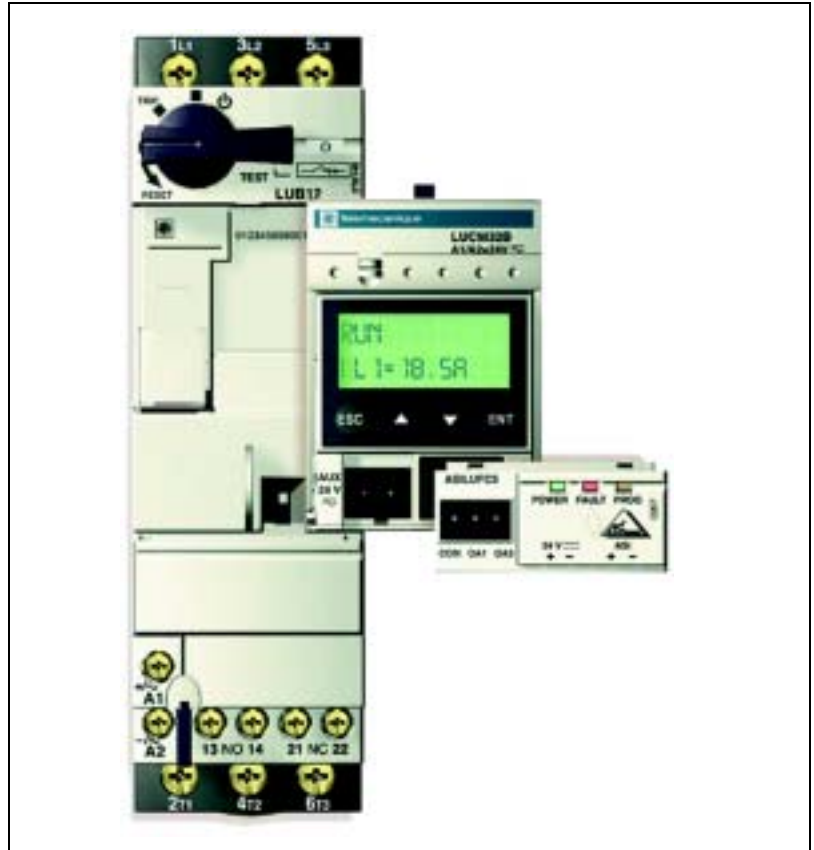


# TeSys®

## U-Line Motor Starters

Catalog  
**2004**

File 8502

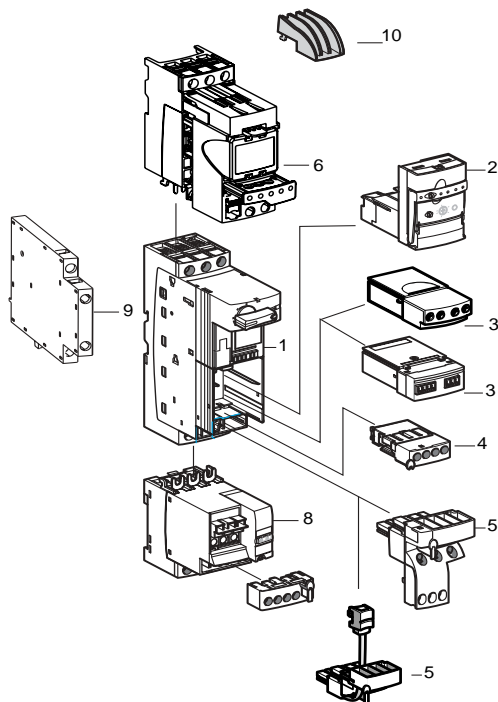


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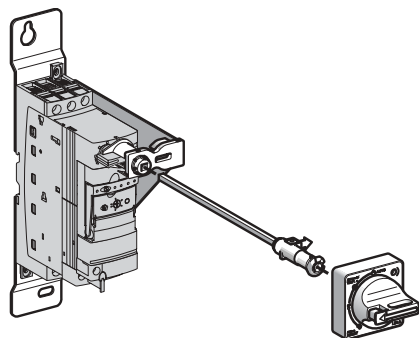
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Examples of Various U-Line Components



Door Interlock Mounting Kit

## GENERAL INFORMATION AND SELECTION

TeSys® U-Line motor starters provide motor control for choices ranging from a basic motor starter with solid-state thermal overload protection to a sophisticated motor controller which communicates on networks and includes programmable motor protection.

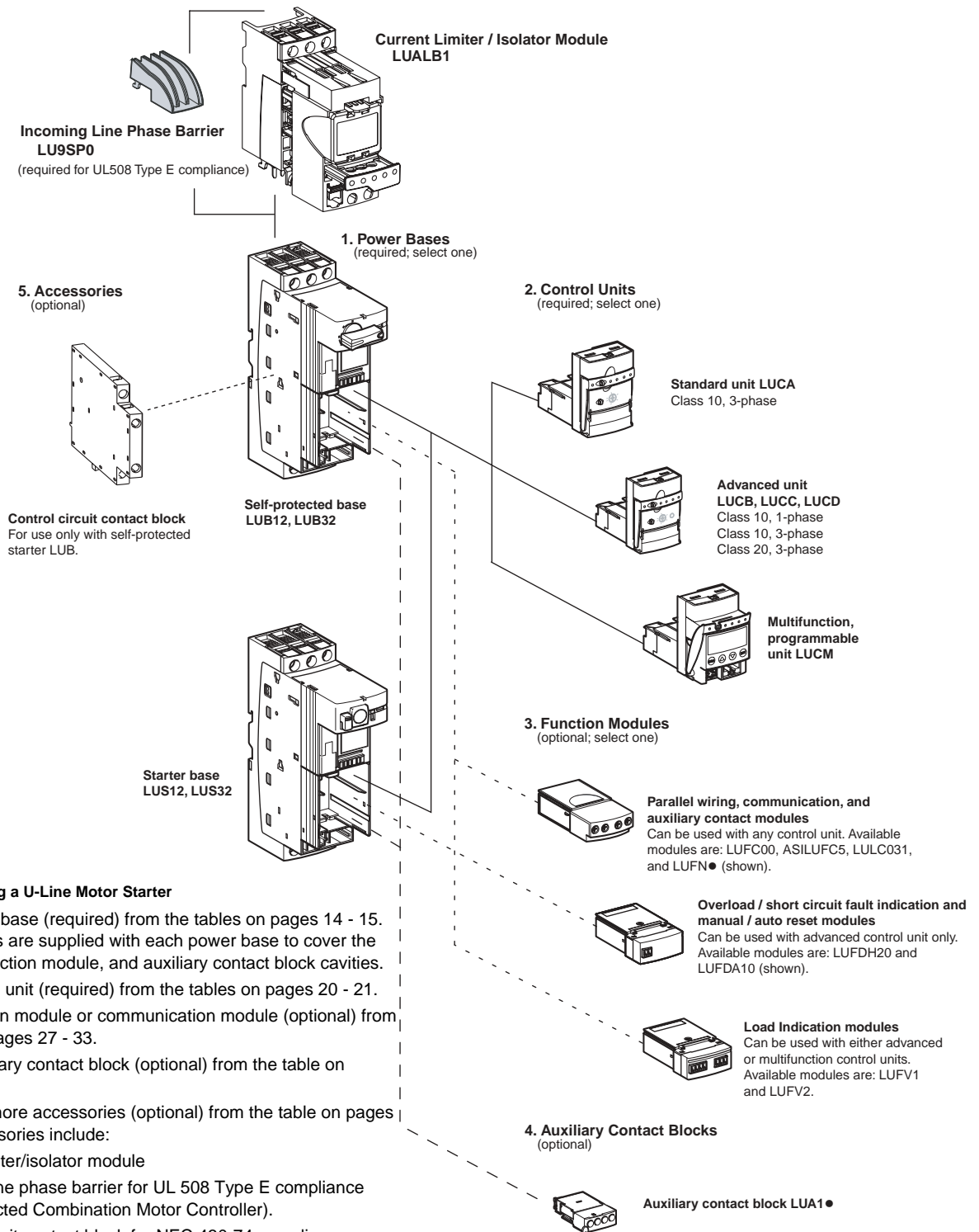
Using a plug-in modular design, the U-line starters allow maximum flexibility in motor control. Simply select the 45 mm Power Base, and mount either on a panel or on a 35 mm DIN rail. Then select and install the various plug-in components for the application. Plug-in design allows wiring to be prepared in advance of final installation or to assist in any maintenance work without unwiring.

1. Power Base—provides the main contacts (power poles) for the device.
  - Self-protected starter base (shown), 12 or 32 A (approved for group motor installations or UL508 Type E self-protected combination motor controller).
  - Starter base, 12 or 32 A (approved for group motor installations).
2. Interchangeable Control Units—provide the control and thermal overload functions for the power bases. Interchangeable, wide-range control units provide motor protection from 0.15 A to 32 A. The low consumption (low heat dissipation) control units include built-in surge protection.
  - Standard Control Unit—provides basic Class 10 trip characteristics, no communications capabilities, manual reset only.
  - Advanced Control Unit—provides a choice of Class 10 or Class 20 trip characteristics and allows for network communications, and manual/auto reset when used with appropriate function modules.
  - Multifunction Control Unit—provides a wider range of programmable protection with built-in Modbus® communication capabilities.
3. Function Modules—each power base includes a blanking cover which can be replaced by one of the following function modules:
  - Parallel wiring module allows for connection to PLC I/O modules without need for tools and powers the power base control circuit without need for hard wiring.
  - Communication modules allow either parallel or serial communication via Modbus or AS-i networks. Other communications protocols are possible via gateways.
  - Auxiliary contact function modules provide a hard contact to monitor status of the power poles. Modules are available in three configurations (2 N.O., 1 N.O./1 N.C., and 2 N.C). This contacts indicate the status of the power poles and provide a fault signal as traditional hard-wired contacts.
  - Other function modules provide alarm indications, fault indication (overload or short circuit) manual or automatic reset on overload trip and indication of motor load (Amps).
4. Auxiliary Contact Blocks—provides indication of power pole status, “ready” position of the control handle and fault signalling.
5. Control Circuit Pre-Wiring Connectors—allows simple, plug-on connection to be made to other units (such as the reversing block).
6. Current Limiter/Isolator Module—mounts directly to the self-protected power bases and provides increased short circuit breaking capacity (up to 130 kA at 480 V and 65 kA at 600 V). Also, provides visible circuit isolation from the main power with provisions for padlocking.

Other options include a reversing block (8), control circuit contact block (9), incoming line phase barrier “required for UL 508 Type E self-protected combination motor controller applications” (10), and door interlock mounting kit for through-the-door operation of the self-protected (LUB) power base.

# TeSys® U-Line Motor Starters

## General Information and Selection

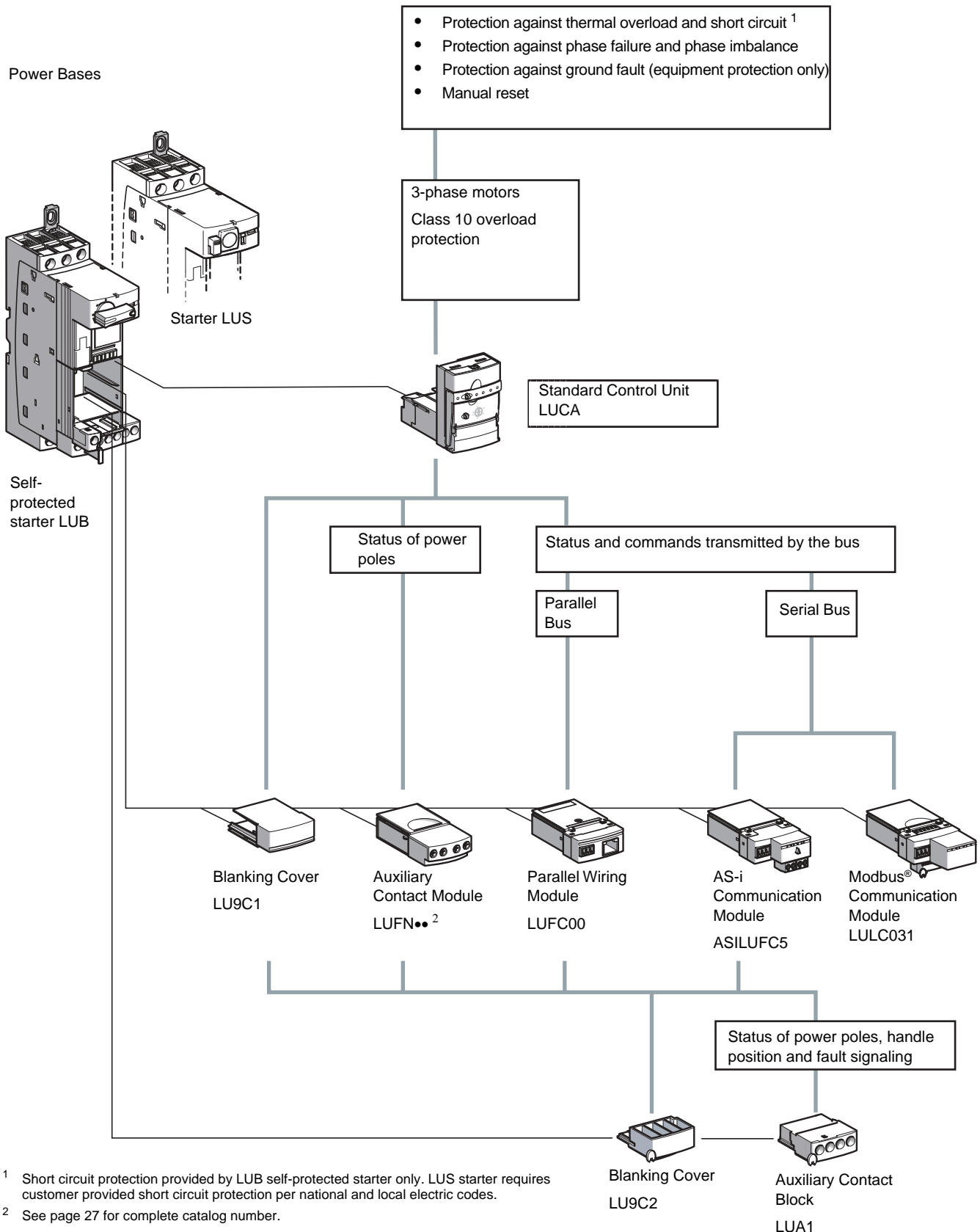


### Steps for Configuring a U-Line Motor Starter

1. Select a power base (required) from the tables on pages 14 - 15. Blanking covers are supplied with each power base to cover the control unit, function module, and auxiliary contact block cavities.
2. Select a control unit (required) from the tables on pages 20 - 21.
3. Select a function module or communication module (optional) from the tables on pages 27 - 33.
4. Select an auxiliary contact block (optional) from the table on page 26.
5. Select one or more accessories (optional) from the table on pages 36 & 39. Accessories include:
  - Current limiter/isolator module
  - Incoming line phase barrier for UL 508 Type E compliance (Self-Protected Combination Motor Controller).
  - Control circuit contact block for NEC 430-74 compliance (disconnection of motor control circuits).
  - Reversing blocks
  - Plug-in terminal blocks
  - Control circuit pre-wiring blocks
  - Soft Start modules

# TeSys® U-Line Motor Starters

## General Information and Selection

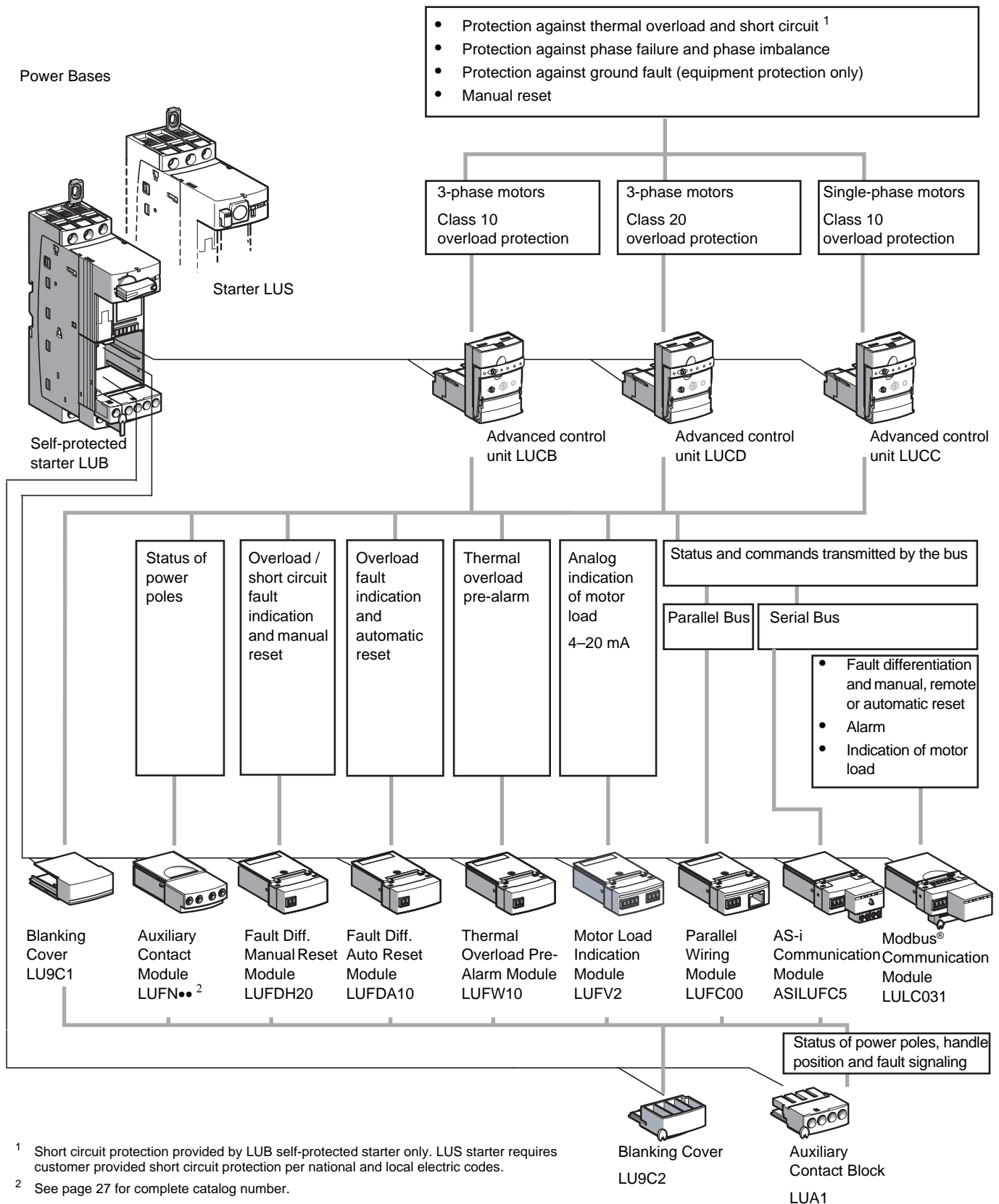


<sup>1</sup> Short circuit protection provided by LUB self-protected starter only. LUS starter requires customer provided short circuit protection per national and local electric codes.

<sup>2</sup> See page 27 for complete catalog number.

# TeSys® U-Line Motor Starters

## General Information and Selection

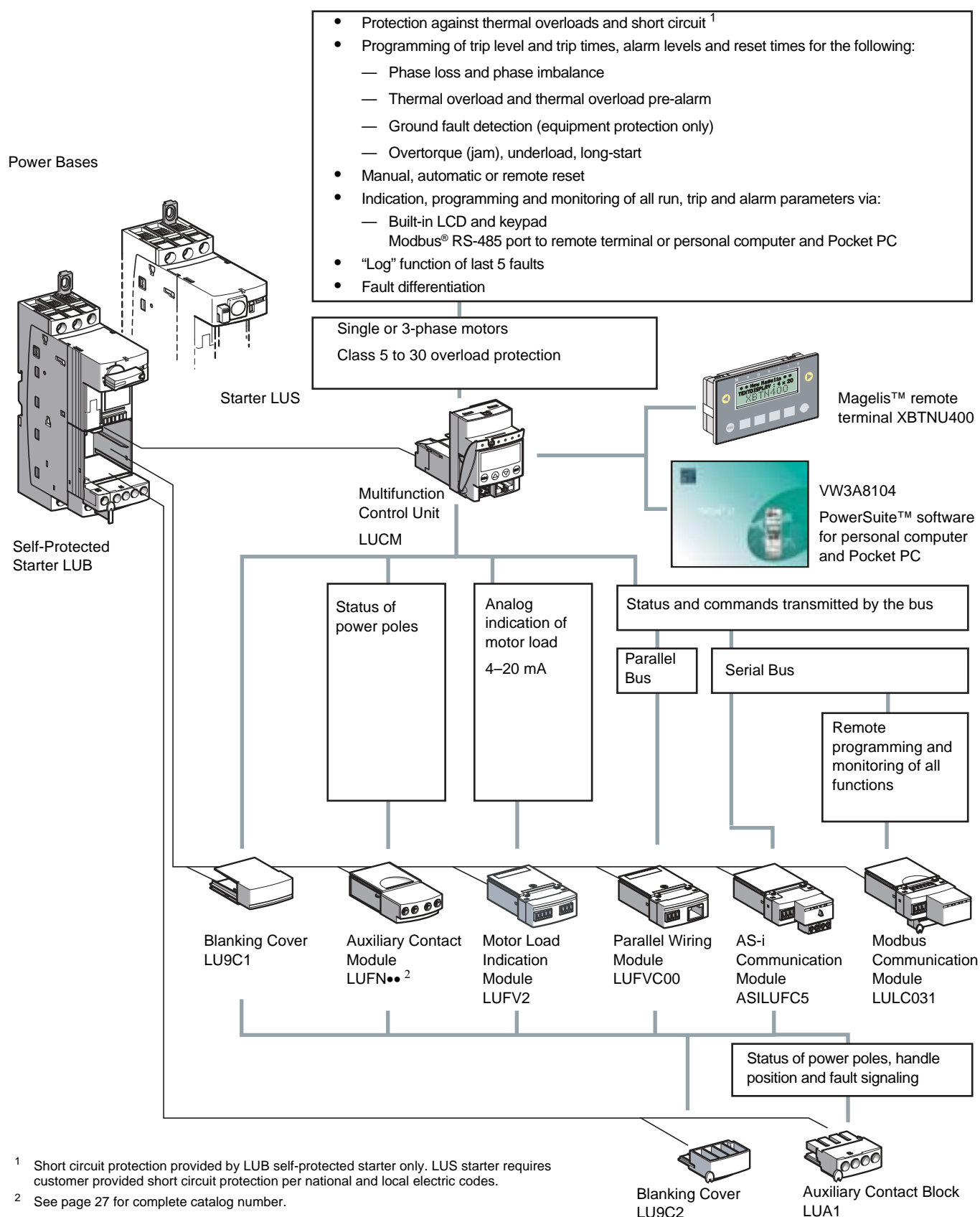


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# TeSys® U-Line Motor Starters

## General Information and Selection




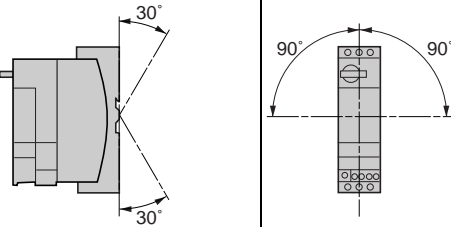


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<sup>2</sup> See page 27 for complete catalog number.

# TeSys® U-Line Motor Starters

## CHARACTERISTICS

Environment				
Approvals	 E164871 NKJH E164862 NLDX, NLDX2 E164862 NLDX	LU•B12, LU•B32 LU•S12, LU•S32 and Accessories LUALB1	 LR43364 3211-08 LR43364 3211-04 LR43364 3211-08	LU•B12, LU•B32 and Accessories LU•S12, LU•S32 LUALB1
Conforming to standards	 meets the essential requirements of the LV and EMC directives.	IEC/EN 60947-6-2, CSA C22-2 no. 14, Type E UL 508 Type E: (LUiB12, LUiB32 with LU9SP0 incoming line phase barrier)		
Rated insulation voltage (Ui)	Conforming to IEC/EN 60947-1, over voltage category III, degree of pollution: 3	690 V		
	UL508, CSA C22-2 no. 14	600 V		
Rated impulse withstand voltage (Uimp)	Conforming to IEC/EN 60947-6-2	6 kV		
Safety separation of circuits SELV	Conforming to IEC/EN 60947-1 appendix N	Between the control or auxiliary circuit and the main circuit: 400 V		
		Between the control and auxiliary circuits: 400 V		
Degree of protection: Conforming to IEC/EN 60947-1 (protection against direct finger contact)	Front panel outside connection zone	IP 40 (Protection against direct contact with a 1 mm diameter wire)		
	Front panel and wired terminals	IP 20 (Protection against direct finger contact)		
	Other faces	IP 20 (Protection against direct finger contact)		
Protective treatment	Conforming to IEC/EN 60068	"TH" (fungus resistant)		
	Conforming to IEC/EN 60068-2-30	12 cycles		
	Conforming to IEC/EN 60068-2-11	48 h		
Ambient air temperature around the device	Storage	-40 to +185 °F (-40 to +85 °C)		
	Operation	Power bases with standard and advanced control units: -13 to +158 °F (-25 to +70 °C)  Power bases with multifunction control units: At temperatures from -13 to +113 °F (-25 to +45 °C), gap not required between products. At temperatures from 113 °F (45 °C) to 131 °F (55 °C), allow a minimum gap of 9 mm between products. At temperatures from 131 °F (55 °C) up to 140 °F (60 °C), allow a minimum gap of 0.79" (20 mm) between products.		
Maximum operating altitude		6560 ft (2000 m)		
Operating positions	In relation to normal vertical mounting plane (Vac and Vdc control)			
Flame resistance	Conforming to UL 94	V2		
	Conforming to IEC/EN 60695-2-12	1760 °F (960 °C) (parts supporting live components) 1200 °F (650 °C)		
Environmental restrictions		Cadmium-free and silicone-free, recyclable		
Shock resistance 1/2 sine wave = 11 ms	Conforming to IEC/EN 60068-2-27	Power poles open: 10 gn Power poles closed: 15 gn		
Vibration resistance 5 to 300 Hz	Conforming to IEC/EN 60068-2-6	Power poles open: 2 gn		
		Power poles closed: 4 gn		
Immunity to electrostatic discharge	Conforming to IEC/EN 61000-4-2	In open air: 8 kV—Level 3		
		On contact: 8 kV—Level 4		
Immunity to radiated high-frequency disturbance	Conforming to IEC/EN 61000-4-3	10 V/m—Level 3		
Immunity to fast transient currents	Conforming to IEC/EN 61000-4-4	All circuits except for serial link: 4 kV—Level 4		
		Serial link: 2 kV—Level 3		
Immunity to dissipated shock waves	Conforming to IEC/EN 61000-4-5	Common mode	Serial mode	
	Uc > 200 V	4 kV	2 kV	
	Uc < 200 V	2 kV	1 kV	
	Uc = 24 Vdc	2 kV	0.5 kV	
Immunity to conducted high-frequency disturbance	Conforming to IEC/EN 61000-4-6	10 kV		



# TeSys® U-Line Motor Starters

## Characteristics

Power Base and Control Unit Type			LUB12, LUS12 + LUCA or LUCB or LUCC or LUCD	LUB32, LUS32 + LUCA or LUCB or LUCC or LUCD	LUB12, LUS12 + LUCM	LUB32, LUS32 + LUCM	LU2M LU6M			
Power Circuit Connection Characteristics										
Screw Clamp Terminals - AWG Conductor Size			16–8 AWG (1–6 mm <sup>2</sup> ) one or two conductors							
Stranded cable without cable end	1 conductor		14–6 AWG (1.5–10 mm <sup>2</sup> )							
	2 conductors		14–8 AWG (1.5–6 mm <sup>2</sup> )							
Stranded cable with cable end	1 conductor		16–8 AWG (1–6 mm <sup>2</sup> )							
	2 conductors		16–8 AWG (1–6 mm <sup>2</sup> )							
Solid cable without cable end	1 conductor		16–6 AWG (1–10 mm <sup>2</sup> )							
	2 conductors		16–8 AWG (1–6 mm <sup>2</sup> )							
Screwdriver			Phillips no. 2 or 1/4" slotted screwdriver							
Tightening torque			15 lb-in (1.7 N•m)							
Control Circuit Connection Characteristics										
Screw Clamp Terminals - AWG Conductor Size			18–14 AWG (0.75–1.5 mm <sup>2</sup> ) one or two conductors)							
Stranded cable without cable end	1 conductor		18–14 AWG (0.75–1.5 mm <sup>2</sup> )							
	2 conductors		18–14 AWG (0.75–1.5 mm <sup>2</sup> )							
Stranded cable with cable end	1 conductor		22–14 AWG (0.34–1.5 mm <sup>2</sup> )							
	2 conductors		22–14 AWG (0.34–1.5 mm <sup>2</sup> )							
Solid cable without cable end	1 conductor		18–14 AWG (0.75–1.5 mm <sup>2</sup> )							
	2 conductors		18–14 AWG (0.75–1.5 mm <sup>2</sup> )							
Screwdriver			Phillips no. 1 or 3/16" slotted screwdriver							
Tightening torque			7 lb-in (0.8 N•m)							
Control Circuit Characteristics										
Rated voltage of control circuit	50/60 Hz		24–240 Vac		–	–	–			
	–		24–240 Vdc		24 Vdc		–			
Voltage limits	Operation	24 Vdc	20–27 Vdc		20–28 Vdc		–			
		24 Vac	20–26.5 Vac		–	–	–			
		48–72 Vac/dc	38.5–72 Vac / 38.5–93 Vdc		–	–	–			
		110–240 Vac/dc	88–264 Vac/dc		–	–	–			
	Drop-out	24 Vdc	14.5 Vdc				–			
		24 Vac	14.5 Vac		–	–	–			
		48–72 Vac/dc	29 Vac/dc		–	–	–			
		110–240 Vac/dc	55 Vac/dc		–	–	–			
Typical consumption	I max Inrush	24 Vdc	130 mA	220 mA	150 mA	200 mA	–			
		24 Vac	140 mA	220 mA	–	–	–			
		48–72 Vac/dc	280 mA		–	–	–			
		110–240 Vac/dc	280 mA		–	–	–			
	I rms sealed	24 Vdc	55 mA	70 mA	70 mA	75 mA	–			
		24 Vac	70 mA	90 mA	–	–	–			
		48–72 Vac/dc	35 mA	45 mA	–	–	–			
		110–240 Vac/dc	30 mA	20 mA	–	–	–			
Heat dissipation		2 W		3 W	1.7 W	1.8 W	–			
Operating time	Closing	24 V: 70 ms / 48 V: 60 ms / ≥ 72 V: 50 ms		75 ms	65 ms	–				
	Opening	35 ms		–						
Resistance to micro-breaks		3 ms		–						
Resistance to voltage drops		IEC/EN 61000-4-11		At least 70% of Uc for 500 ms		–				
Mechanical durability		In millions of operating cycles		15		–				
Maximum operating rate		In operating cycles per hour		3600		–				
Main Pole Characteristics										
Number of poles			3		–					
Isolation function to IEC/EN 60947-1	Possible		Yes		–					
	Padlocking		1 padlock with Ø 1/4" (7 mm) shank		–					
Rated thermal current			12 A	32 A	12 A	32 A	–			
Rated operating current (Ue ≤ 440V)	To IEC/ EN 60947-6-2	In cat. AC-41	0 ≤ 158 °F (70 °C): 12 A	0 ≤ 158 °F (70 °C): 32 A	0 ≤ 131 °F (55 °C): 12 A	0 ≤ 131 °F (55 °C): 32 A	–			
		In cat. AC-43	0 ≤ 158 °F (70 °C): 12 A	0 ≤ 158 °F (70 °C): 32 A	0 ≤ 131 °F (55 °C): 12 A	0 ≤ 131 °F (55 °C): 32 A	–			
Rated operating voltage			690 V		–					
Frequency limits			Of the operating current		40–60 Hz					
Power dissipated in the power circuits	Operating current		3 A	6 A	9 A	12 A	18 A	25 A	32 A	–
	Power dissipated in all three poles		0.1 W	0.3 W	0.6 W	1.1 W	2.4 W	4.6 W	7.5 W	–
Rated breaking capacity on short-circuit—60 Hz			230 V	440 V	480 V	500 V	690 V	–		
			50 kA	50 kA	42 kA	15kA	4	–		
Total breaking time			2 ms	2 ms	2 ms	–				
Thermal stress limit			With Isc max on 440 V		90 kA <sup>2</sup> s	120 kA <sup>2</sup> s	90 kA <sup>2</sup> s	120 kA <sup>2</sup> s	–	

# TeSys® U-Line Motor Starters

## Characteristics

### Specific Characteristics of Power Bases LU2B or LU2S and Reverser Blocks LU2M or LU6M

Maximum operating time	Without change of direction	75 ms
	With change of direction	150 ms

### General Characteristics of all Auxiliary Contacts

Conventional rated thermal current (Ith)	For ambient temperature $\theta < 158^{\circ}\text{F}$ ( $70^{\circ}\text{C}$ )	5 A
Frequency of the operating current		Up to 400 Hz
Minimum switching capacity $\lambda = 10^{-8}$	U min	17 V
	I min	5 mA
Short-circuit protection	Conforming to IEC/EN 60947-5-1	gL fuse: 4 A
Short-time rating	Permissible for	1 s 30 A
		500 ms 40 A
		100 ms 50 A
Insulation resistance		10 m $\Omega$
Non-overlap time	Guaranteed between N.C. and N.O. contacts	2 ms (on energization and on de-energization)

### Specific Characteristics of Auxiliary Contact Built into the Power Base LU9BN

Linked contacts	Conforming to IEC/EN 60947-4-1	Each power base has 1 N.O. contact and 1 N.C. contact which are mechanically linked
Mirror contact	Conforming to draft standard IEC/EN 60947-1	The N.C. contact in each power base reliably represents the state of the power contacts (safety scheme)
Rated operating voltage (Ue)		Up to 690 Vac; 250 Vdc
Rated insulation voltage (Ui)	Conforming to IEC/EN 60947-5-1	690 V
	Conforming to UL, CSA	600 V

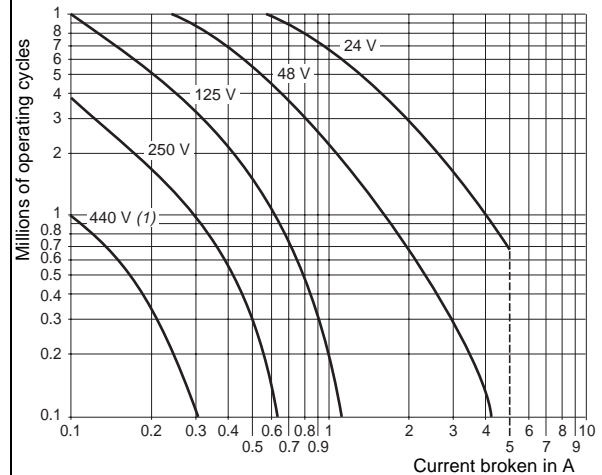
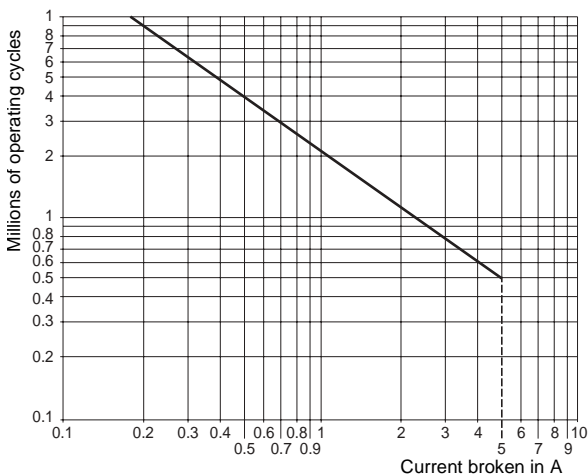
### Specific Characteristics of Auxiliary Contacts in Modules LUFN, Auxiliary Contacts LUA1 and Reverser Blocks LU2M and LU6M

Rated operating voltage (Ue)		Up to 250 Vac; 250 Vdc
Rated insulation voltage (Ui)	Conforming to IEC/EN 60947-5-1	250 V
	Conforming to UL, CSA	250 V

### Operational power of contacts LUFN, LUA1, LU2M, LU6M

Conforming to IEC/EN 60947-5-1

AC supply, categories AC-14 and AC-15 Electrical durability up to 3600 operating cycles/hour on an inductive load such as the coil of an electromagnet: making power ( $\cos \varphi 0.7$ ) = 10 times the power broken ( $\cos \varphi = 0.4$ )								DC supply, category DC-13 Electrical durability (up to 1200 operating cycles/hour) on an inductive load such as the coil of an electromagnet, without economy resistor, the time constant increasing with the load.			
	24 V	48 V	115 V	230 V	400 V	440 V	600 V	24 V	48 V	125 V	250 V
1 million operating cycles	60 VA	120 VA	280 VA	560 VA	960 VA	1050 VA	1440 VA	120 W	90 W	75 W	68 W
3 million operating cycles	16 VA	32 VA	80 VA	160 VA	280 VA	300 VA	420 VA	70 W	50 W	38 W	33 W
10 million operating cycles	4 VA	8 VA	20 VA	40 VA	70 VA	80 VA	100 VA	25 W	18 W	14 W	12 W



# TeSys® U-Line Motor Starters

## Characteristics

### Characteristics of Standard Control Units LUCA

Protection	Motor type	3-phase
	Conforming to standard	IEC/EN 60947-6-2, UL 508, CSA C22-2 no. 14
Overload protection	Tripping class conforming to UL 508, IEC/EN 60947-6-2	10
	Frequency limits of the operating current	40–60 Hz
	Ambient temperature range	-13 to +158 °F (- 25 to + 70 °C)
	Protection against phase imbalance	30 %
Short-circuit protection	Tripping threshold	14.2 x the setting current
	Tripping tolerance	± 20 %

### Characteristics of Advanced Control Units LUCB, LUCC and LUCD

Control unit type		LUCB	LUCC	LUCD
Protection	Motor type	3-phase	Single-phase	3-phase
	Conforming to standard	IEC/EN 60947-6-2, UL 508, CSA C22-2 no. 14		
Overload protection	Tripping class conforming to UL 508, IEC/EN 60947-6-2	10		20
	Frequency limits of the operating current	40–60 Hz		
	Ambient temperature range	-13 to +158 °F (- 25 to + 70 °C)		
	Protection against phase imbalance	30 %	–	30 %
Short-circuit protection	Tripping threshold	14.2 x the setting current		
	Tripping tolerance	± 20 %		

### Characteristics of Multifunction Control Units LUCM

Protection	Motor type	Selectable: single-phase or 3-phase
	Conforming to standard	IEC/EN 60947-6-2, UL 508
Overload protection	Tripping class conforming to UL 508, IEC/EN 60947-6-2	5, 10, 15, 20, 25, 30 (selectable)
	Frequency limits of the operating current	40–60 Hz
	Ambient temperature range	Power bases with multifunction control units: At temperatures from -13 to +113 °F (-25 to +45 °C), gap not required between products. At temperatures from 113 °F (45 °C) to 131 °F (55 °C), allow a minimum gap of 9 mm between products. At temperatures from 131 °F (55 °C) up to 140 °F (60 °C), allow a minimum gap of 0.79" (20 mm) between products.
Communication interface for terminal on enclosure door	Physical interface	RS-485 multi-drop
	Connector	RJ45 on front panel
	Protocol	Modbus® RTU
	Maximum transmission speed	19,200 bit/s (self-configuration up to this value)
	Maximum return time	200 ms (from PLC to LULC031 communication module to LUCM control unit back to LULC031 and back to PLC)
Display	Type	LCD, 2 lines of 12 characters
	Language version	Multilanguage (English, French, German, Italian, Spanish)
	Accuracy	± 5 %
	Resolution	1 % of I <sub>r</sub>
Auxiliary supply	External type	24 Vdc (maximum range of 0.90 to 1.10 of nominal voltage)
	Heat dissipation	0.8 W

### Configuration Table for Protection Devices and Alarms on Multifunction Control Units LUCM

	Tripping	Alarm	Adjustment of tripping threshold		Adjustment of time before tripping		Adjustment of alarm threshold	
	Factory setting	Factory setting	Range	Default value	Range	Default value	Range	Default value
Overcurrent	Activated <sup>1</sup>	–	3–17 I <sub>r</sub>	14.2	–	–	–	–
Overload	Activated <sup>1</sup>	Activated	0.15–32 A <sup>2</sup>	I <sub>r</sub> min	Class: 5–30	5	10–100 % thermal state	85 %
Ground fault	Activated	Activated	0.2–5 I <sub>r</sub> min	0.3 I <sub>r</sub> min	0.1–1.2 s	0.1 s	0.2–5 I <sub>r</sub> min	0.3 I <sub>r</sub> min
Phase imbalance	Activated	Activated	10–30 %	10 %	0.2–20 s	5 s	10–30 %	10 %
Over torque (Jam)	Deactivated	Deactivated	1–8 I <sub>r</sub>	2 I <sub>r</sub>	1–30 s	5 s	1–8 I <sub>r</sub>	2 I <sub>r</sub>
Underload	Deactivated	Deactivated	0.3–1 I <sub>r</sub>	0.5 I <sub>r</sub>	1–200 s	10 s	0.3–1 I <sub>r</sub>	0.5 I <sub>r</sub>
Long starting times	Deactivated	Deactivated	1–8 I <sub>r</sub>	I <sub>r</sub>	1–200 s	10 s	1–8 I <sub>r</sub>	I <sub>r</sub>

<sup>1</sup> This function cannot be deactivated.

<sup>2</sup> The setting range depends on the rating of the control unit used.

### Configuration of additional functions on Multifunction Control Units LUCM

	Factory setting	Setting range
Reset	Manual	Manual, automatic or remote
Time before reset	120 s	1–1000 s
Type of load	Motor type	3-phase motor, single-phase motor
	Self-cooled	Self-cooled, auxiliary cooling fan
Language	English	English, French, German, Italian, Spanish
Display	Average current	Average current, thermal state of motor, current in phase 1 / 2 / 3, ground fault current, phase imbalance, cause of last 5 faults

# TeSys® U-Line Motor Starters

## Characteristics

### Characteristics of Limiter Isolator Module LUALB1

Rated insulation voltage (Ui) conforming to standard IEC/EN 60947-1		690 V
Conventional rated thermal current (Ith) conforming to standard IEC/EN 60947-1		32 A
Operating threshold	I rms	50 kA
Breaking capacity		440/480 wye      600 wye
		130 kA              65 kA
Mounting		Directly on the upstream terminals of the LUB, LU2B power base
Screw Clamp Terminals - AWG conductor size		16–8 AWG (1–6 mm <sup>2</sup> ) one or two conductors
Stranded cable without cable end	1 conductor	16–6 AWG (1–10 mm <sup>2</sup> )
	2 conductors	16–8 AWG (1–6 mm <sup>2</sup> )
Stranded cable with cable end	1 conductor	16–8 AWG (1–6 mm <sup>2</sup> )
	2 conductors	16–8 AWG (1–6 mm <sup>2</sup> )
Solid cable	1 conductor	14–8 AWG (1.5–10 mm <sup>2</sup> )
	2 conductors	14–8 AWG (1.5–6 mm <sup>2</sup> )
Screwdriver		Phillips no. 2 or 1/4" slotted screwdriver
Tightening torque		15 lb-in (1.7 N•m)

### Characteristics of Control Circuit Contact Block LUA8E20

Rated operating voltage (Ue)		Up to 600 Vac, 125 Vdc
Rated insulation voltage (Ui) conforming to standard IEC/EN 60947-5-1 conforming to UL and CSA		690 V
		600 V
Conventional thermal current (Ith)	Ambient temperature ≤ 70° C	5 A
Minimum switching capacity		2 Watts (83 mA at 24 Vdc)

# TeSys® U-Line Motor Starters

## Characteristics

### Characteristics of Thermal Overload Pre-alarm Function Module LUFW10

Activation threshold		Fixed at 88% of the thermal tripping state
Hysteresis between activation and switching off		5 %
Display		By LED on front panel
Supply		Powered by the control unit
Digital output characteristics	Type	N.O. contact
	AC-15	230 V max; 400 VA 100,000 operating cycles
	DC-13	24 V; 50 W 100,000 operating cycles

### Characteristics of Motor Load Indication Function Module LUFV2

Analog output		4–20 mA
Signal delivered		Value of I average/I <sub>r</sub> ratio within the range of 0 to 2
Load impedance	Minimum	–
	Maximum	500 Ω
	Typical	100 Ω
Signal characteristics with advanced control unit		Accuracy ± 6 %
Signal characteristics with multifunction control unit	Accuracy	± 10 %
	Resolution	1 % of I <sub>r</sub>
Supply		External 24 Vdc

### Characteristics of AS-i Communication Module ASILUFC5

Approval		AS-i V2.1 no. (pending)
AS-i profile		7.D.F.0
Ambient air temperature		Operation -13 to + 158 °F (- 25 to + 70 °C)
AS-i supply		29.5–31.5 V
Current consumption	By the AS-i system	Normal operation: 25 mA
		Fault condition: 30 mA
Auxiliary supply		24 Vdc ± 30 %
Current consumption	On 24 V supply for the outputs	200 mA
Number of outputs		2 dedicated to power base coil operation
Switching capacity of the solid state outputs		0.5 A/24 V (outputs protected against short-circuits)
Indication/diagnostics		By 2 LEDs on front panel

### Characteristics of Modbus® Communication Module LULC031

Physical interface		RS-485 multi-drop
Connector		RJ45 on front panel
Protocol		Modbus RTU
Maximum transmission speed		19,200 bit/s (self-configuration up to this value)
Maximum return time		30 ms (from LULC031 to PLC and back to LULC031)
Addressing (Modbus drop numbers)		By switches: from 0–31
Ambient air temperature		Operation -13 to +131 °F (- 25 to +55 °C)
Supply for the outputs		24 Vdc
Current consumption		On 24 V supply for the outputs 200 mA
Number of outputs		3, of which 2 are dedicated to power base coil operation
Switching capacity of the solid state outputs		0.5 A/24 V
Indication/diagnostics		

### Connection Characteristics of Function and Communication Modules

Module type		LUFW10	LUFV2	ASILUFC5		LULC031	LUFC00	
				Inputs and 24 V auxiliary	Outputs			
Connectors		Pitch	5.08 mm	3.81 mm	5.08 mm	3.81 mm	3.81 mm	3.81 mm
Flexible cable without cable end		1 conductor	0.2–1.5 mm <sup>2</sup>	0.14–1 mm <sup>2</sup>	0.2–1.5 mm <sup>2</sup>	0.14–1 mm <sup>2</sup>	0.14–1 mm <sup>2</sup>	0.14–1 mm <sup>2</sup>
		2 identical conductors	0.2–1 mm <sup>2</sup>	0.14–0.75 mm <sup>2</sup>	0.2–1 mm <sup>2</sup>	0.14–0.75 mm <sup>2</sup>	0.14–0.75 mm <sup>2</sup>	0.14–0.75 mm <sup>2</sup>
Flexible cable with cable end	Without insulated ferrule	1 conductor	0.25–1.5 mm <sup>2</sup>	0.25–1 mm <sup>2</sup>	0.25–1.5 mm <sup>2</sup>	0.25–1 mm <sup>2</sup>	0.25–1 mm <sup>2</sup>	0.25–1 mm <sup>2</sup>
		2 identical conductors	0.25–1 mm <sup>2</sup>	0.25–0.34 mm <sup>2</sup>	0.25–1 mm <sup>2</sup>	0.25–0.34 mm <sup>2</sup>	0.25–0.34 mm <sup>2</sup>	0.25–0.34 mm <sup>2</sup>
	With insulated ferrule	1 conductor	0.25–1.5 mm <sup>2</sup>	0.25–0.5 mm <sup>2</sup>	0.25–1.5 mm <sup>2</sup>	0.25–0.5 mm <sup>2</sup>	0.25–0.5 mm <sup>2</sup>	0.25–0.5 mm <sup>2</sup>
		2 identical conductors <sup>1</sup>	0.5–1.5 mm <sup>2</sup>	0.5 mm <sup>2</sup>	0.5–1.5 mm <sup>2</sup>	0.5 mm <sup>2</sup>	0.5 mm <sup>2</sup>	0.5 mm <sup>2</sup>
Solid cable without cable end		1 conductor	0.2–1.5 mm <sup>2</sup>	0.14–1 mm <sup>2</sup>	0.2–1.5 mm <sup>2</sup>	0.14–1 mm <sup>2</sup>	0.14–1 mm <sup>2</sup>	0.14–1 mm <sup>2</sup>
		2 identical conductors	0.2–1 mm <sup>2</sup>	0.14–0.5 mm <sup>2</sup>	0.2–1 mm <sup>2</sup>	0.14–0.5 mm <sup>2</sup>	0.14–0.5 mm <sup>2</sup>	0.14–0.5 mm <sup>2</sup>
AWG conductor size (one or two conductors)			12–24 AWG	16–28 AWG	12–24 AWG	16–28 AWG	16–28 AWG	16–28 AWG
Tightening torque			5 lb-in (0.5–0.6 N•m)	2 lb-in (0.22–0.25 N•m)	5 lb-in (0.5–0.6 N•m)	2 lb-in (0.22–0.25 N•m)	2 lb-in (0.22–0.25 N•m)	2 lb-in (0.22–0.25 N•m)
Slotted screwdriver			1/8 in	3/32 in	1/8 in	3/32 in	3/32 in	1/8 in

<sup>1</sup> Use a double cable end.

# TeSys® U-Line Motor Starters



LUB-2



LUB-20

## POWER BASE SELECTION

The U-Line motor starter consists of one power base (selected from this page) and one control unit (select from page 20 or 21) as a minimum. The power bases are available in two control circuit methods:

- With screw clamp terminals
- Without screw clamp terminals

Each power base with control circuit screw clamp terminals includes one N.O. and one N.C. auxiliary contact to indicate the open or closed position of the power contacts.

When ordering power bases without control circuit screw clamp terminals (i.e., when building a reversing unit or pre-wiring the low voltage control), the terminal assemblies must be ordered separately.

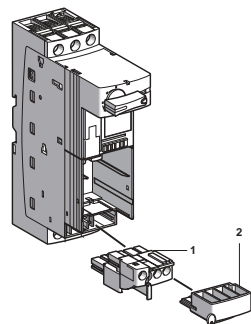
### Full Voltage, Non-Reversing for Standard Applications

Control Connection	Max. Current (Amps)	Three Phase (hp max.)				Single Phase (hp max.)		Self-Protected Starter Base Catalog Number	Starter Base Catalog Number	Weight lb (kg)
		200/208 V	220/240 V	460 V	575/600 V	120 V	240 V			
With screw terminations	12	3	3	7.5	10	1/2	2	LUB12	LUS12	1.98 (0.900)
	32	10	10	20	25	2	5	LUB32	LUS32	1.98 (0.900)
Without <sup>1</sup> terminations	12	3	3	7.5	10	1 1/2	2	LUB120	LUS120	1.90 (0.865)
	32	10	10	20	25	2	5	LUB320	LUS320	1.90 (0.865)

<sup>1</sup> Must order LU9BN11, LU9BN11C, LU9MRC or LU9MR1C.

### Terminal Blocks for Non-Reversing Power Bases LUB••0, LUS••0 without Terminations

Control Connection	For Use On	Item	Catalog Number	Weight lb (kg)
With screw terminations	LUB120/LUB320	1 + 2	LU9BN11	0.10 (0.45)
	LUS120/LUS320			



# TeSys® U-Line Motor Starters

## Power Base Selection



LU2B-2

### Full Voltage, Reversing for Standard Applications

Control Connection	Max. Current (Amps)	Three Phase (hp max.)				Single Phase (hp max.)		Self-Protected Starter Base <sup>1</sup>	Starter Base	Weight lb (kg)
		200/208 V	220/240 V	460 V	575/600 V	120 V	240 V	Catalog Number	Catalog No.	
With screw terminations	12	3	3	7.5	10	1/2	2	LU2B12**	LU2S12**	2.80 (1.270)
	32	10	10	20	25	2	5	LU2B32**	LU2S32**	2.80 (1.270)
Without terminations	12	3	3	7.5	10	1 1/2	2	LU2BA0**	LU2SA0**	2.75 (1.250)
	32	10	10	20	25	2	5	LU2BB0**	LU2SB0**	2.75 (1.250)

<sup>1</sup> Complete the catalog number by selecting the proper voltage code from the table below.

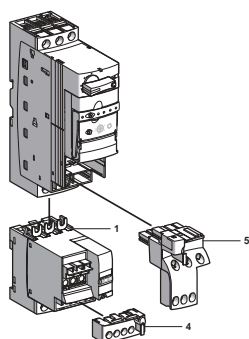
### Voltage Codes

Volts	24	48-72	110-240
DC	BL <sup>1 2</sup>	—	—
AC	B	—	—
DC or AC	—	ES <sup>3</sup>	FU

<sup>1</sup> Voltage code to use for a power base with a communication module.

<sup>2</sup> DC voltage with range of 0.90 to 1.10 of nominal.

<sup>3</sup> 48-72 Vdc; 48 Vac



### Reversing blocks for assembly by the customer

Reversing blocks can be mounted directly to the power bases (LUB\*\* or LUS\*\*) using LU2MB0\*\* or mounted separately using LU6MB0\*\* to provide the reversing function. The design and operation of the reversing blocks provide mechanical interlocking internally. The reversing blocks latch in one direction or the other and remain latched in position even after a loss of power. The reversing block will not change state until given a control signal to change direction.

When directly mounted to the power base, control wiring and electrical interlocking is provided by the pre-wired connector (LU9MR1C) which uses the standard auxiliary contacts of the power base. When using the pre-wired connector, the power base auxiliary contacts at terminals 13-14 and 21-22 are not available for customer use. Customers can provide the electrical control and interlock functions themselves with the control terminal blocks LU9M1 and LU9MR1.

The reversing blocks have additional contacts (2 N.O. Form C contacts) at terminals 81-82-84, which signal the direction of the motor. These contacts maintain their status (even after loss of power) and change condition only when the reversing block changes direction.

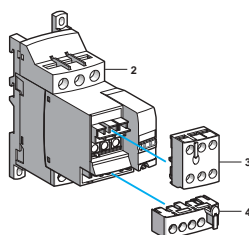
Refer to the connection diagrams on page 42 and the application examples on pages 54 - 56 for more details.

Reversing block 32 A	Connection		Item	Catalog Number <sup>1</sup>	Weight lb (kg)
	Power	Control			
For mounting directly beneath the power base LUB, LUS	Screw clamps	Without connections	1 <sup>2</sup>	LU2MB0**	0.88 (0.400)
For mounting separately from the power base LUB, LUS (screw or 35 mm DIN rail mounting)	Screw clamps	Without connections	2 <sup>3</sup>	LU6MB0**	0.94 (0.425)

<sup>1</sup> Complete the catalog number by selecting the proper voltage code from the table above.

<sup>2</sup> Must order reversing pre-wiring connector LU9MR1C. Must order control terminal block LU9M1 or pre-wired coil connector LU9MRC.

<sup>3</sup> Must order control terminal block LU9MR1. Must order control terminal block LU9M1 or pre-wired coil connector LU9MRC.



### Control Terminal Blocks

Description	Application	Item	Catalog Number	Weight lb (kg)
Coil terminal	Reversing power base, without connections LU2BA0** or B0**	4	LU9M1	0.05 (0.025)
	Reversing block LU2MB0** for direct mounting beneath power base	4	LU9M1	0.05 (0.025)
	Reversing block LU6MB0** for mounting separately from power base	4	LU9M1	0.05 (0.025)
Control block	Reversing block LU6MB0** for mounting separately from power base	3	LU9MR1	0.06 (0.030)

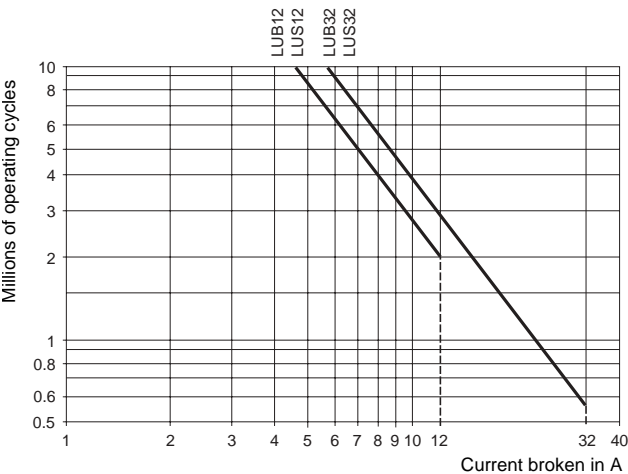
### Pre-wired Control Connection Accessories

For control connections between a power base and a direct mount reversing block.

Description	Item	Catalog Number	Weight lb (kg)
Reversing prewiring connector	5	LU9MR1C	0.08 (0.035)

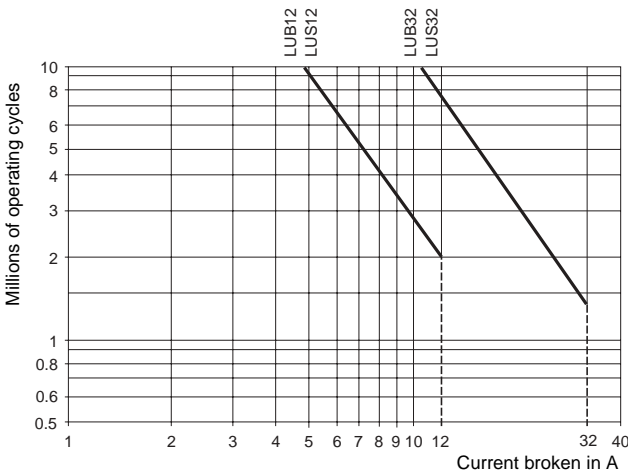
# TeSys® U-Line Motor Starters Power Base Selection

Use in Category AC-41 per IEC 60947 (previously IEC 947 AC-1)

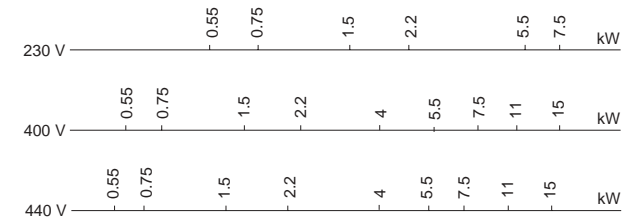
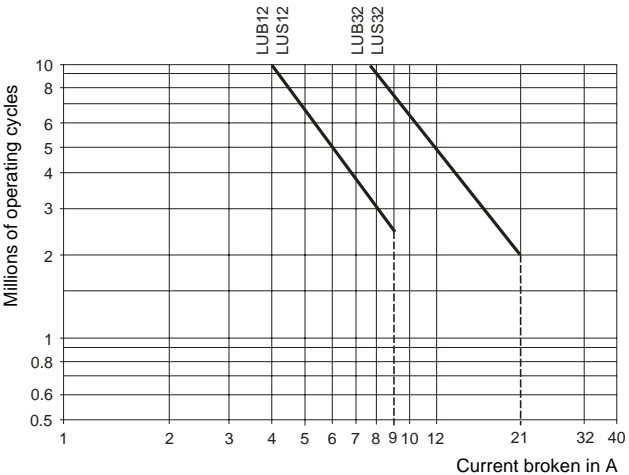


Use in Category AC-43 per IEC 60947 (previously IEC 947 AC-3)

Ue ≤ 440 V



Ue = 690 V

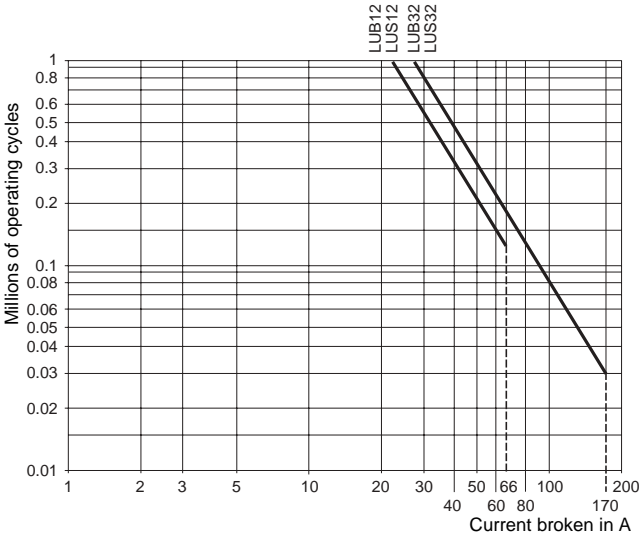




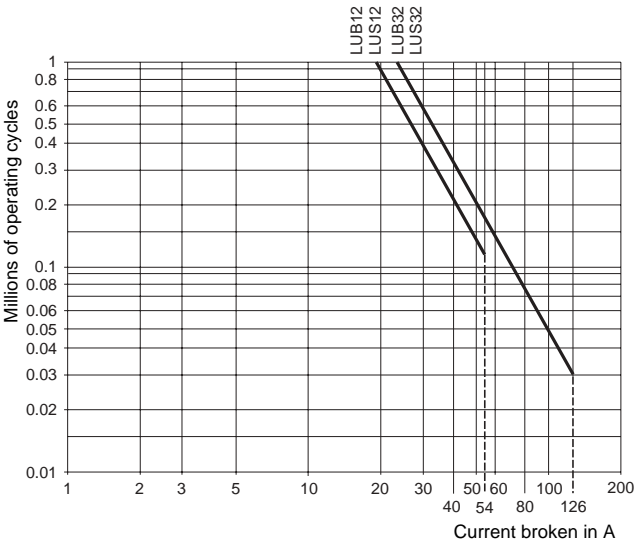
TeSys® U-Line Motor Starters  
Power Base Selection

Use in Category AC-44 per IEC 60947 (previously IEC 947 AC-4)

Ue ≤ 440 V



Ue = 690 V

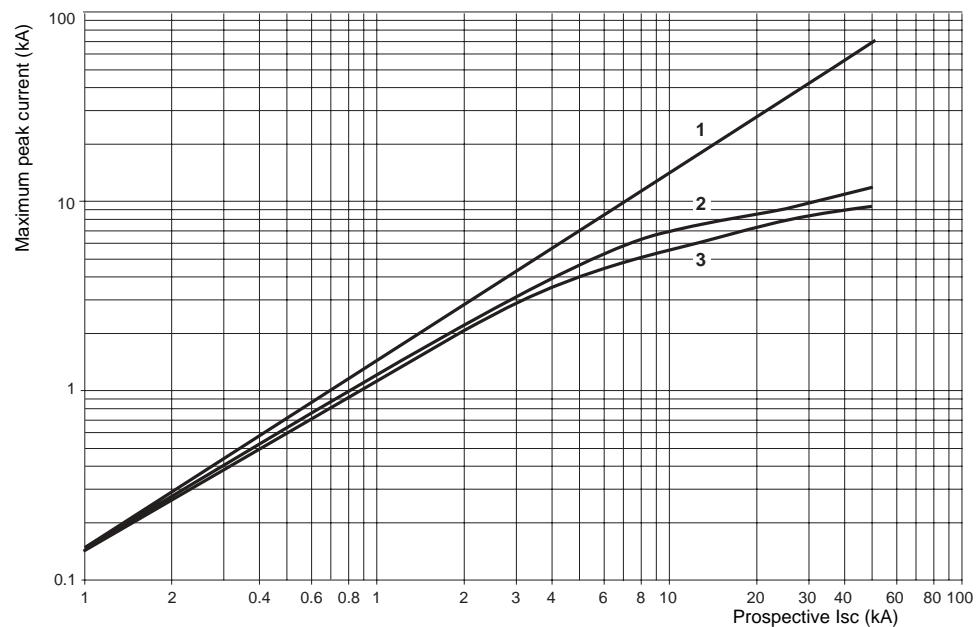


# TeSys® U-Line Motor Starters

## Power Base Selection

### Short-Circuit Ratings for Power Base LUB

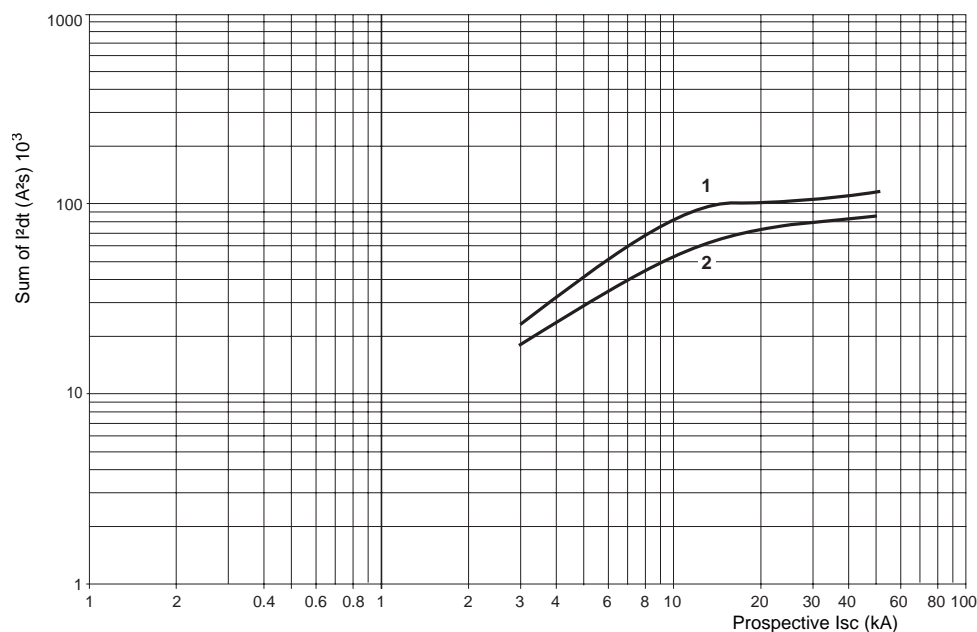
$U_e = 460 \text{ V}$



1. Maximum peak current
2. 32 A power base LUB32
3. 12 A power base LUB12

### Thermal Limit on Short-Circuit for Power Base LUB

$U_e = 460 \text{ V}$



1. 32 A power base LUB32
2. 12 A power base LUB12

## CONTROL UNITS

### Function Characteristics

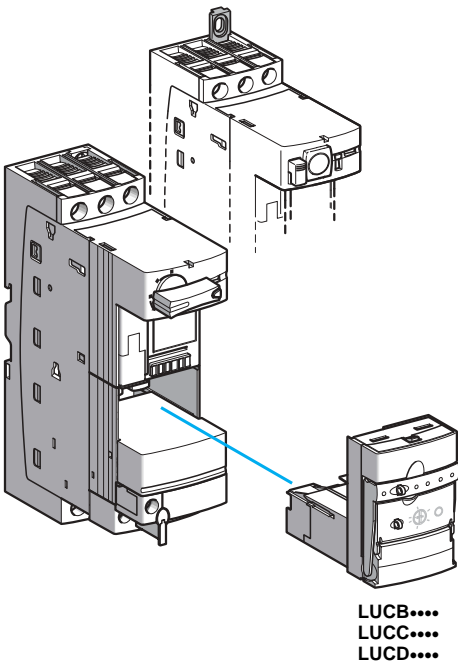
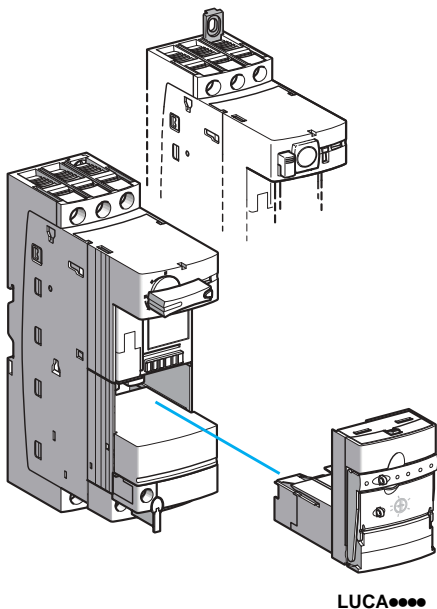
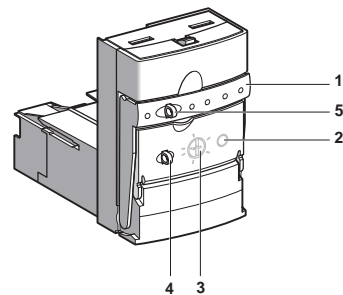
Control Units		Standard	Advanced			Multifunction
		LUCA	LUCB	LUCC	LUCD	LUCM
Overload Protection		1				
Magnetic Trip Overcurrent Protection		14.2 x the FLA setting <sup>1</sup>				3 to 17 x the FLA setting <sup>1</sup>
Short-Circuit Protection <sup>2</sup>		14.2 x maximum rated current of the control unit <sup>1</sup>				
Phase Loss Protection		1			—	1
Phase Imbalance Protection		1			—	1
Ground Fault Detection (equipment protection only)		—				1
Overload Trip Class		10 <sup>1</sup>		10 <sup>1</sup>	20 <sup>1</sup>	5 to 30 <sup>1</sup>
Motor Type (AC only)		3-phase <sup>1</sup>			Single-phase <sup>1</sup>	Single-phase and 3-phase <sup>1</sup>
Test Function		—		1		
Overtorque (Jam)		—				1
Underload		—				1
Long Starting Times		—				1
Reset Modes	Manual	1	1			Parameters can be set via integrated LCD and keypad, communication module LUFDA10 or LULC031, network <sup>1</sup> , or PowerSuite™ Software.
	Automatic or Remote	—	With function module LUFDA10 or LULC031			
Alarm		—	With function module LUFW10, or communication module LULC031			Possible for each type of fault. Indication via integrated LCD and keypad, via remote terminal, via PowerSuite Software. <sup>1</sup>
						With function module LUFW10, or communication module LULC031
“Log” Function		—				Log of the last 5 trips includes number of starts, number of trips, number of operating hours. <sup>1</sup>
“Monitoring” Function		—				Indication on integrated LCD and keypad, via remote terminal or PowerSuite Software. <sup>1</sup>
With Function Modules <sup>3</sup>						
Thermal Overload Pre-alarm		—	With function module LUFW <sup>1</sup>			—
Fault Differentiation and Manual Reset		—	With function module LUFDH20 <sup>1</sup>			—
Fault Differentiation and Automatic or Remote Reset		—	With function module LUFDA10 <sup>1</sup>			—
Indication of Motor Load (analog signal) 0–10 V or 4–20 mA		—	With function module LUFV <sup>1</sup>			
With Communication Module or via RS-485 Modbus® port on LUCM control unit <sup>3</sup>						
Starter Status (ready, run, trip)		With communication module ASILUFC5 or LULC031				
Reset Mode		—	Parameters can be set via the bus.			
Alarm		—				
Remote Reset via the Bus		—	With Modbus communication module LULC031			With Modbus communication module LULC031 and RS-485 Modbus port on the LUCM control unit
Indication of Motor Load		—	(thermal overload alarm only) <sup>1</sup>			(alarm possible for all types of fault) <sup>1</sup>
Fault Differentiation		—				
Remote Programming and Monitoring of all Functions		—				With Modbus communication module LULC031and RS-485 Modbus port on the LUCM control unit <sup>1</sup>
“Log” Function		—				With Modbus communication module LULC031and RS-485 Modbus® port on the LUCM control unit <sup>1</sup>
“Monitoring” Function		—				With Modbus communication module LULC031and RS-485 Modbus port on the LUCM control unit <sup>1</sup>

1 Built-in function

2 LUS and LU2S require customer provided supplemental short circuit protection (fuses or circuit breaker) per national and local electric codes.

3 Mounting possibilities: 1 function module or 1 communication module.

TeSys® U-Line Motor Starters  
Control Units



Standard and Advanced Control Units

Description	
1	Extraction and locking handle
2	Test button (on advanced control unit only)
3	Adjustable Full Load Amps (FLA) dial
4	Locking of settings by sealing the transparent cover
5	Sealing of locking handle

Standard, 3-Phase, Class 10 Overload Protection

Setting Range (Amps)	Used with power bases	Catalog Number	Weight lb (kg)
0.15–0.6	LU•B12, LU•B32, LU•S12, LU•S32	LUCAX6 <sup>1</sup>	0.30 (0.135)
0.3–1.4	LU•B12, LU•B32, LU•S12, LU•S32	LUCA1X <sup>1</sup>	0.30 (0.135)
1.25–5.0	LU•B12, LU•B32, LU•S12, LU•S32	LUCA05 <sup>1</sup>	0.30 (0.135)
3–12	LU•B12, LU•B32, LU•S12, LU•S32	LUCA12 <sup>1</sup>	0.30 (0.135)
4.5–18	LU•B32, LU•S32	LUCA18 <sup>1</sup>	0.30 (0.135)
8–32	LU•B32, LU•S32	LUCA32 <sup>1</sup>	0.30 (0.135)

<sup>1</sup> Complete the catalog number by selecting the proper voltage code from the table below.

Advanced, 3-Phase, Class 10 Overload Protection

Setting Range (Amps)	Used with power bases	Catalog Number	Weight lb (kg)
0.15–0.6	LU•B12, LU•B32, LU•S12, LU•S32	LUCBX6 <sup>1</sup>	0.31 (0.140)
0.3–1.4	LU•B12, LU•B32, LU•S12, LU•S32	LUCB1X <sup>1</sup>	0.31 (0.140)
1.25–5.0	LU•B12, LU•B32, LU•S12, LU•S32	LUCB05 <sup>1</sup>	0.31 (0.140)
3–12	LU•B12, LU•B32, LU•S12, LU•S32	LUCB12 <sup>1</sup>	0.31 (0.140)
4.5–18	LU•B32, LU•S32	LUCB18 <sup>1</sup>	0.31 (0.140)
8–32	LU•B32, LU•S32	LUCB32 <sup>1</sup>	0.31 (0.140)

<sup>1</sup> Complete the catalog number by selecting the proper voltage code from the table below.

Advanced, Single Phase, Class 10 Overload Protection

Setting Range (Amps)	Used with power bases	Catalog Number	Weight lb (kg)
0.15–0.6	LU•B12, LU•B32, LU•S12, LU•S32	LUCCX6 <sup>1</sup>	0.31 (0.140)
0.3–1.4	LU•B12, LU•B32, LU•S12, LU•S32	LUCC1X <sup>1</sup>	0.31 (0.140)
1.25–5.0	LU•B12, LU•B32, LU•S12, LU•S32	LUCC05 <sup>1</sup>	0.31 (0.140)
3–12	LU•B12, LU•B32, LU•S12, LU•S32	LUCC12 <sup>1</sup>	0.31 (0.140)
4.5–18	LU•B32, LU•S32	LUCC18 <sup>1</sup>	0.31 (0.140)
8–32	LU•B32, LU•S32	LUCC32 <sup>1</sup>	0.31 (0.140)

<sup>1</sup> Complete the catalog number by selecting the proper voltage code from the table below.

Advanced, 3-Phase, Class 20 Overload Protection

Setting Range (Amps)	Used with power bases	Catalog Number	Weight lb (kg)
0.15–0.6	LU•B12, LU•B32, LU•S12, LU•S32	LUCDX6 <sup>1</sup>	0.31 (0.140)
0.3–1.4	LU•B12, LU•B32, LU•S12, LU•S32	LUCD1X <sup>1</sup>	0.31 (0.140)
1.25–5.0	LU•B12, LU•B32, LU•S12, LU•S32	LUCD05 <sup>1</sup>	0.31 (0.140)
3–12	LU•B12, LU•B32, LU•S12, LU•S32	LUCD12 <sup>1</sup>	0.31 (0.140)
4.5–18	LU•B32, LU•S32	LUCD18 <sup>1</sup>	0.31 (0.140)
8–32	LU•B32, LU•S32	LUCD32 <sup>1</sup>	0.31 (0.140)

<sup>1</sup> Complete the catalog number by selecting the proper voltage code from the table below.

Voltage Codes

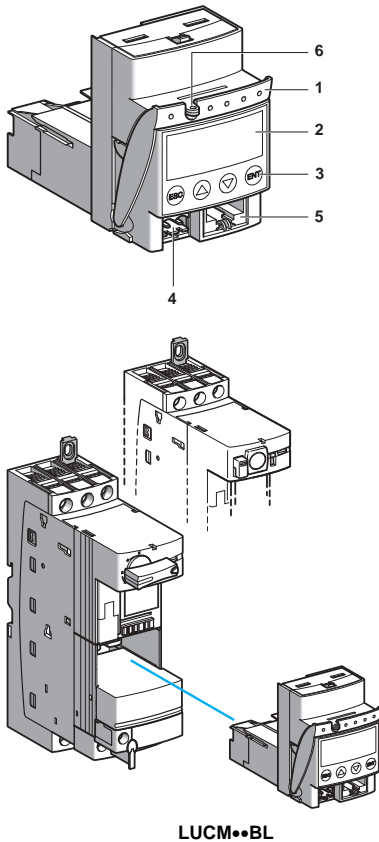
Volts	24	48–72	110–240
DC	BL <sup>1 2</sup>	–	–
AC	B	–	–
DC or AC	–	ES <sup>3</sup>	FU

<sup>1</sup> Voltage code to use for a power base with a communication module.

<sup>2</sup> DC voltage with range of 0.90 to 1.10 of nominal.

<sup>3</sup> 48–72 Vdc; 48 Vac

# TeSys® U-Line Motor Starters Control Units



LUCM••BL

## Multifunction

Description	
1	Extraction and locking handle
2	Built in display window (2 lines, 12 characters)
3	4-button keypad
4	24 Vdc auxiliary power input
5	RS-485 external communication port. Connection by RJ45 connector.
6	Sealing of locking handle

The display window and keypad allow:

- In configuration mode: local configuration of protection functions and alarms
- In run mode: display of parameter values and events

The RS-485 Modbus® communication port is used to connect:

- An operator terminal XBTNU400 on an enclosure door
- Personal computer with Windows™ 95 or higher and with PowerSuite™ V2.0 software
- Pocket PC (PPC) with an Intel Xscale™ processor and Windows™ 2003 for PPC and PowerSuite™ V2.0 software.

## Multifunction Control Units

Programming of motor protection parameters, monitoring of motor load values and consultation of faults/statistics by:

- Front panel using the integrated LCD and keypad
- Remote terminal XBTNU400 via Modbus communication bus
- Personal computer or Pocket PC with PowerSuite™ software VW3A8104.
- Remotely via a Modbus communication bus to a PLC

Multifunction control units must be connected to a 24 Vdc auxiliary power supply for programming.

## Multifunction Programmable Units

Built-in Modbus communication port, 24 Vdc only

Setting Range (Amps)	Used with power bases	Catalog Number <sup>1</sup>	Weight lb (kg)
0.15–0.6	LU•B12, LU•B32, LU•S12, LU•S32	LUCMX6BL	0.38 (0.175)
0.3–1.4	LU•B12, LU•B32, LU•S12, LU•S32	LUCM1XBL	0.38 (0.175)
1.25–5.0	LU•B12, LU•B32, LU•S12, LU•S32	LUCM05BL	0.38 (0.175)
3–12	LU•B12, LU•B32, LU•S12, LU•S32	LUCM12BL	0.38 (0.175)
4.5–18	LU•B32, LU•S32	LUCM18BL	0.38 (0.175)
8–32	LU•B32, LU•S32	LUCM32BL	0.38 (0.175)

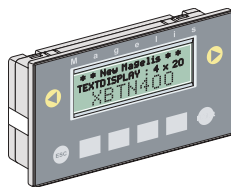
<sup>1</sup> Standard voltages. These control units can operate only on 24 Vdc supply. DC voltage with a range of 0.90 to 1.10 of nominal.

## User's Manual

Application	Languages	Catalog Number	Weight lb (kg)
TeSys® U-Line User's manual on CD-ROM <sup>1</sup>	Multi-language <sup>2</sup>	LU9CD1	0.05 (0.022)

<sup>1</sup> The CD-ROM contains user manuals for the AS-i and Modbus communication modules, multifunction control units and gateway modules, and ABC Configurator gateway programming software.

<sup>2</sup> English, French, German, Spanish, Italian.



XBTNU400

## Operator Terminal

This compact Magelis™ terminal enables the parameters of multifunction control unit LUCM to be read and modified. Requires XBTZ938 connector cable.

It is supplied pre-configured to provide dialogue with a quantity of 8 LUCM control units (Modbus protocol, application pages and alarm pages loaded).

Power base alarm and fault management takes priority.

Language	Display Window	Supply Voltage	Catalog Number	Weight lb (kg)
Multi-language <sup>1</sup>	4 lines of 20 characters	24 Vdc	XBTNU400	0.32 (0.150)

<sup>1</sup> English, French, German, Spanish, Italian.

## Connecting Cable <sup>1</sup>

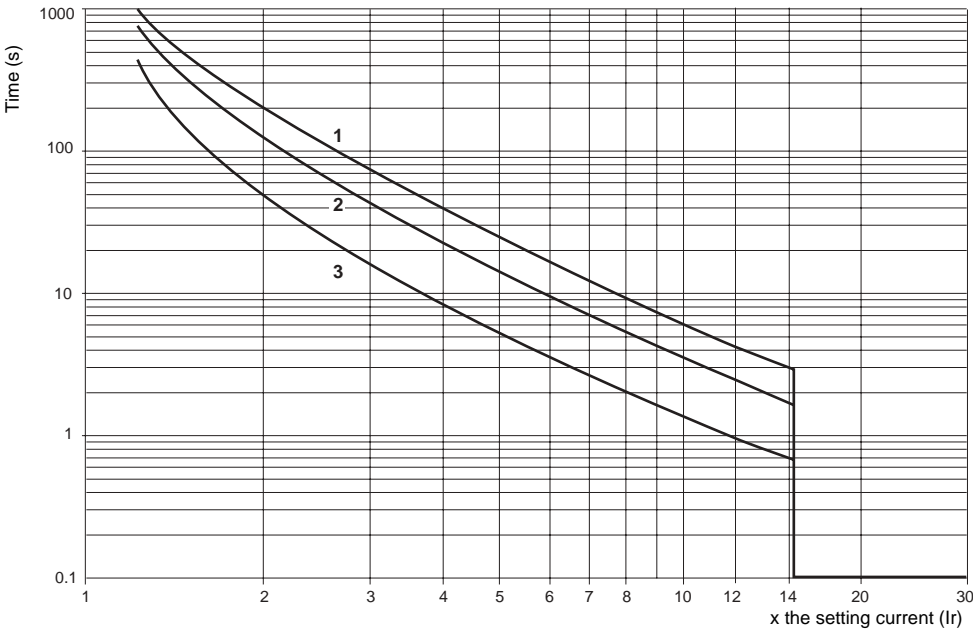
Function	Length	Type	Catalog Number	Weight lb (kg)
Connects terminal XBTNU400 to LUCM multifunction control unit.	8.20 ft. (2.5 m)	SUB-D 25-way female—RJ45	XBTZ938	0.43 (0.200)

<sup>1</sup> If a terminal is used with several control units, this cable can be connected to a Modbus hub LU9GC3 or to T-junctions VW3A8306TF.

TeSys® U-Line Motor Starters  
Control Units

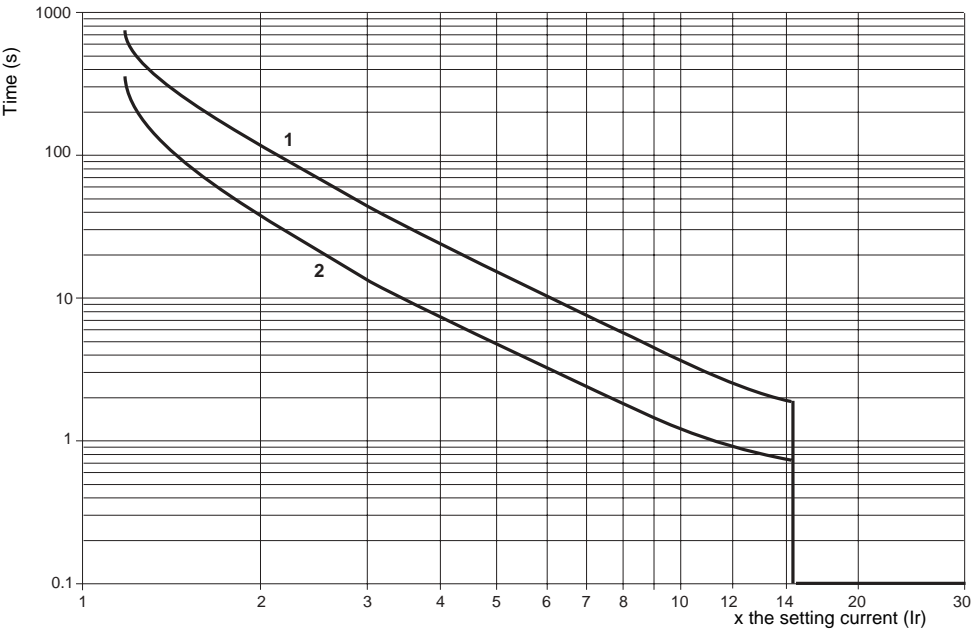
Tripping Curves for Control Units LUCA, LUCB, LUCD

Average operating times at 70 °F (20 °C) according to multiples of the setting current, tolerance: ± 20 %.



Tripping Curves for Control Unit LUCC

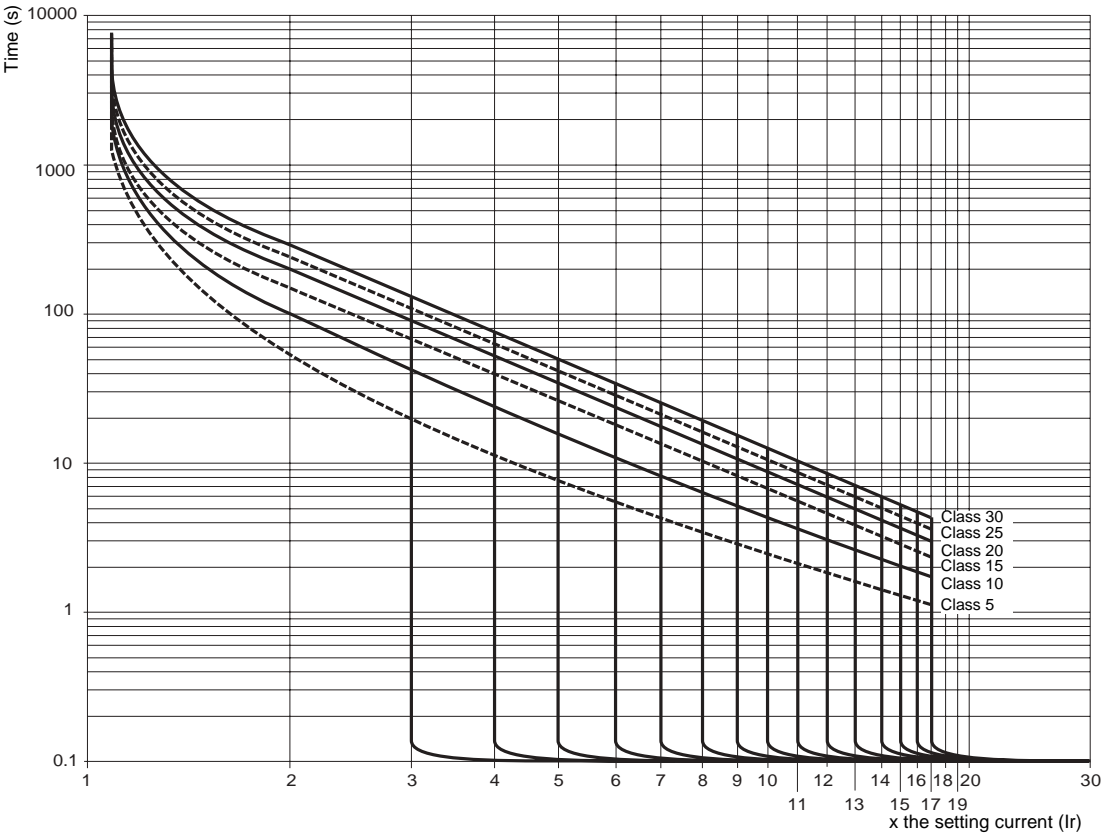
Average operating times at 70 °F (20 °C) according to multiples of the setting current, tolerance: ± 20 %.



Tripping curves for control unit LUCM

Cold state curves

Average operating times at 70 °F (20 °C) according to multiples of the setting current, tolerance:  $\pm 20\%$ .



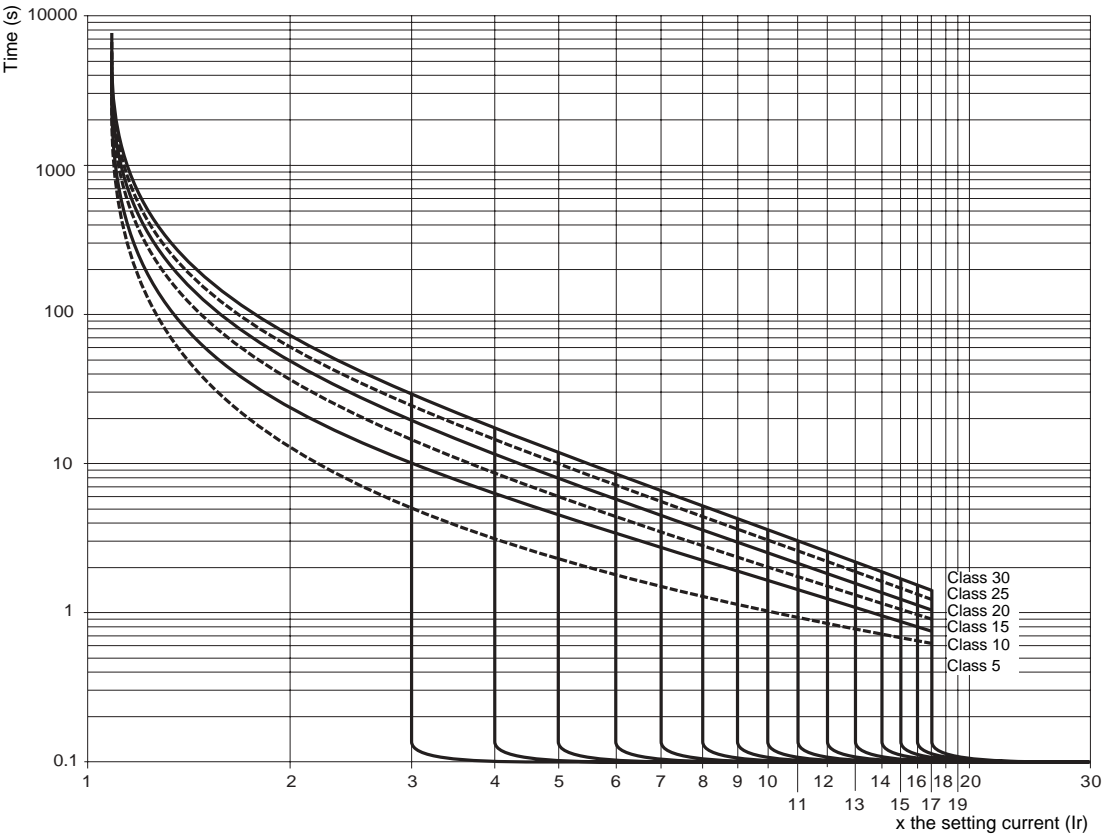
# TeSys® U-Line Motor Starters

## Control Units

### Tripping Curves for Control Unit LUCM

Hot state curves

Average operating times at 70 °F (20 °C) according to multiples of the setting current, tolerance: ± 20 %





## COMMUNICATION AND FUNCTION MODULES

### PowerSuite™ Software

PowerSuite™ software is a Windows™ -based program providing an intuitive, graphical user interface for the TeSys® U-Line LUCM multifunction control units, Altivar® 11 (ATV11), Altivar® 28 (ATV28), and Altivar® 58 (ATV58) drive controllers, and Altistart® 48 (ATS48) soft start controllers. The software is designed to run on:

- Any PC using the Microsoft® Windows™ 95, Windows™ 98, Windows NT® V4.0, or Windows XP® operating system
- Pocket PC (PPC) with an Intel Xscale™ processor and Windows™ 2003 for PPC and PowerSuite™ V2.0 software.

The PowerSuite™ commissioning software allows you to:

- Create, modify and store multi-function control unit configurations
- Transfer data to and from the multi-function control unit
- Print a hard copy of the multi-function control unit configuration for reference
- Operate the multi-function control unit to verify proper commissioning
- Display and view run time data
- Display and view faults and fault history



Catalog Number	Description
VW3A8104	PowerSuite2™ commissioning software on CD
VW3A8106	PC connection kit. Includes the following to connect a PC to a TeSys U-line LUCM control unit, ATV11, ATV28, ATV31, ATV58 or ATS48 controller: <ul style="list-style-type: none"> <li>• 1 m cable with RJ45 connectors</li> <li>• RS-232 to RS-485 adapter with RJ45 and DB9 female connectors</li> <li>• RJ45 to DB9 adapter for use with an ATV58 controller</li> <li>• Cable adapter for use with an ATV11 controller, VW3A11301</li> </ul>
VW3A8111	Pocket PC connection kit. Includes the following to connect a Jornada or iPAQ PPC to a TeSys U-line LUCM control unit, ATV11, ATV28, ATV31, ATV58 or ATS48 controller: <ul style="list-style-type: none"> <li>• 1/2 m cable with RJ45 connectors</li> <li>• RS-232 to RS-485 adapter with RJ45 and DB9 male connectors</li> <li>• RJ45 to DB9 adapter for use with an ATV58 controller</li> <li>• Cable adapter for use with an ATV11 controller, VW3A11301</li> <li>• Cable to connect the serial port on the PPC to the DB9 connector on the RS-232 to RS-485 adapter</li> </ul>
VW3A8105	PowerSuite™ upgrade CD. <ul style="list-style-type: none"> <li>• For current owners of PowerSuite™ versions 1.0, 1.4, or 1.5.</li> <li>• Software for PC and Pocket PC</li> <li>• Includes technical documentation and ABC Configurator gateway programming software.</li> </ul>

## TeSys® U-Line Motor Starters

### Communication and Function Modules

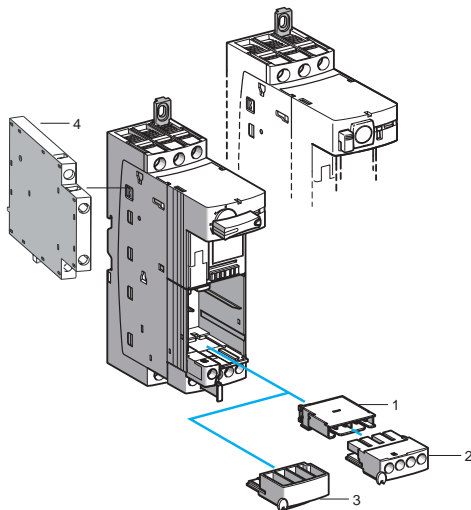
Terminals	Contact Indicates	Contact Normal Status	Auxiliary Contact State for Each Power Base Mode <sup>1</sup>						Catalog Number
			Off	Ready	Run	Short Circuit Trip	Overload Trip (Manual Reset)	Overload Trip (Remote/Auto Reset) <sup>2</sup>	
Screw	Ready condition	N.O.	O	I	I	O	O	I	LUA1C11
	Fault condition	N.C.	I	I	I	O	O	I	
Without terminals <sup>3</sup>	Ready condition	N.O.	O	I	I	O	O	I	LUA1C110
	Fault condition	N.C.	I	I	I	O	O	I	
Screw	Ready condition	N.O.	O	I	I	O	O	I	LUA1C20
	Fault condition	N.O.	O	O	O	I	I	O	
Without terminals <sup>4</sup>	Ready condition	N.O.	O	I	I	O	O	I	LUA1C200
	Fault condition	N.O.	O	O	O	I	I	O	

<sup>1</sup> I—indicates closed contact; O—indicates open contact

<sup>2</sup> Must order LU9BN11, LU9BN11C, LU9MRC or LU9MR1C.

<sup>3</sup> Requires multifunction or advanced control unit plus fault indication function module LUFDDA10.

<sup>4</sup> Requires multifunction or advanced control unit plus fault indication function module LUFDDA10.



#### Auxiliary Contact Blocks

Status and Fault Indication	Connection	Item	Catalog Number	Weight lb (kg)
1 N.O. contact indicating that control handle is in "ready" position and 1 N.C. fault signaling contact	Screw clamps	1 + 2	LUA1C11	0.07 (0.030)
	Without connections	1	LUA1C110	0.03 (0.012)
1 N.O. contact indicating that control handle is in "ready" position and 1 N.O. fault signaling contact	Screw clamps	1 + 2	LUA1C20	0.07 (0.030)
	Without connections	1	LUA1C200	0.03 (0.012)

#### Accessories

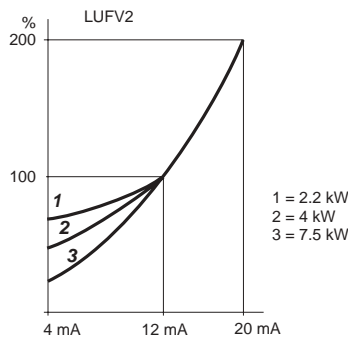
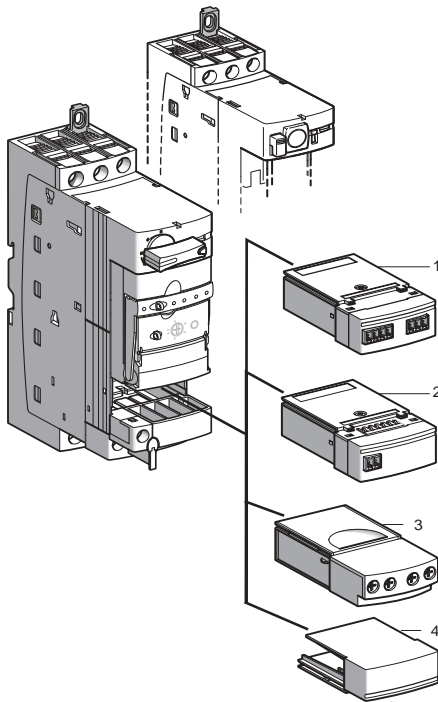
Description	For use on	Item	Catalog Number	Weight lb (kg)
Screw clamp terminal blocks	LUA1D110	2	LU9BD11	0.05 (0.022)
	LUA1C110	2	LU9BC11	0.05 (0.022)
	LUA1C200	2	LU9BC20	0.05 (0.022)
Blanking cover <sup>1</sup>	for auxiliary contact block slot	3	LU9C2	0.02 (0.010)
Control circuit contact block <sup>2</sup>	LUB, LU2B	4	LUA8E20 <sup>2</sup>	

<sup>1</sup> Blanking cover is included with every power base and starter only base.

<sup>2</sup> For use only with LUB, LU2B power bases. Not for use with LUS power bases.  
For compliance with NEC 430-74 disconnection of motor control circuits.

# TeSys® U-Line Motor Starters

## Communication and Function Modules



### Function Modules

Output	Application	Item	Catalog Number	Weight lb (kg)
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#### Motor Load Indication Function Module

Provides a signal proportional to the average currents in the three phases, divided by the FLA setting.

The value of the output signal 4-20 mA corresponds to a load status of 0 to 2 x FLA (0 to 3 x FLA for single-phase motor load).

The LUFV2 function module can be used with LUCB, LUCC, LUCD or LUCM control units. The LUFV2 function module requires a 24 Vdc auxiliary power supply. Includes removable screw terminal (not shown).

4 - 20 mA	-	1	LUFV2	0.11 (0.050)
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#### Overload / Short-Circuit Fault and Manual Reset Function Module

Includes an overload fault contact and a short-circuit fault contact.

It can only be used with an advanced control unit, from which it takes its power supply.

The control unit is forced to manual reset mode. Includes removable screw terminal (not shown).

2 N.O. Contacts	24 to 250 Vac or Vdc	2	LUFDH20	0.13 (0.060)
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#### Overload Fault and Automatic Reset Function Module

Includes overload fault contact. Short-circuit signaling can be obtained by using an add-on fault signaling contact LUA1 (see page 26).

The module can only be used with an advanced control unit from which it takes its power supply.

The control unit is forced to automatic reset mode. Includes removable screw terminal (not shown).

1 N.O. Contact	24 to 250 Vac or Vdc	2	LUFDA10	0.12 (0.055)
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#### Thermal Overload Pre-Alarm Function Module

Through load shedding, this module makes it possible to avoid stoppages in operation due to overload tripping.

Imminent overload tripping is displayed as soon as the current drawn by the load exceeds 1.05 x FLA.

Signaling is possible via an LED on the front panel of the module and externally by a N.O. relay output.

The module can only be used with an advanced control unit from which it takes its power supply. Includes removable screw terminal (not shown).

1 N.O. Contact	24 to 250 Vac or Vdc	2	LUFW10	0.12 (0.055)
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#### Auxiliary Contact Function Modules

Module with 2 contacts indicating state of LUB or LUS power base power poles.

For use with: 24 to 250 Vac or Vdc, 5 A.

Connection	Application	Item	Catalog Number	Weight lb (kg)
2 N.O. Contacts	24 to 250 Vac or Vdc	3	LUFN20	0.11 (0.050)
1 N.O., 1 N.C. Contacts	24 to 250 Vac or Vdc	3	LUFN11	0.11 (0.050)
2 N.C. Contacts	24 to 250 Vac or Vdc	3	LUFN02	0.11 (0.050)

#### Accessories

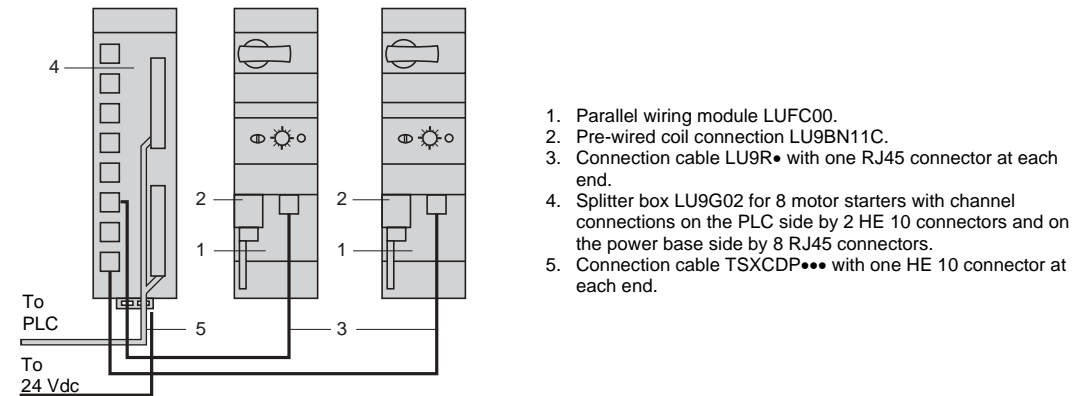
Description	For use on	Item	Catalog Number	Weight lb (kg)
Blanking cover <sup>1</sup>	Function module slot	4	LU9C1	0.04 (0.020)

<sup>1</sup> Blanking cover is included with every power base.

TeSys® U-Line Motor Starters  
Communication and Function Modules

Parallel Wiring Module

Architecture

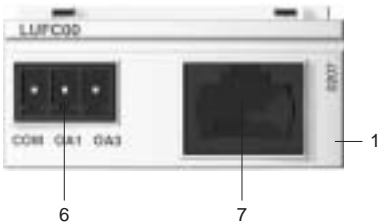


The parallel wiring system makes it possible to connect power bases to the PLC I/O modules quickly and without any need for tools. It replaces traditional screw terminal and hard-wired connections.

The parallel wiring module allows for energization of the coil circuit of each power base, and an output signal from a PLC. Provides a "Run" and "Fault" status of each power base to the PLC.

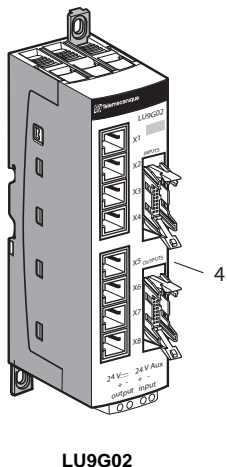
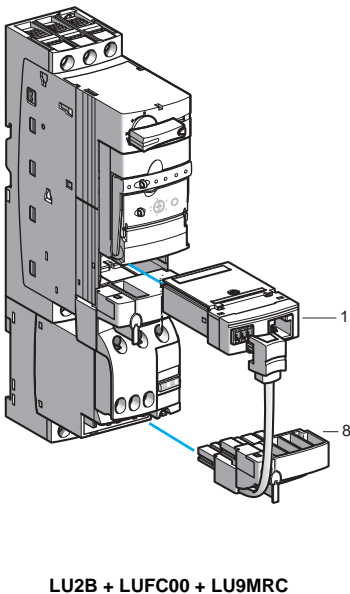
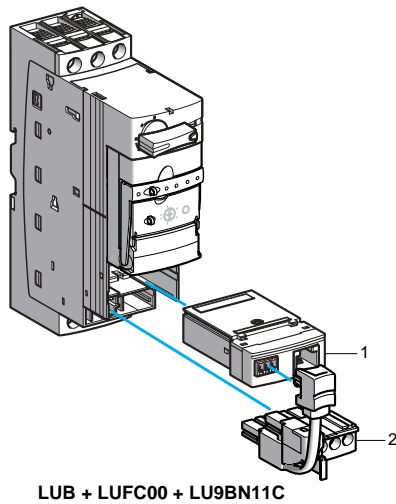
Requires a 24 Vdc control unit, LUC•••BL.

The splitter box distributes information from the PLC I/O modules to each of the power bases connected to it.



Description	Item	Catalog Number	Weight lb (kg)
Parallel wiring module	1	LUFC00	0.10 (0.045)
Outputs for starter commands	6	—	—
RJ45 connector for connecting to splitter box LU9G02	7	—	—

# TeSys® U-Line Motor Starters Communication and Function Modules



## Connection of Parallel Wiring Module Output Terminals to the Power Base Coil Terminals

By pre-wired connector or removable screw terminal:

- Pre-wired connector:

Pre-wired components simplify wiring and reduce wiring errors. The use of a power base without screw terminal connections is recommended when using LU9BN11C or LU9MRC pre-wired connectors.

Description	For use with power base	Item	Catalog Number	Weight lb (kg)
Pre-wired coil connectors	LUB••	2	LU9BN11C	0.099 (0.045)
	LUS••			
	LU2B••	8	LU9MRC	0.066 (0.030)
	LU2S••			

- Removable screw terminal:

Allows insertion, for example, of an emergency stop control or a voltage interface. This type of connection must be used for a reversing power base assembled using an LU6M reversing block for separate mounting. When reversing block LU6M and the power base are mounted side-by-side, a pre-wired connector LU9MRC may be used.

## Connection of Parallel Wiring Module to the PLC

No tools are required to connect the parallel wiring module to the PLC. Connection is via a splitter box which allows up to 8 power bases to be connected; a maximum of 4 reversing starters per splitter box is allowed.

The splitter box requires a 24 Vdc power supply.

### Parallel Wiring Splitter Boxes

PLC Connection (16/120)	Power Base Connection	Item	Catalog Number	Weight lb (kg)
Cable with two HE 1020-way connectors	Eight RJ45 ports	4	LU9G02 <sup>1</sup>	0.573 (0.260)

<sup>1</sup> Allows "run" and "fault" status of each power base to be fed back to the PLC and transmits commands

### Connection Cables from Splitter Box to Parallel Wiring Modules

Item	Length ft. (m)	Catalog Number	Weight lb (kg)
Cable with two RJ45 connectors <sup>1</sup>	0.98 (0.3)	LU9R03	0.099 (0.045)
	3.28 (1)	LU9R10	0.143 (0.065)
	9.84 (3)	LU9R30	0.275 (0.125)

<sup>1</sup> For connection from parallel wiring module LUFC00 to parallel wiring splitter box LU9G02.

### Connection Cables from Splitter Box to PLC

PLC Connection	Splitter Box Connection	Gauge AWG	mm <sup>2</sup>	Length ft. (m)	Catalog Number	Weight lb (kg)
HE 10 20-way	HE 10 20-way	22	0.324	1.64 (0.5)	TSXCDP053	0.187 (0.085)
				3.28 (1)	TSXCDP103	0.330 (0.150)
				6.56 (2)	TSXCDP203	0.617 (0.280)
				9.84 (3)	TSXCDP303	0.903 (0.410)
		28	0.080	16.4 (5)	TSXCDP503	1.47 (0.670)
				3.28 (1)	ABFH20H100	0.176 (0.080)
Bare wires	HE 10 20-way	22	0.324	6.56 (2)	ABFH20H200	0.308 (0.140)
				9.84 (3)	ABFH20H300	0.462 (0.210)
				9.84 (3)	TSXCDP301	0.881 (0.400)
				16.4 (5)	TSXCDP501	1.45 (0.660)

TeSys® U-Line Motor Starters  
Communication and Function Modules

AS-i Communication Module

Serial Type Connection

The AS-i communication module makes it easy to connect power bases to the AS-i wiring system, allowing remote control and command of these power bases.

The operating states of the module (AS-i voltage present, communication fault, addressing fault,...) are indicated on the front panel by 2 LEDs (green and red).

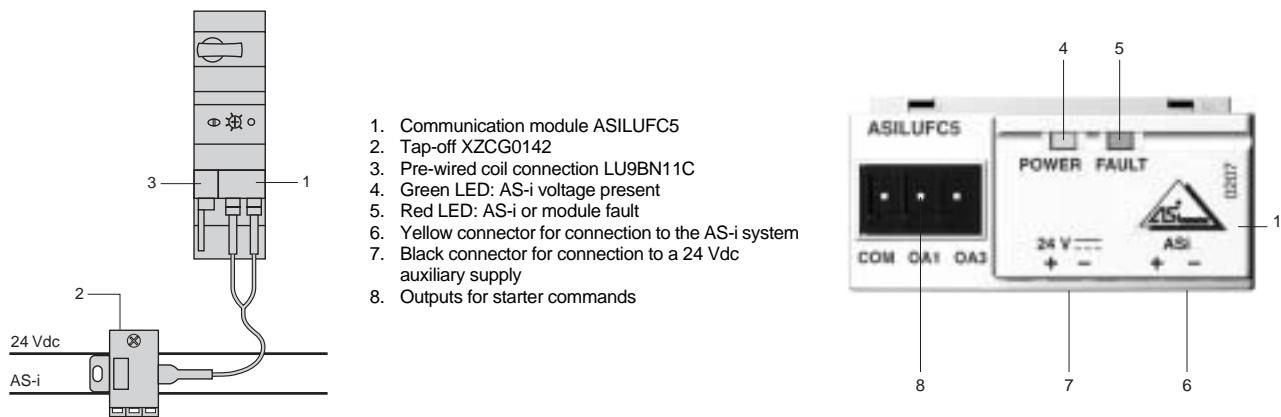
Operation of the module is continuously monitored by auto-testing, in a way that is totally transparent to the user.

The incorporation of AS-i V.2 functions allows diagnostics to be performed on the module, either remotely via the bus or locally via the ASITERV2 addressing terminal.

The communication module must have a 24 Vdc supply and must be used in conjunction with a 24 Vdc control unit, LUC●●BL.

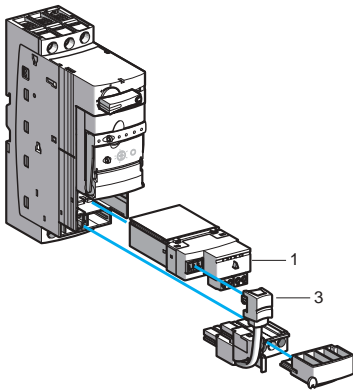
The product is supplied with a yellow connector (6) for connection to the AS-i system, a black connector (7) for connection to the 24 Vdc auxiliary supply and a black connector (8) for connection of the outputs.

Architecture

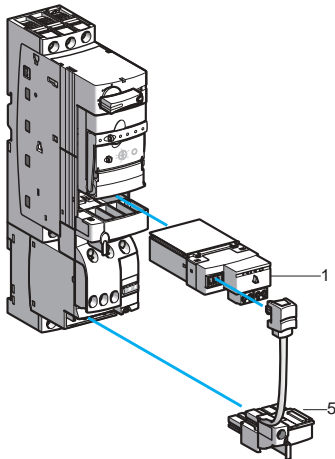


AS-i profile		7.D.F.0	
Data bits (command)	Bit value	= 0	= 1
	Command D0 (O)	Stop forward	Forward running
	Command D1 (O)	Stop reverse	Reverse running
	Command D2 (O)	Not used	Not used
	Command D3 (O)	Not used	Not used
Data bits (status)	Bit value	= 0	= 1
	Status D0 (I)	Not ready or fault	Ready
	Status D1 (I)	Stopped	Running
	Status D2 (I)	Not used	Not used
	Status D3 (I)	Not used	Not used
Description	Item	Catalog Number	Weight lb (kg)
AS-i Communication Module	1	ASILUFC5	0.143 (0.065)

# TeSys® U-Line Motor Starters Communication and Function Modules



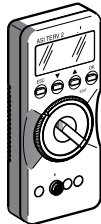
LUB + ASILUF C5 + LU9BN11C



LU2B + ASILUF C5 + LU9MRC



XZMC11



ASITERV2



Configuration example with  
Premium TSXSAY100/1000 module

## Connection of AS-i Communication Module Output Terminals to the Power Base Coil Terminals

By pre-wired connector or removable screw terminal:

- Pre-wired connector:

Pre-wired components simplify wiring and reduce wiring errors. The use of a power base without screw terminal control circuit connections is recommended when using LU9BN11C or LU9MRC pre-wired connectors.

Description	For use with power base	Item	Catalog Number	Weight lb (kg)
Pre-wired coil connectors	LUB••	3	LU9BN11C	0.099 (0.045)
	LUS••			
	LU2B••	5	LU9MRC	0.066 (0.030)
	LU2S••			

- Removable screw terminal (included with ASILUFC5):

Allows insertion, for example, of an emergency stop control or a voltage interface. This type of connection must be used for a reversing power base assembled using an LU6M reversing block for separate mounting. When reversing block LU6M and the power base are mounted side-by-side, a pre-wired connector LU9MRC may be used.

## Connection of the Communication Module on the Serial Bus <sup>1</sup>

Achieved by using a tap-off for connection to 2 ribbon cables:

- 1 for AS-i (yellow)
- 1 for separate 24 Vdc supply (black).

Description	Length ft. (m)	Catalog Number	Weight lb (kg)
Tap-off	6.56 (2)	XZCG0142	0.584 (0.265)

## Consoles and Cable Adapters

Description	Catalog Number	Weight lb (kg)
<b>Addressing console</b> Battery operated. Battery charger supplied AS-i V.1 and V.2.1 compatible.	XZMC11US	1.21 (0.550)
<b>Adjustment and diagnostics console</b> Runs on LR6 batteries. Allows addressing of AS-i V.2.1 interfaces and diagnostics	ASITERV2	1.10 (0.500)
<b>Cable adapter</b> For console XZMC11	XZMG12US	0.154 (0.070)

## Software Set-Up

AS-i configuration is carried out using PL7 Micro/Junior/Pro software. From the module declaration screen, it is possible to configure all the slave devices corresponding to all the AS-i I/O.

Configuration is carried out by following the instructions on the screen.

## TeSys® U-Line User's Manual <sup>1</sup>

Application	Language	Catalog Number	Weight lb (kg)
User's Manual On CD-ROM	Multi-language <sup>2</sup>	LU9CD1	0.048 (0.022)

<sup>1</sup> The CD-ROM contains user's manuals for the AS-i and Modbus® communication modules, multifunction control units, gateway modules, and ACB Configurator gateway programming software.

<sup>2</sup> English, French, German, Italian, Spanish.

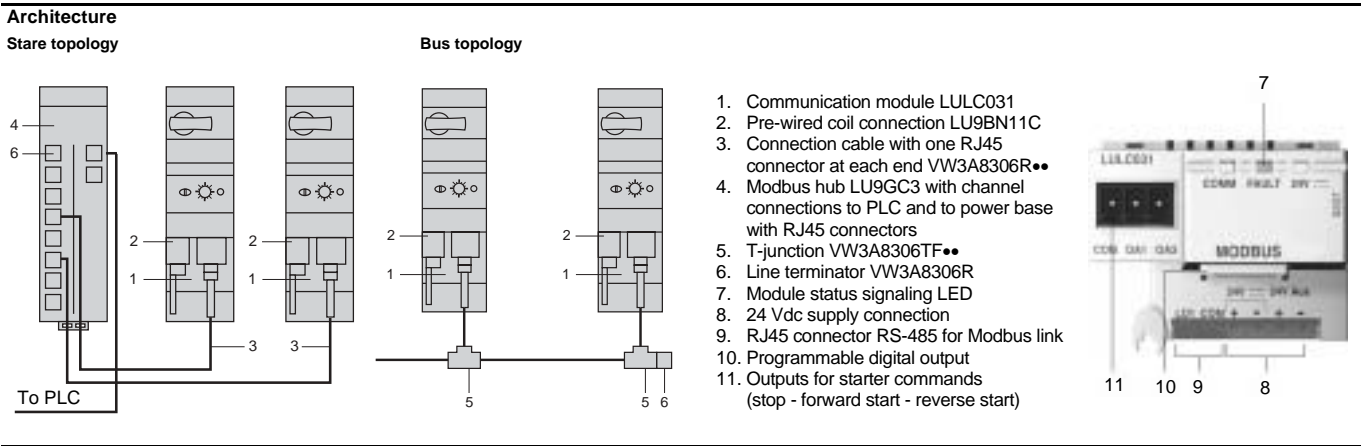
<sup>1</sup> Degree of protection IP 54. Connection by 4 x 0.34 mm<sup>2</sup> wires.  
Black wire: +24 V      Blue wire: AS-i (–)  
White wire: 0 V      Brown wire: AS-i (+)

TeSys® U-Line Motor Starters  
Communication and Function Modules

Modbus® Communication Module

Series Type Connection

Communication module LULC031 enables the U-Line power base to be connected to the Modbus network. It must have a 24 Vdc supply and must be used in conjunction with a 24 Vdc control unit, LUC•••BL. It incorporates a 0.5 A, 24 Vdc digital output for local command requirements.



Information carried by the bus depends on the type of control unit used.

Control Unit	Standard	Advanced	Multifunction
Starter status (ready, running, fault)	√	√	√
Alarms (over current)			√
Thermal overload alarm		√	√
Remote reset via the bus		√	√
Indication of motor load		√	√
Fault differentiation		√	√
Remote programming and monitoring of all functions			√
"Log" function			√
"Monitoring" function			√
Start and Stop commands	√	√	√
Functions performed √			

Description	Item	Catalog Number	Weight lb (kg)
Modbus Communication Module	1	LULC031	0.176 (0.080)

For more detailed information, please refer to TeSys® U-Line User's Manual LU9CD1, on CD-ROM.



# TeSys® U-Line Motor Starters Communication and Function Modules

## Connection of Modbus® Communication Module Output Terminals to the Power Base Coil Terminals

By pre-wired connector or removable screw terminal:

- Pre-wired connector:

Pre-wired components simplify wiring and reduce wiring errors. The use of a power base without screw terminal control circuit connections is recommended when using LU9BN11 or LU9MRC pre-wired connectors.

Description	For use with power base	Item	Catalog Number	Weight lb (kg)
Pre-wired coil connectors	LUB••	2	LU9BN11C	0.099 (0.045)
	LUS••			
	LU2B••	7	LU9MRC	0.066 (0.030)
	LU2S••			

- Removable screw terminal (included with LULC031):

Allows insertion, for example, of an emergency stop control or a voltage interface. This type of connection must be used for a reversing power base assembled using an LU6M reversing block for separate mounting. When reversing block LU6M and the power base are mounted side-by-side, a pre-wired connector LU9MRC may be used.

## Connection of the Communication Modules on the Serial Bus

Achieved either by means of a Modbus hub or using T-junctions.

Description	Length ft. (m)	Item	Catalog Number	Weight lb (kg)
Modbus hub for 8 slaves	—	4	LU9GC3	0.573 (0.260)
Cables with two RJ45 connectors <sup>1</sup>	0.98 (0.3)	3	VW3A8306R03	0.099 (0.045)
	3.28 (1)	3	VW3A8306R10	0.143 (0.065)
	9.84 (3)	3	VW3A8306R30	0.275 (0.125)
T-junctions <sup>2</sup>	0.98 (0.3)	5	VW3A8306TF03	0.07 (0.032)
	3.28 (1)	5	VW3A8306TF10	0.07 (0.032)
RS-485 line terminator <sup>3</sup>	—	6	VW3A8306RC	0.026 (0.012)

<sup>1</sup> For connection from Modbus hub LU9GC3 to Modbus communication module LULC031.

<sup>2</sup> Includes 2 RJ45 female connectors (bus side) and a 0.3 m or 1 m cable supplied with an RJ45 male connector (station side).

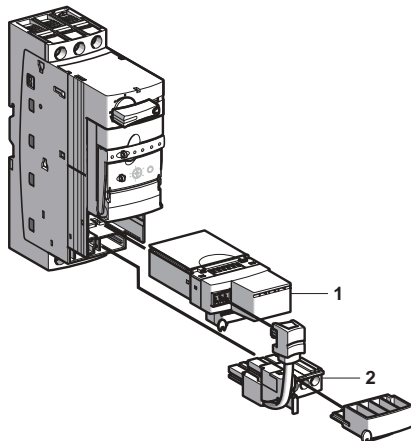
<sup>3</sup> Required at end of Modbus serial bus.

## TeSys® U-Line User's Manual <sup>1</sup>

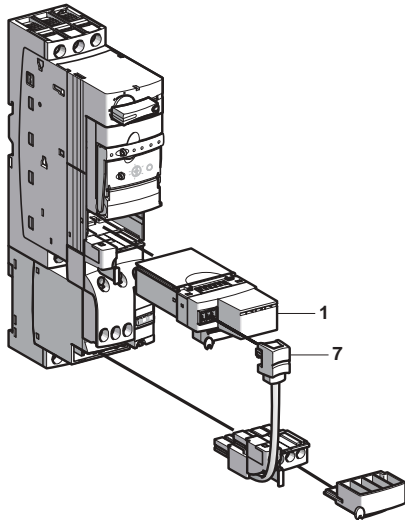
Application	Language	Catalog Number	Weight lb (kg)
User's Manual on CD-ROM	Multi-language <sup>2</sup>	LU9CD1	0.048 (0.022)

<sup>1</sup> The CD-ROM contains user's manuals for the AS-i and Modbus communication modules, multifunction control units and gateway modules, and ABC Configurator gateway programming software.

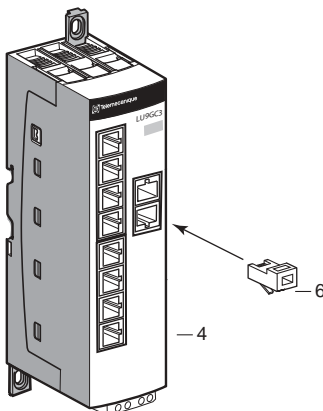
<sup>2</sup> English, French, German, Italian, Spanish



LUB + LUL C031 + LU9B



LU2B + LUL C031 + LU9M



LU9GC3

# TeSys® U-Line Motor Starters

## Communication and Function Modules

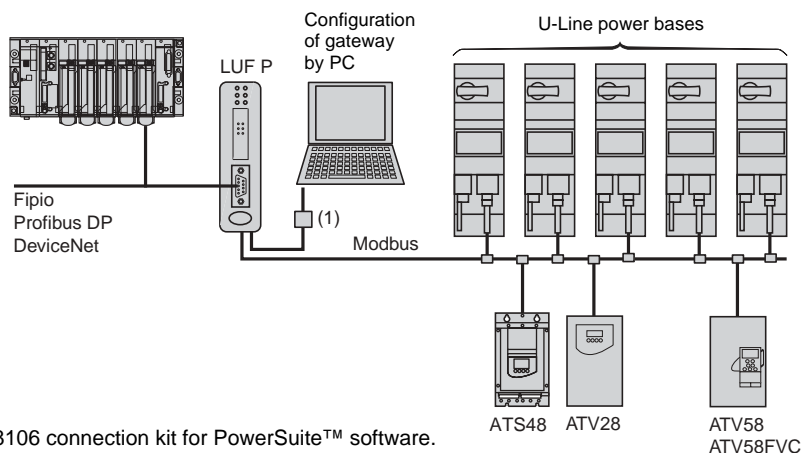
### Communication Gateways

LUFP communication gateway allows connection between Modbus® and field buses such as Fipio, Profibus DP or DeviceNet.

After configuration, these gateways manage information which can be accessed by the Modbus network and make this information available for read/write functions (command, monitoring, configuration and adjustment) on the field buses.

An LUFP communication gateway can be clipped onto a 35 mm DIN rail, allowing connection of up to 8 slaves to the Modbus bus.

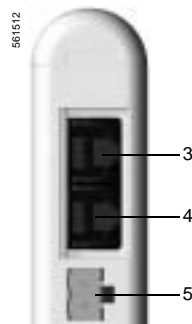
### Example of Architecture



### Description

Front panel of the product

1. LED indicates:
  - communication status of the Modbus buses
  - gateway status
  - communication status of the Fipio, Profibus DP or DeviceNet bus
2. Connectors for connection to Fipio, Profibus DP or DeviceNet buses
3. RJ45 connector for connection on the Modbus bus
4. RJ45 connector for link to a PC
5. 24 Vdc power supply



### Software Set-Up

For the Fipio bus, software set-up of the gateway is performed using either PL7 Micro/Junior/Pro software or ABC Configuration software.

For the Profibus DP and DeviceNet buses, software set-up is performed using the ABC Configurator.

This software is included:

- In the PowerSuite™ software workshop for PC (see VW3A8104)
- In the TeSys® U-Line user's manual LU9CD1 on CD-ROM.

# TeSys® U-Line Motor Starters Communication and Function Modules

## Communication Gateway Specifications



Bus Type		Fipio	Profibus DP	DeviceNet
Environment	Conforming to IEC 60664	Degree of pollution: 2		
Ambient air temperature	Around the device	40 to 122 °F (+ 5 to + 50 °C)		
Degree of protection		IP 20		
Electromagnetic compatibility	Emission	Conforming to IEC 50081-2: 1993		
	Immunity	Conforming to IEC 61000-6-2: 1999		
Number of Modbus® slaves which can be connected		< 8		
Connection	Modbus	By RJ45 connector conforming to Schneider Electric RS-485 standard		
	To a PC	By RJ45 connector, with PowerSuite™ connection kit		
	Field bus	By SUB-D9 pin female connector	By SUB-D9 pin female connector	By 5-way removable screw connector
Supply		External supply, 24 Vdc ± 10 %		
Consumption	Max.	280 mA		
	Typical	100 mA		
Indication/diagnostics		By LED on front panel		
Services	Profile	FED C32 or FED C32P	–	–
	Command	26 configurable words <sup>1</sup>	122 configurable words	256 configurable words
	Monitoring	26 configurable words <sup>1</sup>	122 configurable words	256 configurable words
	Configuration and adjustment	By gateway mini messaging facility (PKW)		

<sup>1</sup> If the gateway is configured using PL7 software and not the ABC Configurator, the I/O capacity is limited to a total of 26 words.

## Communication Gateways

Description	For use with	With bus type	Catalog Number	Weight lb (kg)
Communication gateways	TeSys U-Line power bases, Altistar® 48, Altivar® 28, 58 and 58FVC	Fipio/Modbus	LUFPP1	0.54 (0.245)
		Profibus DP/Modbus	LUFPP7	0.54 (0.245)
		DeviceNet/Modbus	LUFPP9	0.54 (0.245)

## Connection Accessories

 <b>TSXFPACC12</b>   <b>490NAD91103</b>	Description	For use with	Length ft. (m)	Connectors	Catalog Number	Weight lb (kg)
	Connection cables	Modbus	9.84 (3)	1 RJ45 type connector and one end with stripped wires	VW3A8306D30	0.330 (0.150)
			0.98 (0.3)	2 RJ45 type connectors	VW3A8306R03	0.110 (0.050)
			3.28 (1)	2 RJ45 type connectors	VW3A8306R10	0.110 (0.050)
			9.84 (3)	2 RJ45 type connectors	VW3A8306R30	0.330 (0.150)
	Connectors	Fipio	–	1 SUB-D 9 pin male connector	TSXFPACC12	0.088 (0.040)
		Profibus mid line	–	1 SUB-D 9 pin male connector	490NAD91104	–
		Profibus line end	–	1 SUB-D 9 pin male connector	490NAD91103	–

## TeSys U-Line User's Manual

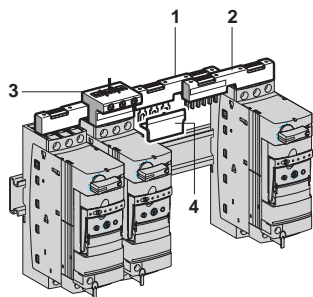
Description	Medium	Language	Catalog Number	Weight lb (kg)
User's manual on CD ROM <sup>1</sup>	CD-ROM	Multilingual: English, French, German, Italian, Spanish	LU9CD1	0.048 (0.022)

<sup>1</sup> This CD-ROM contains user's manuals for AS-i and Modbus communication modules, multifunction control units and gateways, and ABC Configurator gateway programming software.

ACCESSORIES

Pre-wired System for Power Connections up to 63 A

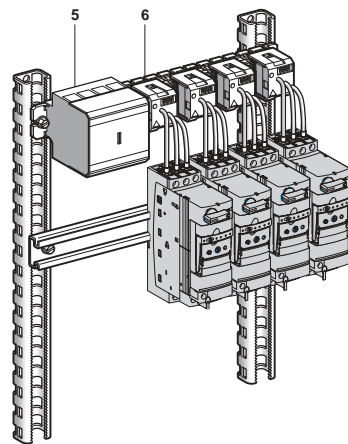
Suitable for group motor installations only



Description	Application	Pitch inches (mm)	Item	Sold in lots of	Catalog Number	Weight lb (kg)
Set of 3-pole 63 A busbars	2 power bases	1.77 (45)	2	1	GV2G245	0.080 (0.036)
		2.12 (54)	—	1	GV2G254	0.083 (0.038)
	3 power bases	1.77 (45)	—	1	GV2G345	0.127 (0.058)
		2.12 (54)	—	1	GV2G354	0.132 (0.060)
	4 power bases	1.77 (45)	1	1	GV2G445	0.169 (0.077)
		2.12 (54)	—	1	GV2G454	0.187 (0.085)
Protective end cover	For unused busbar outlets	—	4	5	GV1G10	0.011 (0.005)
Terminal block for supply to one or more busbar sets	Connection from the top	—	3	1	GV1G09	0.088 (0.040)

Pre-wired System for Power Connections up to 160 A

The busbar system can be screw-mounted to any type of support



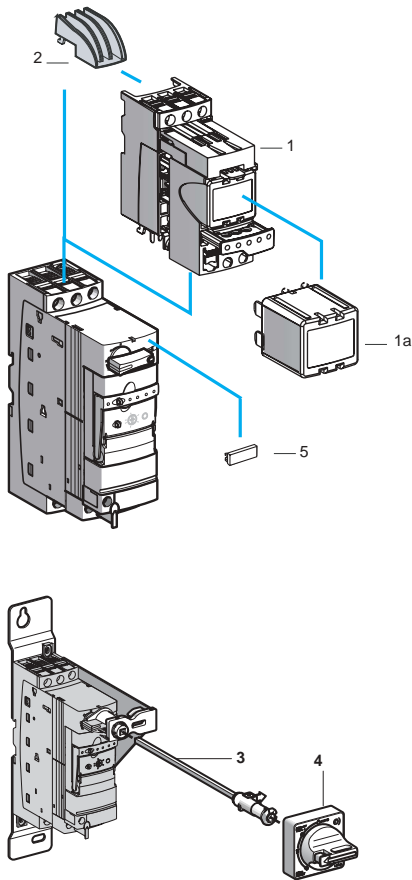
4 Pole Busbar Set: 3-Phase + Neutral or 3-Phase + Common

Number of Tap-offs at 0.71" (18 mm) Intervals	Length inches (mm)	For Mounting in Enclosure Width mm	Item	Catalog Number	Weight lb (kg)
18	17.8 (452)	800	5	AK5JB144	1.98 (0.900)

Removable 3-Phase Power Sockets

Number of Points used on the Busbar System	Thermal Current	Cable Length inches (mm)	Item	Sold in lots of	Catalog Number	Weight lb (kg)
2	16	7.87 (200)	6	6	AK5PC13	0.088 (0.040)
	32	9.84 (250)	6	6	AK5PC33	0.099 (0.045)
		39.4 (1000)	—	6	AK5PC33L	0.132 (0.060)

# TeSys® U-Line Motor Starters Accessories



## Current Limiter - Isolator Module

Description	Breaking Capacity Iq		For Use With	Item	Catalog Number	Weight lb (kg)
	480 V kA	600 V kA				
Current limiter-isolator module <sup>3</sup>	130	65	LUB; LU2B	1	LUALB1 <sup>1</sup>	0.683 (0.310)
Replacement limiter cartridge	—	—	LUALB1	1a	LUALF1	0.297 (0.135)

## UL508 Type E Phase Barrier for use with LUB•• and LU2B••

Phase barrier LU9SP0 is required to create a UL 508 Type E self-protected combination motor controller. Without the phase barrier, the LUB/LU2B power base is a UL 508 motor starter.

Description	Application	Mounting	Item	Catalog Number	Weight lb (kg)
Incoming line phase barrier	LUB or LU2B 12 or 120 LUB or LU2B 32 or 320 LUA LB1	Direct on terminals L1, L2, L3	2	LU9SP0	0.066 (0.030)

## Door Interlock Mounting Kit and Handles for use with LUB•• and LU2B••

Description	Item	Catalog Number	Weight lb (kg)
Mounting Kit <sup>2</sup>	3	LU9AP00	1.080 (0.490)
Handle kit (black/blue) NEMA Type 12/3R	4	LU9AP11	0.330 (0.150)
Handle kit (red/yellow) NEMA Type 12/3R	4	LU9AP12	0.330 (0.150)

## Other Accessories

Clip-on identification markers	—	—	Power bases, and reversing blocks	5	LAD90 <sup>3</sup>	0.002 (0.001)
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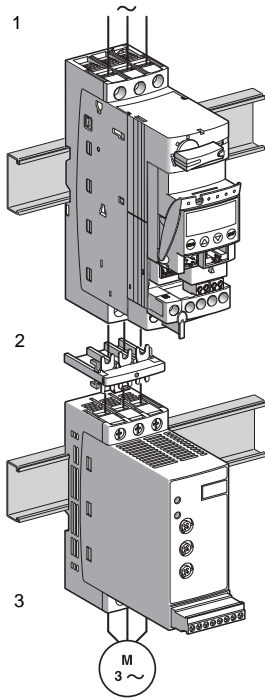
<sup>1</sup> LUALB1 supplied with LUALF1 limiter cartridge. LUB, LU2B power bases are rated for 480 V/60 Hz/42 kA short circuit breaking capacity. For applications requiring higher short circuit breaking capacity, add the LUALB1 current limiter-isolator module which provides capacity at 480 V/60 Hz/130 kA, 600 V/60 Hz/65 kA and 690 V/60 Hz/70 kA. LUALB1 is required for all 600 V / 690 V motor load applications.

<sup>2</sup> For enclosures with 7.5" to 20" (190.5 mm to 508 mm) mounting depth.

<sup>3</sup> Sold in lots of 100.

## ALTISTART® SOFT STARTS FOR TESYS® U-LINE

### Overview



While Altistart 01 soft starts can be used with almost any motor starter, it now adds soft start and soft stop motor control to the TeSys U-Line family of motor starters.

When either an ATS01•••LU/QN/RT or an ATS01•••LT model (3) is combined with the TeSys U-Line motor starter (1) by means of a power connector (2), the result is a unique, innovative motor starting solution. A low power soft start installation now has access to all of the benefits of the TeSys U-Line motor starter:

- Modular design with a standard 45 mm width
- Short circuit and multi-class overload protection
- Phase loss, phase imbalance, ground fault, jam, under load, and long-start protection
- Fault history
- PC and PDA based programming software
- Optional LCD display
- Networking capabilities: Modbus®, AS-i, DeviceNet, Ethernet TCP/IP, Profibus DP
  - Monitoring of motor status
  - Remote starting and fault reset
- Electronic Reversing

The ATS01•••LT soft start is optimized for installations offering 24 Vdc control power.

The ATS01•••LU/QN/RT soft start is self-powered from the AC line supply and is compatible with all other control power schemes.

The panel space required to install the ATS01 soft start and the TeSys U-Line motor starter is minimal with a standard 45 mm product width and side by side mounting.

The Altistart 01 soft start enhances the starting performance of asynchronous motors by allowing them to start gradually, smoothly, and in a controlled manner. It is ideal for applications that do not require high starting torque. The ATS01 limits starting torque and reduces the current inrush experienced with other motor starting methods.

The transitionless starting method of the Altistart 01 soft start avoids the torque surges associated with other reduced voltage starting methods.

Using the Altistart 01 soft start avoids the damage and expense associated with full voltage starting:

- wear and tear to motors, shafts, bearings, clutches, belts and other attached machinery
- damage to product being moved due to sudden starts and stops
- production downtime and material waste
- maintenance labor and replacement equipment cost

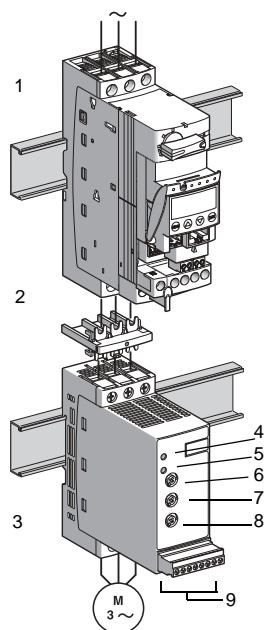
The Altistart 01 soft start is designed for the following simple applications:

- material handling conveyors
- belt-driven machinery
- fans and pumps
- small compressors
- automatic doors and gates
- process machinery (grinders, mixers, agitators, etc.)
- filling lines
- people movers
- any other application that can benefit from the pluses of stepless reduced voltage starting

The Altistart 01 low power mini soft start is compact, easy to install, and complies with the following international standards: IEC/EN 60947-4-2, UL, CSA, CCC, C-Tick and CE

Altistart 01 low power mini soft starts:

- control two phases of the AC voltage supplying the motor to limit starting torque and current
- have a motor power ratings range of 1 to 20 HP (0.75 to 15 kW), three-phase only
- have a motor voltage range of 208 to 460V



## Description

The Altistart® 01 soft start is equipped with:

- 1 green LED (4) to indicate that soft start power is ON
- 1 yellow LED (5) that will illuminate 10 seconds after a start command has been given indicating that the soft start's voltage ramp is complete, the internal shorting contactor has closed, and the motor is up to speed
- a potentiometer to set the starting time (6)
- a potentiometer to set the initial voltage applied to the motor when starting begins (7)
- a potentiometer to set the stopping time (8)
- a removable I/O terminal block (9) that includes:
  - 2 logic or control inputs for Run and Stop commands
  - 1 logic or control input for the BOOST or Kickstart function
  - 1 "open collector" logic or signal output to indicate that the soft start ramp is complete and the motor is up to speed
  - 1 normally open relay contact that is:
    - closed when the soft start is running the motor
    - open if the soft start is faulted or if the motor has stopped

**NOTE:** For additional information refer to catalog 8637CT0401.

## Altistart 01 Soft Start and TeSys U-Line Motor Starter Combinations

Motor Power <sup>1</sup>				24 Vdc Control Power			Motor Power <sup>1</sup>				110–240 Vac Control Power		
			ATS01 Rated Current	ATSU01 Soft Start	TeSys U-Line					ATS01 Rated Current	ATSU01 Soft Start	TeSys U-Line	
Voltage	kW	HP	Amps		Power Base	Control Module <sup>2</sup>	Voltage	kW	HP	Amps		Power Base	Control Module <sup>2</sup>
230 V	0.75	1	6	ATSU01N206LT	LUB12	LUCp05BL	230 V	0.75	1	6	ATS01N206LU	LUB12	LUCp05FU
	1.1	1.5	6	ATSU01N206LT	LUB12	LUCp12BL		1.1	1.5	6	ATS01N206LU	LUB12	LUCp12FU
	1.5	2	9	ATSU01N209LT	LUB12	LUCp12BL		1.5	2	9	ATS01N209LU	LUB12	LUCp12FU
	2.2	3	12	ATSU01N212LT	LUB12	LUCp12BL		2.2	3	12	ATS01N212LU	LUB12	LUCp12FU
	3	—	12	ATSU01N212LT	LUB32	LUCp18BL		3	—	12	ATS01N212LU	LUB32	LUCp18FU
	4	5	22	ATSU01N222LT	LUB32	LUCp18BL		4	5	22	ATS01N222LU	LUB32	LUCp18FU
	5.5	7.5	22	ATSU01N222LT	LUB32	LUCp32BL		5.5	7.5	22	ATS01N222LU	LUB32	LUCp32FU
	7.5	10	32	ATSU01N232LT	LUB32	LUCp32BL		7.5	10	32	ATS01N232LU	LUB32	LUCp32FU
400 V	1.5	—	6	ATSU01N206LT	LUB12	LUCp05BL	400 V	1.5	—	6	ATS01N206QN	LUB12	LUCp05FU
	2.2	—	6	ATSU01N206LT	LUB12	LUCp12BL		2.2	—	6	ATS01N206QN	LUB12	LUCp12FU
	3	—	9	ATSU01N209LT	LUB12	LUCp12BL		3	—	9	ATS01N209QN	LUB12	LUCp12FU
	4	—	9	ATSU01N209LT	LUB12	LUCp12BL		4	—	9	ATS01N209QN	LUB12	LUCp12FU
	5.5	—	12	ATSU01N212LT	LUB32	LUCp32BL		5.5	—	12	ATS01N212QN	LUB32	LUCp32FU
	7.5	—	22	ATSU01N222LT	LUB32	LUCp32BL		7.5	—	22	ATS01N222QN	LUB32	LUCp32FU
	11	—	22	ATSU01N222LT	LUB32	LUCp32BL		11	—	22	ATS01N222QN	LUB32	LUCp32FU
	15	—	32	ATSU01N232LT	LUB32	LUCp32BL		15	—	32	ATS01N232QN	LUB32	LUCp32FU
460 V	2	—	6	ATSU01N206LT	LUB12	LUCp05BL	460 V	2	—	6	ATS01N206RT	LUB12	LUCp05FU
	3	—	6	ATSU01N206LT	LUB12	LUCp12BL		3	—	6	ATS01N206RT	LUB12	LUCp12FU
	5	—	9	ATSU01N209LT	LUB12	LUCp12BL		5	—	9	ATS01N209RT	LUB12	LUCp12FU
	7.5	—	12	ATSU01N212LT	LUB32	LUCp18BL		7.5	—	12	ATS01N212RT	LUB32	LUCp18FU
	10	—	22	ATSU01N222LT	LUB32	LUCp18BL		10	—	22	ATS01N222RT	LUB32	LUCp18FU
	15	—	32	ATSU01N222LT	LUB32	LUCp32BL		15	—	32	ATS01N222RT	LUB32	LUCp32FU
	20	—	32	ATSU01N232LT	LUB32	LUCp32BL		20	—	32	ATS01N232RT	LUB32	LUCp32FU
	20	—	32	ATSU01N232LT	LUB32	LUCp32BL		20	—	32	ATS01N232RT	LUB32	LUCp32FU

<sup>1</sup> Standard power rating according to UL508.

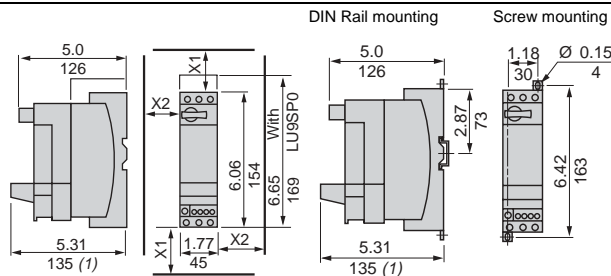
<sup>2</sup> Depending on the configuration of the selected TeSys U-Line motor starter, replace the p with A for standard control unit, B for advanced control unit, and M for multifunction control unit.

# TeSys® U-Line Motor Starters

## DIMENSIONS, MOUNTING, AND SCHEMATICS

### Power Bases

#### Non-Reversing LUB12, LUB32, LUS12, LUS32



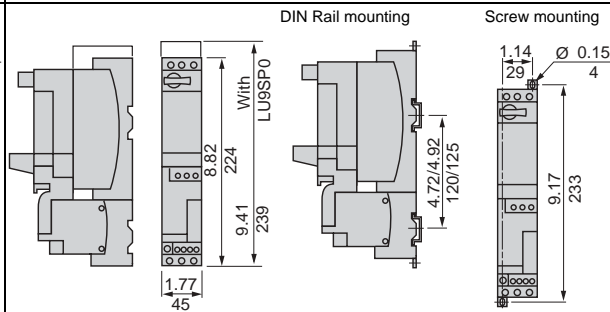
Minimum electrical clearance:

X1 = 1.38" (35 mm) for Ue = 440 V and 2.76" (70 mm) for Ue = 480, 600 and 690 V

X2 = 0

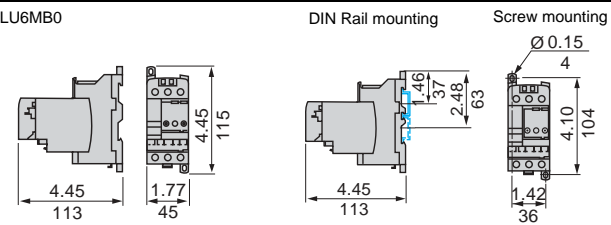
(1) Maximum depth (with Modbus® communication module)

#### Reversing LU2B12, LU2B32, LU2S12, LU2S32



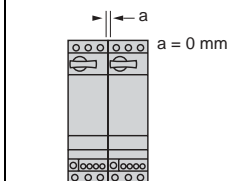
### Reversing Block for Mounting Separately from Power Base

#### LU6MB0

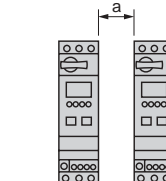


### Operation in High Ambient Temperatures

#### Power Base + LUCA, LUCB, LUCC, LUCD



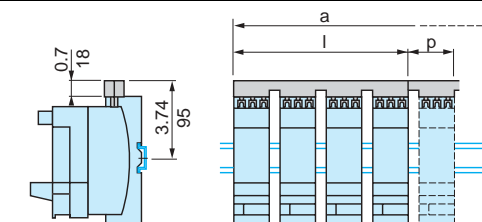
#### Power Base + LUCM



Operating ambient temp	Mounting Dimension a
≤ 113 °F (45 °C)	0 in (0 mm)
113 to 131 °F (45 °C to 55 °C)	0.35 in (9 mm)
131 to 140 °F (55 to 60 °C)	0.78 in (20 mm)

### Sets of Busbars and Plug-In Power Sockets

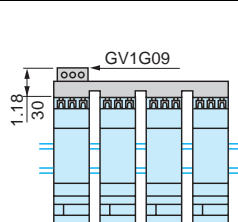
#### GV2G445 and GV2G454



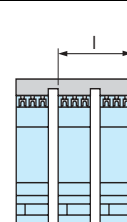
Dimensions in (mm)	I	P
GV2G445 (2 x 45)	7.04 (179)	1.77 (45)
GV2G454 (2 x 54)	8.11 (206)	2.12 (54)

Dimensions in (mm)	a
Number of tap-offs	0.19 (5) 0.23 (6) 0.27 (7) 0.31 (8)
GV2G445 (2 x 45)	8.81 (224) 10.59 (269) 12.36 (314) 14.13 (359)
GV2G454 (2 x 54)	10.23 (260) 12.36 (314) 14.48 (368) 16.61 (422)

#### GV2G... with terminal block GV1G09

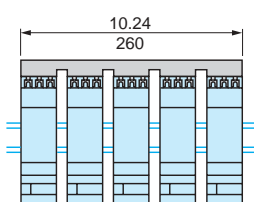


#### GV2G245 and G254

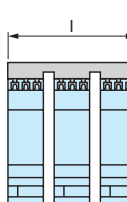


Dimensions in (mm)	I
GV2G245 (2 x 45)	3.50 (89)
GV2G254 (2 x 54)	3.85 (98)

#### GV2G554

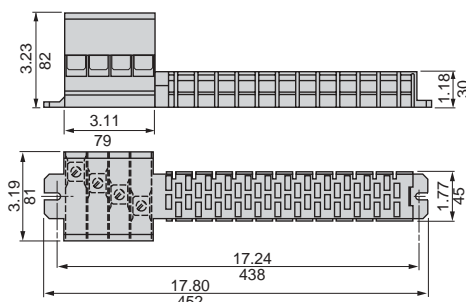


#### GV2G345 and G354

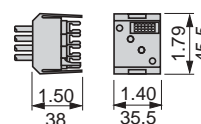


Dimensions in (mm)	I
GV2G345 (2 x 45)	5.27 (134)
GV2G354 (2 x 54)	5.98 (152)

#### AK5B144



#### AK5PC13, PC33, PC33L



inches  
mm



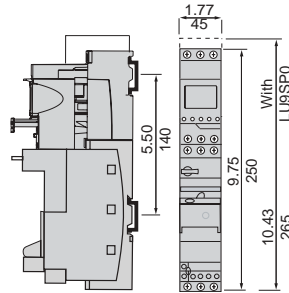
# TeSys® U-Line Motor Starters

## Dimensions, Mounting, and Schematics

### Current Limiter Isolator Module

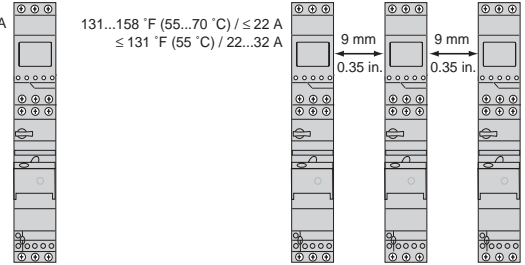
LUALB1 and LUB••

Operation in High Ambient Temperatures  
LU•B12. LU•B32 + LUALB1



$\leq 158^{\circ}\text{F}$  ( $70^{\circ}\text{C}$ ) /  $\leq 32\text{ A}$

$131\text{...}158^{\circ}\text{F}$  ( $55\text{...}70^{\circ}\text{C}$ ) /  $\leq 22\text{ A}$   
 $\leq 131^{\circ}\text{F}$  ( $55^{\circ}\text{C}$ ) /  $22\text{...}32\text{ A}$

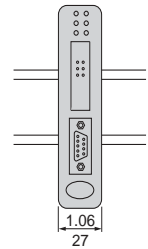
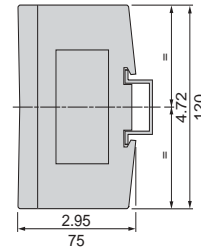
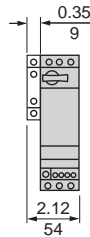


### Control Circuit Contact Block

### Communication Gateways

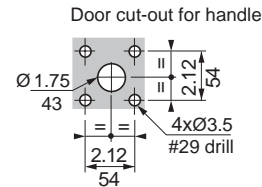
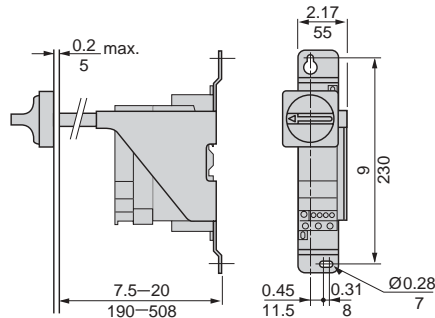
LUA8E20

LUFP



### Door Interlock Mounting Kit

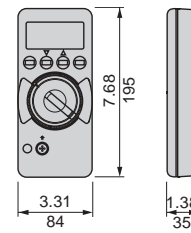
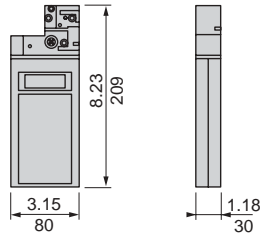
LU9AP00 / LU9AP11 / LU9AP12



### AS-i Addressing Consoles

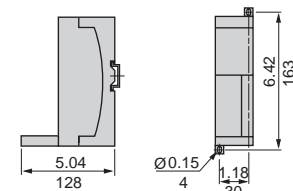
XZMC11

ASITERV2



### Modbus® Hub LU9CG3

### Parallel Wiring Splitter Box LU9G02



inches  
mm

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com

# TeSys® U-Line Motor Starters

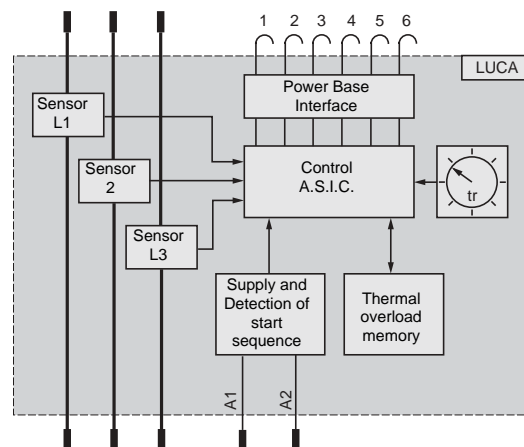
## Dimensions, Mounting, and Schematics

### Control units

For additional wiring information refer to pages 53 - 56.

#### Standard control unit LUCA

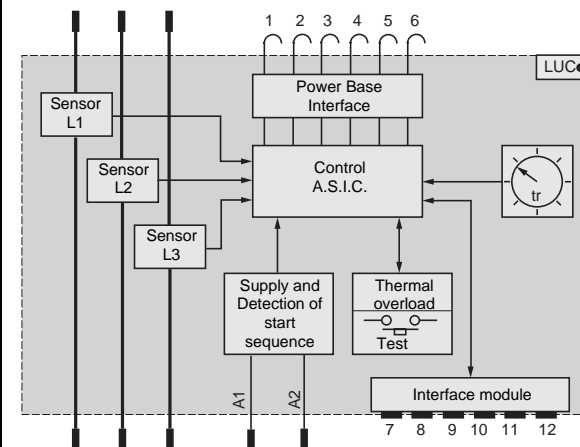
##### Basic internal scheme



- |         |                   |
|---------|-------------------|
| 1 and 2 | Trips             |
| 3 and 4 | Coil bobbin       |
| 5       | Power base rating |
| 6       | N.C.              |

#### Advanced control unit LUCB, LUCC, LUCD

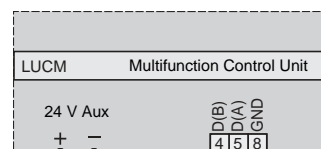
##### Basic internal scheme



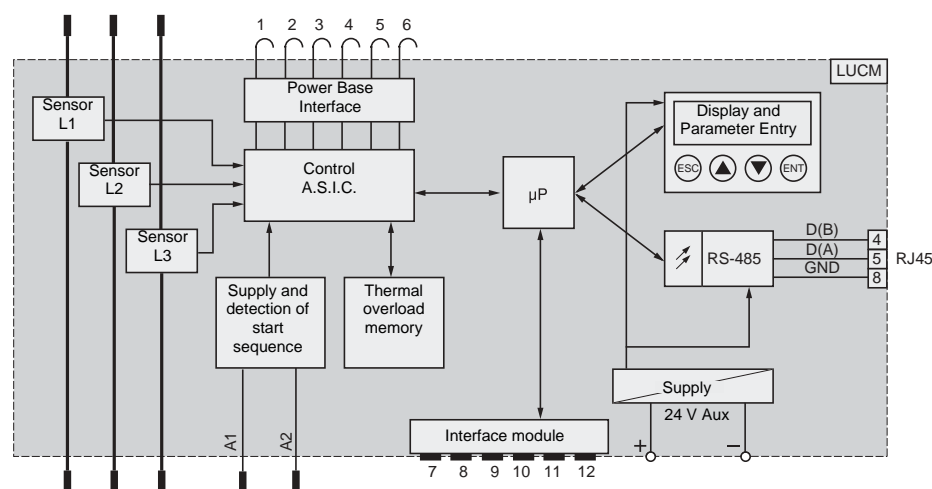
- |         |                   |    |                                              |
|---------|-------------------|----|----------------------------------------------|
| 1 and 2 | Trips             | 8  | Thermal status/Set                           |
| 3 and 4 | Coil bobbin       | 9  | Reset mode/Reset                             |
| 5       | Power base rating | 10 | (Im/Ir) - average current versus FLA setting |
| 6       | N.C.              | 11 | Vc2 - auto-reset signal to function modules  |
| 7       | Ground            | 12 | Vc1 - auxiliary power to function modules    |

#### Multifunction control unit LUCM

##### Control terminal block



##### Basic internal scheme



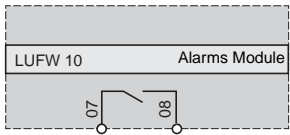
- |         |                   |    |                                                        |
|---------|-------------------|----|--------------------------------------------------------|
| 1 and 2 | Trips             | 8  | N.C.                                                   |
| 3 and 4 | Coil bobbin       | 9  | Ground                                                 |
| 5       | Power base rating | 10 | (Im/Ir) - average current versus FLA setting           |
| 6       | N.C.              | 11 | Rx/Tx - transmit-receive link to communication modules |
| 7       | Ground            | 12 | Vc1 - auxiliary power to function modules              |

TeSys® U-Line Motor Starters

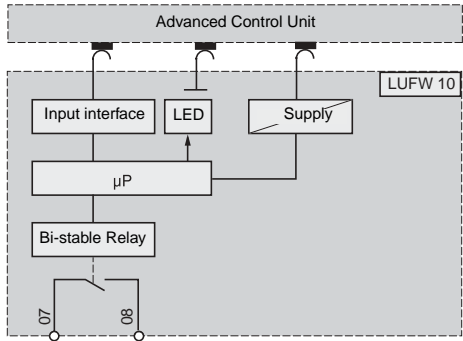
Dimensions, Mounting, and Schematics

For additional wiring information refer to pages 53 - 56.

Thermal Overload Pre-Alarm Function Module LUFW10



Basic internal scheme

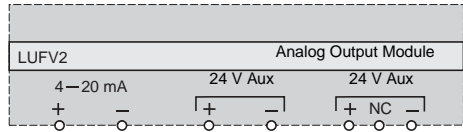


250 Vac, 2A  
24 Vdc, 2 A

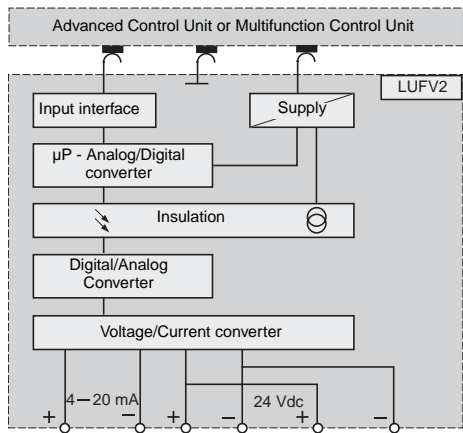
Motor Load Indication Module

LUFV2

4-20 mA output



Basic internal scheme



100 Ω < load < 500 Ω 30 Vdc max and 40 mA min

# TeSys® U-Line Motor Starters

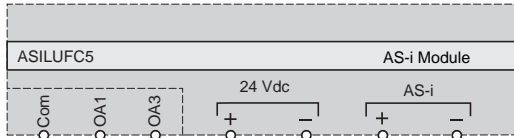
## Dimensions, Mounting, and Schematics

### Communication Modules

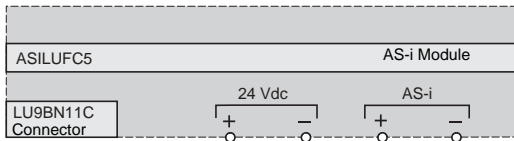
For additional wiring information refer to pages 53 - 56.

#### Communication module ASILUFC5

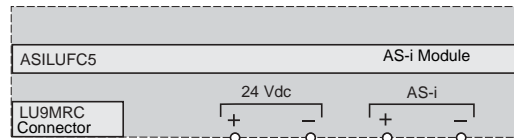
Without pre-wired coil connector



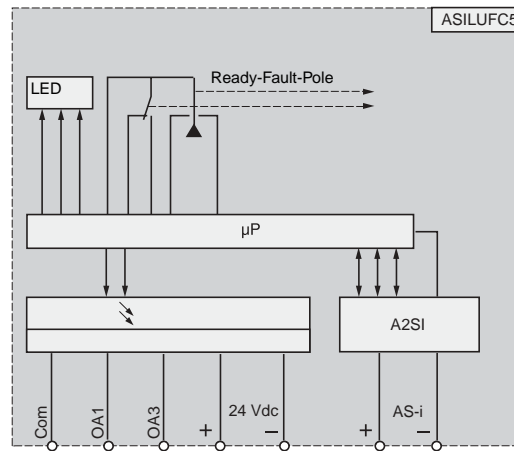
With pre-wired coil connector LU9BN11C



With pre-wired coil connector LU9MRC

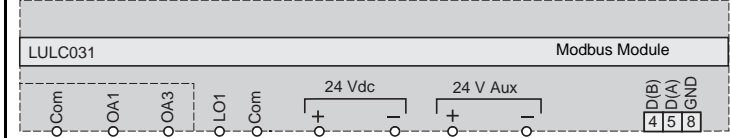


#### Basic Internal Scheme

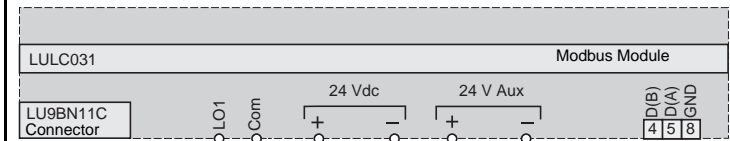


#### Modbus® communication module LULC031

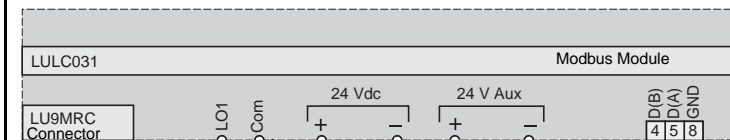
Without pre-wired coil connector



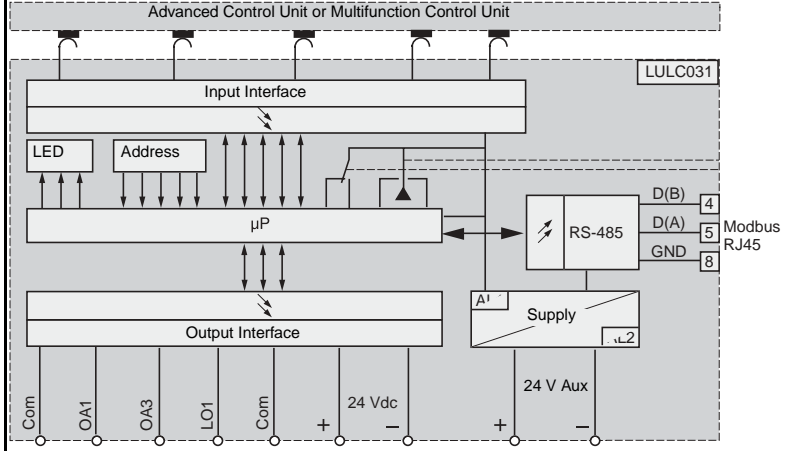
With pre-wired coil connector LU9BN11C



With pre-wired coil connector LU9MRC



#### Basic Internal Scheme



Com Common output (- Vdc)  
OA1 Forward direction output  
OA3 Reverse direction output  
LO1 Programmable output

## TeSys® U-Line Motor Starters

### Dimensions, Mounting, and Schematics

## Communication Modules

### Parallel wiring module

---

**Without pre-wired coil connector**



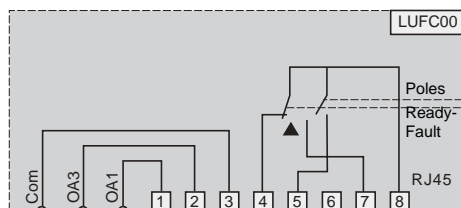
With pre-wired coil connector LU9BN11C




With pre-wired coil connector LU9M RC



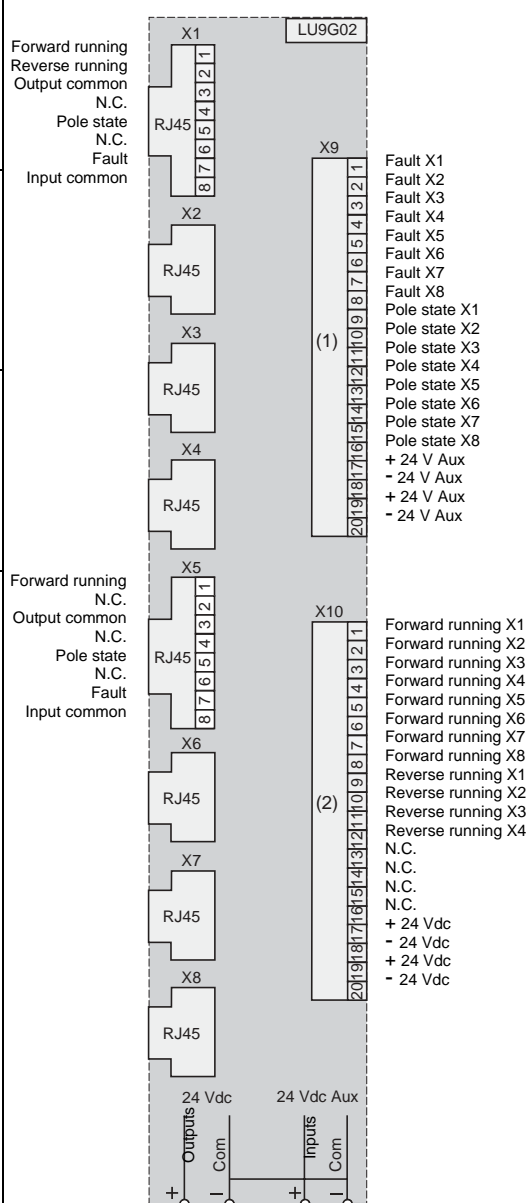
### Basic scheme



1. Forward running
2. Reverse running
3. Output common
4. Selector in "Ready" position 
5. Pole state
6. Reserved
7. Fault
8. Input common

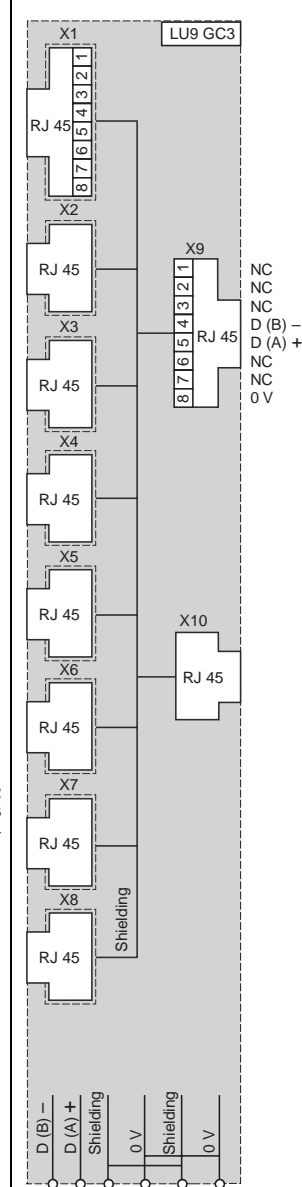
Com Common output (-Vdc)  
OA1 Forward direction output  
OA3 Reverse direction output

## Parallel wiring splitter box LU9G02



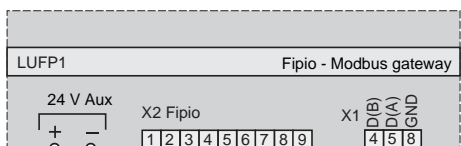
- (1) 20-way HE10 input connector
- (2) 20-way HE10 output connector

## Modbus® hub LU9GC3

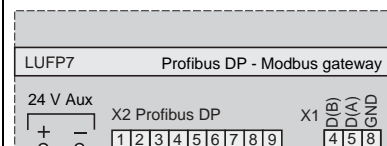


## Gateways

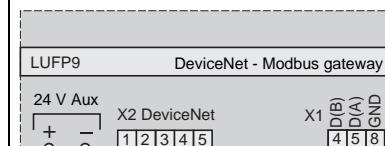
**LUFP1**



LUFP7



LUFP9



# TeSys® U-Line Motor Starters

## Dimensions, Mounting, and Schematics

Data Profile under AS-i				Control Units		
Control Unit				Standard	Advanced	Multifunction
Status		D0	Ready (available)	√	√	√
		D1	Poles closed (running)	√	√	√
Commands		D0	Forward running	√	√	√
		D1	Reverse running	√	√	√

Register Addresses Accessible under Modbus®				Control Units		
Control Unit				Standard	Advanced	Multifunction
Identification	Register 0–Register 99	Words–Bits	Commercial reference, serial number, software version	√	√	√
Log	Register 100–Register 450	Words–Bits	Fault log, operating log, log of last 5 trips			√
Status	Register 451–Register 464	Words–Bits	Alarm signaling (bits), fault signaling (bits)	√	√	√
Values	Register 465–Register 473	Words	Irms phase 1, phase 2, phase 3. Motor load, thermal status of ground fault current. Phase imbalance and phase failure		√	√
	Register 474–Register 599	Words–Bits	Reserved			
Configuration	Register 600–Register 699	Words–Bits	Protection and alarm thresholds, fallback mode and reset mode		√	√
Commands	Register 700–Register 714	Words–Bits	Commands	√	√	√

Status and values	Register 452	Bit 0	Short-circuit fault		√	√
		Bit 1	Overcurrent fault		√	√
		Bit 2	Thermal overload fault		√	√
	Register 455	Bit 0	Ready (available)	√	√	√
		Bit 1	Poles closed	√	√	√
		Bit 2	Fault	√	√	√
		Bit 3	Alarms		√	√
		Bit 4	Tripped ("TRIP" position)			
		Bit 5	Fault acknowledgement allowed			√
		Bit 6	Reserved			
		Bit 7	Motor running		√	√
		Bit 8	Motor current % (bit 0)		√	√
		Bit 9	Motor current % (bit 1)		√	√
		Bit 10	Motor current % (bit 2)		√	√
		Bit 11	Motor current % (bit 3)		√	√
		Bit 12	Motor current % (bit 4)		√	√
		Bit 13	Motor current % (bit 5)		√	√
		Bit 14	Reserved			
		Bit 15	Motor starting			√
	Register 461	Bit 3	Thermal overload alarm		√	√
	Register 465	Word	Thermal status value		√	√
	Register 466	Word	Motor load value (Im/Ir)		√	√

Configuration	Register 602	Bit 0	Manual reset on thermal overload fault		√	√
		Bit 1	Remote reset on thermal overload fault		√	√
		Bit 2	Automatic reset on thermal overload fault		√	√
	Register 682	Value 0	Fallback mode validation	√	√	√
		Value 1	Outputs OA1 and OA3 unchanged	√	√	√
		Value 2	Outputs OA1 and OA3 forced to 0	√	√	√
		Value 3	Outputs OA1 and OA3 unchanged, signaling existence of communication failure	√	√	√
		Value 4	Outputs OA1 forced to 1 and OA3 unchanged	√	√	√
		Value 5	Outputs OA3 forced to 1 and OA1 unchanged	√	√	√
Commands	Register 700	Bit 0	LO1 output command	√	√	√
	Register 704	Bit 0	OA1 output command	√	√	√
		Bit 1	OA3 output command	√	√	√
		Bit 2	Reserved			
		Bit 3	Fault acknowledgement		√	√
		Bit 4	Reserved			
		Bit 5	Trip test		√	√
		Bit 6–15	Reserved			

Data Accessible √

APPLICATION EXAMPLES



**Application**  
Control and protection of a motor (pump, fan, etc.)

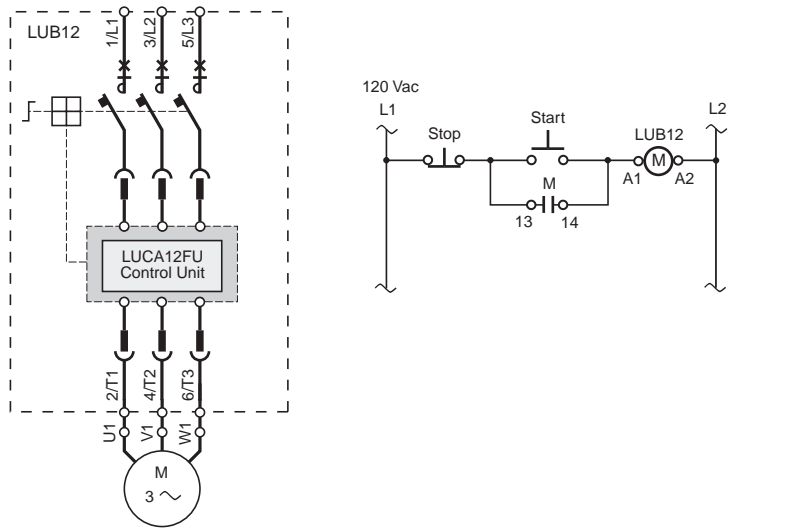
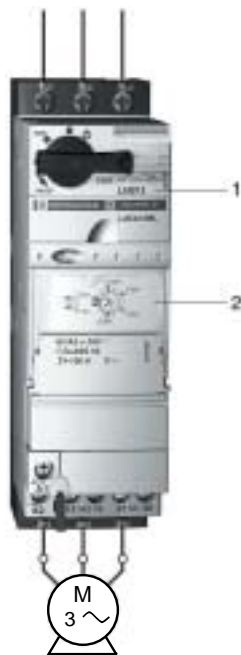
- Operating Conditions**
- Power: 5 hp at 480 V
  - FLA: 7.5 A
  - Class 10 overload protection
  - Utilization category: AC-43
  - 3-wire control:
    - Start button
    - Stop button
  - Control circuit voltage: 120 Vac

- Functions Performed**
- Short-circuit protection with level of protection of 42 kA at 480 V wye (10 kA at 600 V wye).
  - Type 2 total coordination of protection devices conforming to EN 60947-6-2 (continuity of service) in case of a short-circuit.
  - Electronic protection against thermal overloads with an adjustment current range of 4.
  - Load switching (2 million operating cycles in category AC-43).
  - Indication of motor status by N.C. or N.O. contact.
  - Interlock between the motor starter control and the handle position; not possible to start motor when the handle is in the OFF position.

**Products Used**

	Item	Quantity	Catalog Number
Power base 12 A with screw clamp control connections	1	1	LUB12
Standard control unit	2	1	LUCA12FU

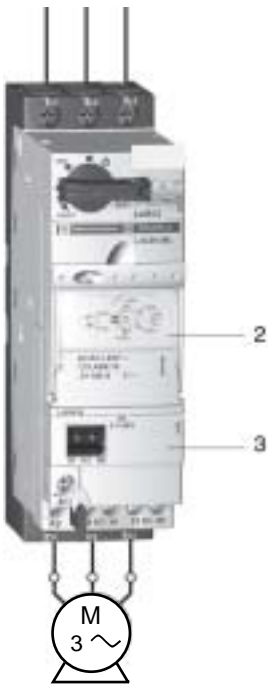
Wiring Diagram





# TeSys® U-Line Motor Starters

## Application Examples



### Application

Upgrading of an existing installation (from previous page) to meet the operating conditions described below.

### Operating Conditions

Monitor the status of the motor and obtain alarm signaling by an integrated mechanical contact, in order to improve operation of the pump and anticipate any problems.

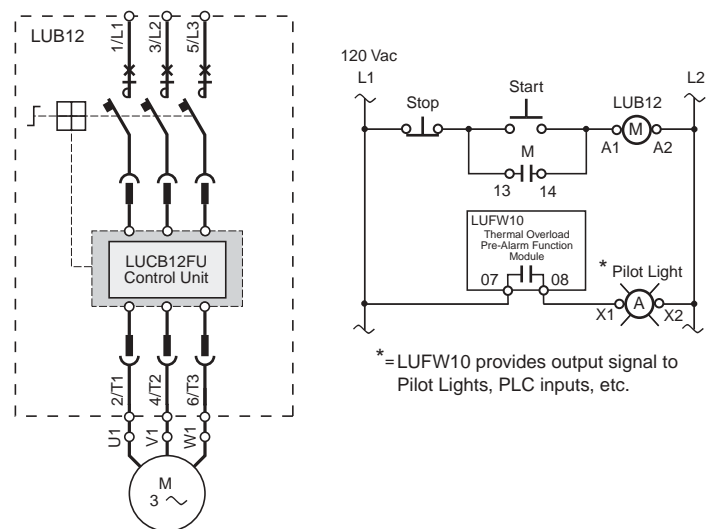
### Functions Performed

Alarm information is generated by the advanced control unit and is processed by the thermal overload pre-alarm function module. The advanced control unit includes a thermal trip test button.

### Products Used

	Item	Quantity	Catalog Number
Replace the standard control unit with an advanced control unit and insert a thermal alarm function module.			
Advanced control unit	2	1	LUCB12FU
Thermal overload pre-alarm function module	3	1	LUFW10

### Wiring Diagrams



### Other Functions

The advanced control unit provides other functions depending on the type of function modules used (instead of the LUFW10 module described above):

- fault differentiation with function module LUFDA10 or LUFDH20,
- indication of motor load with function modules LUFV which delivers a 0–10 V or 4–20 mA, analog signal which is proportional to the average 3-phase current drawn by the motor. Can be used with a customer provided analog ammeter. Allows the load current to be monitored and provides access to other application functions using this value, or allows predictive or preventive maintenance information (replacement of the motor before it breaks down).

# TeSys® U-Line Motor Starters Application Examples



**Application**

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Control and protection of a packing machine conveyor belt.

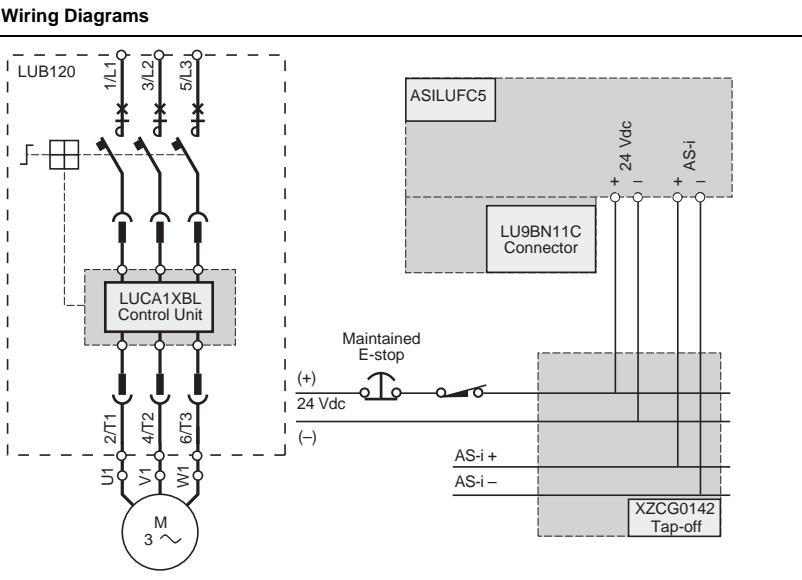
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- Operating Conditions**
- 
- Power: 0.5 hp at 480 V
  - FLA: 1.0 A
  - Utilization category: AC-43
  - Two wire control
    - Maintained emergency stop push button
    - Limit switch
  - Control circuit voltage: 24 Vdc
  - Control and command by the AS-i wiring system.
- 

- Functions Performed**
- 
- Short-circuit protection with level of protection of 42 kA at 480 V delta.
  - Total coordination of protection devices conforming to IEC/EN 60947-6-2 (continuity of service) in the event of a short-circuit.
  - Solid-state protection against thermal overloads with an adjustment current range of 4.
  - Load switching (2 million operating cycles in category AC-43).
  - Motor status signaling by N.C. or N.O. contact
  - Interlock between the motor starter control and the handle position; not possible to start motor when the handle is in the OFF position.
  - Start/Stop commands and Ready, Run and Stop motor states are transmitted by the bus. The AS-i 7.DE profile of the new AS-i V2 protocol, implemented in the starter-controller, ensures total compatibility with that of the LF enclosed starter range.
  - Indication of module operation and communication status by 2 LEDs on the front panel of the communication module.
  - Addressing of the module is achieved via an infrared link, using adjustment console ASITERV2 or console XZMC11. Using pre-wired terminal block LU9BN11C avoids having to wire the control connections. However, easy access to the control connector on the front panel of the starter allows any control scheme required by the user to be included in the line (local controls, emergency stop, safety contact.)
- 

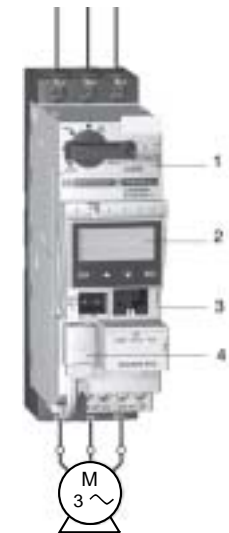
**Products Used**

	Item	Quantity	Catalog Number
<b>Power base</b> 12 A without screw clamp control terminals	1	1	<b>LUB120</b>
<b>Standard control unit</b>	2	1	<b>LUCA1XBL</b>
<b>AS-i communication module</b>	3	1	<b>ASILUFC5</b>
<b>Tap-off</b> for connecting the communication module to the serial bus	—	1	<b>XZCG0142</b>
<b>Pre-wired coil connector</b> for connecting the AS-i communication module output terminals to the power base coil terminals.	4	1	<b>LU9BN11C</b>
<b>Adjustment console</b> , infrared	—	1	<b>ASITERV2</b>



# TeSys® U-Line Motor Starters

## Application Examples



### Modbus profile IEC 64915

Commands (Register 704)		Status (Register 455)
Forward running	Bit 0	Ready (available)
Reverse running	Bit 1	Poles closed
Reserved	Bit 2	Fault
Reset	Bit 3	Alarms
Reserved	Bit 4	Reserved
Connection test	Bit 5	Reserved
Reserved	Bit 6	Reserved
Reserved	Bit 7	Motor running
Reserved	Bit 8	Motor current % (bit 0)
Reserved	Bit 9	Motor current % (bit 1)
Reserved	Bit 10	Motor current % (bit 2)
Reserved	Bit 11	Motor current % (bit 3)
Reserved	Bit 12	Motor current % (bit 4)
Reserved	Bit 13	Motor current % (bit 5)
Reserved	Bit 14	Reserved
Reserved	Bit 15	Motor starting

### Application

Monitoring operation of a surface pump in a water treatment plant to avoid running empty which could lead to destruction of the pump.

### Operating Conditions

- Power: 20 hp at 480 V
- FLA: 27 A
- Utilization category: AC-43
- Control circuit voltage: 24 Vdc
- Control-command by PLC and serial link using Modbus® network.

### Functions Performed

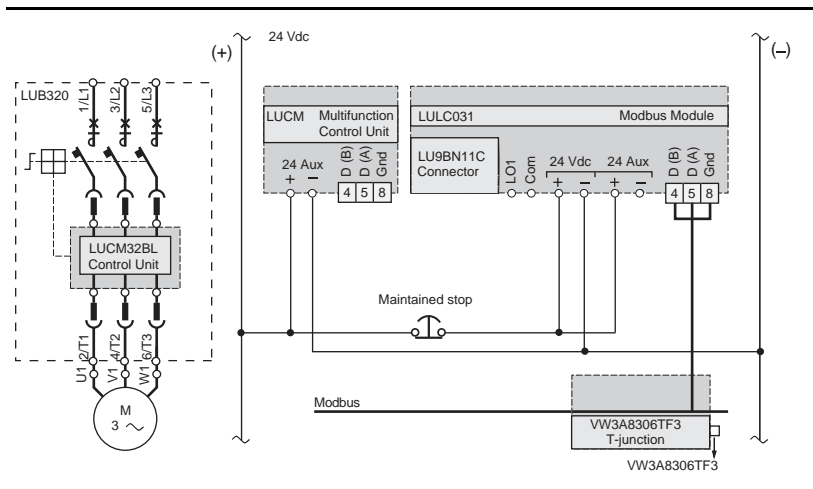
- Short-circuit protection with level of protection of 42 kA at 480 V wye.
- Total coordination of protection devices conforming to IEC/EN 60947-6-2 (continuity of service) in the case of a short-circuit.
- Electronic protection against thermal overloads with an adjustment current range of 4.
- Load switching (2 million operating cycles in category AC-43 at In).
- Measurement of load current and undercurrent detection by the multifunction control unit.
- Interlock between the motor starter control and the handle position; not possible to start motor when the handle is in the OFF position.
- No load or underload. To use this function, the following parameters must be entered:
  - trip: enable or disable underload protection,
  - time before tripping: the time period during which the value of the current must be below the tripping threshold in order to cause tripping (adjustable from 1 to 200 s),
  - tripping threshold: value as a percent of the load current ratio in relation to the setting current. If the ratio remains below this threshold for the time specified in the previous parameter, the product trips (adjustable from 30 to 100 %).
- Indication of the various motor starter states and currents.

### Products Used

	Item	Quantity	Catalog Number
Power base 32 A without screw clamp control connections	1	1	LUB320
Multifunction control unit	2	1	LUCM32BL
ModBus communication module	3	1	LULC031
Pre-wired coil connector for connecting the communication module output terminals to the coil terminals	4	1	LU9BN11C
T-junction for connection from communication module	—	1	VW3A8306TF3

RS-485 line terminator required at end of modbus serial bus — 1 VW3A8306RC

### Wiring Diagram



# TeSys® U-Line Motor Starters Application Examples



## Application

Control and protection of a reversing motor (Example: 2-position turntable).

## Operating Conditions

- Power: 5 hp at 480 V
- FLA: 7.5 A
- Maximum of 1 class 10 start per minute
- Utilization category: AC-43
- 3-wire control:
- Push button for Forward (start direction)
- Push button for Reverse (start direction)
- Push button for emergency stop
- Stopping at the positions is achieved by limit switches.
- Control circuit voltage: 120 Vac

## Functions Performed

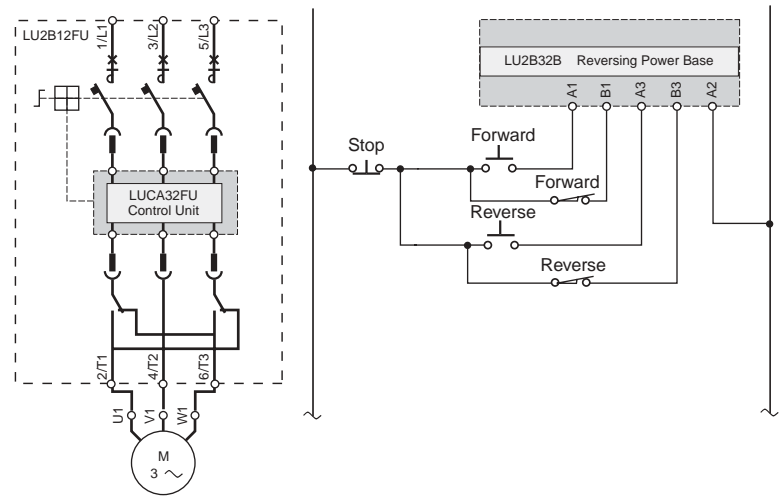
- Short-circuit protection with level of protection of 42 kA at 480 Vac.
- Total coordination of protection devices conforming to IEC/EN 60947-6-2 (continuity of service) in the case of a short-circuit.
- Electronic protection against thermal overloads with an adjustment current range of 4.
- Load switching (2 million operating cycles in category AC-43 at In).
- Motor status signaling by N.C. or N.O. contact
- Interlock between the motor starter control and the handle position: not possible to start the motor when the handle is in the OFF position.

Electrical interlocking is ensured by prewiring block LU9MRC (included on power base LU2B12). The design of the reversing power block makes mechanical interlocking unnecessary.

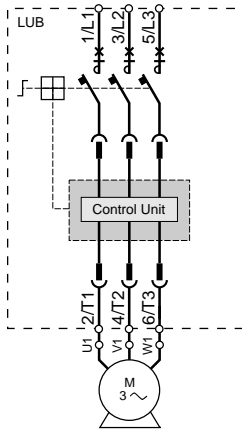
## Products Used

	Item	Quantity	Catalog Number
Power base, reversing, 12 A with screw clamp control connections	1	1	LU2B12FU
Standard control unit	2	1	LUCA32FU

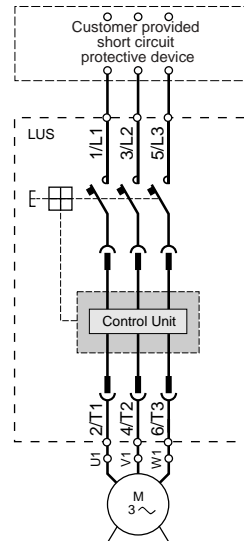
## Wiring Diagram



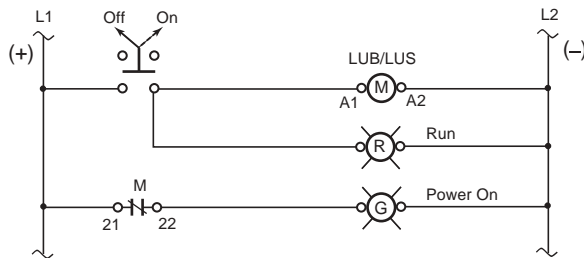
### Non-Reversing Power Base LUB



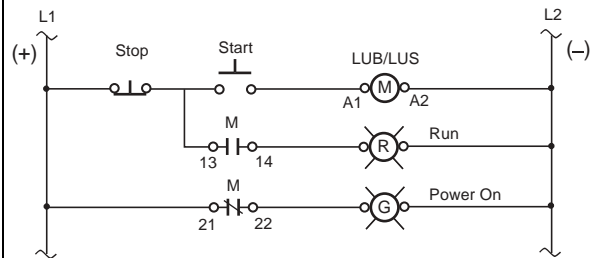
### Non-Reversing Power Base LUS



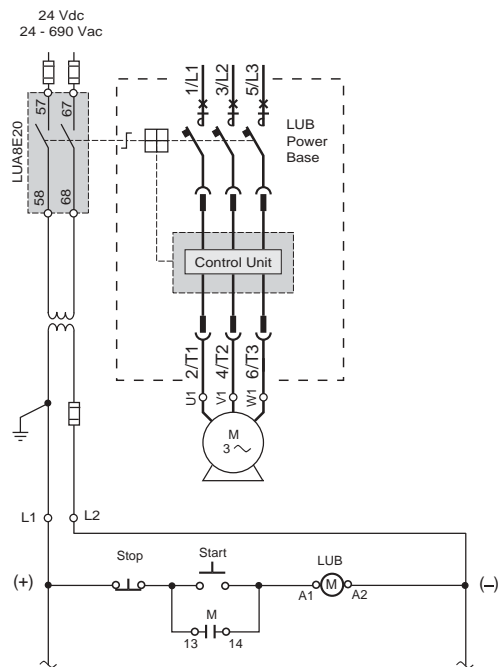
### LUB/LUS 2-Wire Control, with 2-Position Selector Switch



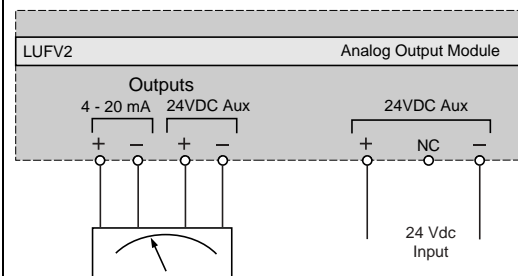
### LUB/LUS 3-Wire Control, Momentary Start Push Button with Holding Contact



### Control Circuit Contact Block LUA8E20 + Power Bases LUB or LUB2



### Motor Load Indicator Module LUFV2

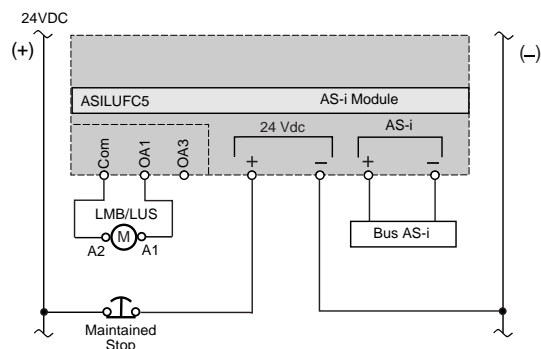


## TeSys® U-Line Motor Starters

## Non-Reversing Power Bases LUB, LUS (continued)

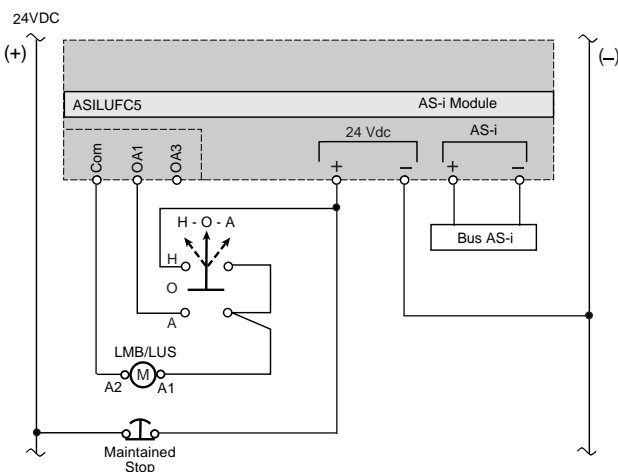
### Control via AS-i Communication Module ASILUFC5

Without pre-wired coil connector	With emergency stop



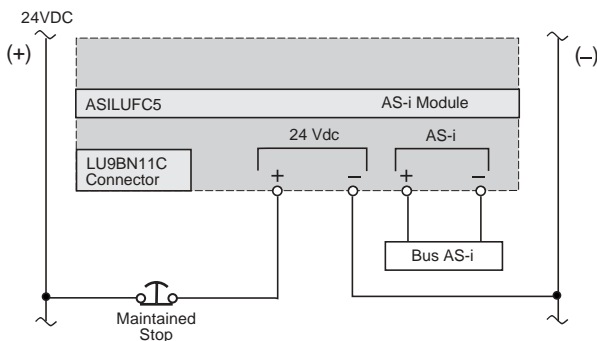
## Control via AS-i Communication Module ASILUFC5

Without pre-wired coil connector
With emergency stop and hand-off auto control



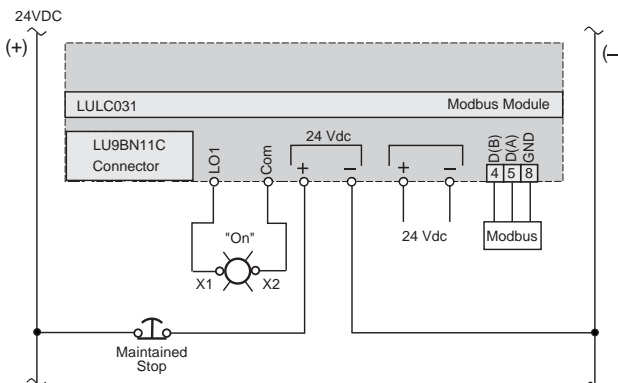
## Control via AS-i Communication Module ASILUFC5

With pre-wired coil connector LU9BN11C  
With emergency stop



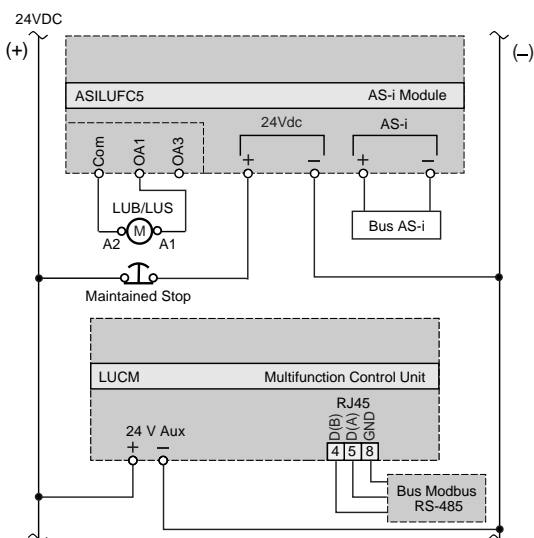
Control via Modbus® Communication Module LULC031

With pre-wired coil connector LU9BN11C
With general emergency stop, local emergency stop and local control



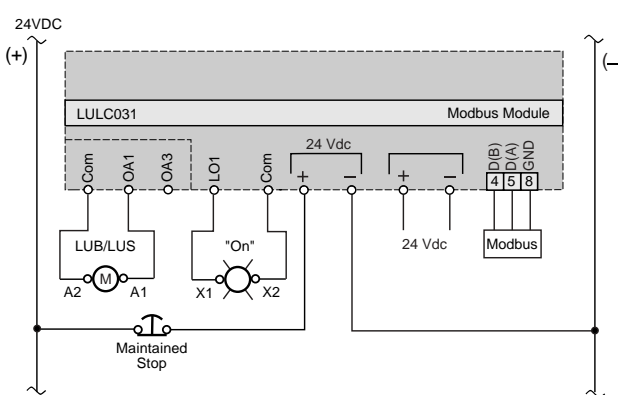
Control via AS-i Communication Module ASILUFC5

Without pre-wired coil connector  
With emergency stop and multifunction control unit LUCM

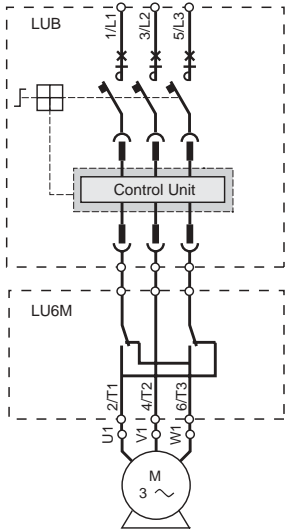


Control via Modbus Communication Module LULC031
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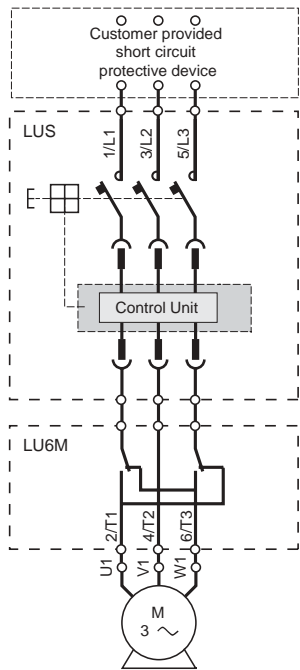
With pre-wired coil connector LU9BN11C
With emergency stop



Power Bases LUB + Reversing Block LU6M

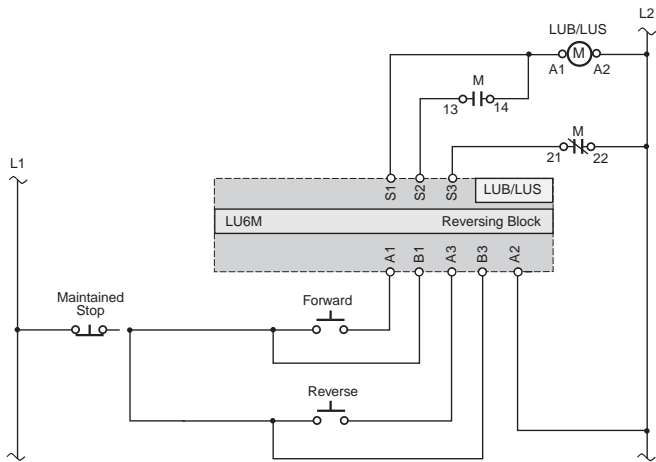


Power Base LUS + Reversing Block LU6M



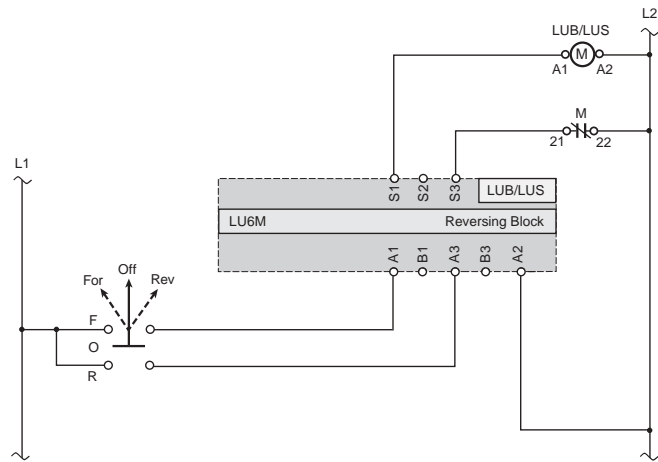
LUB/LUS + LU6M

3-wire control, momentary start push button with holding contact



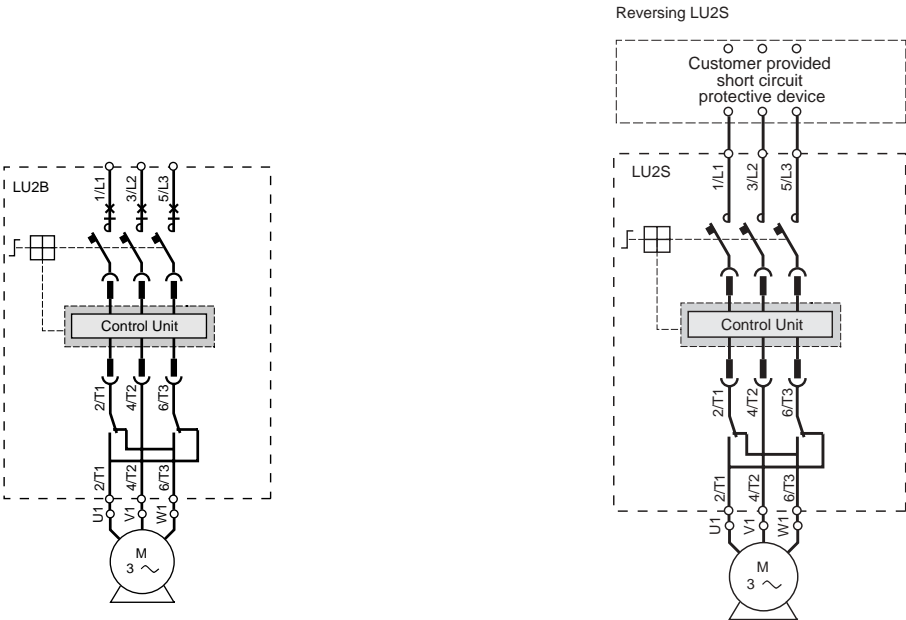
LUB/LUS + LU6M

2-wire control with 3-position "forward-stop-reverse" switch

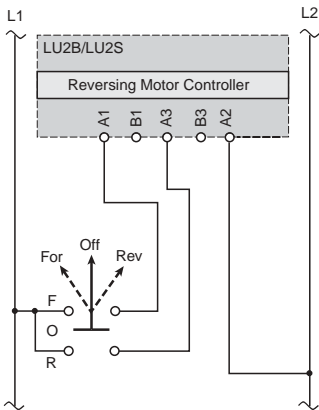


# TeSys® U-Line Motor Starters Application Examples

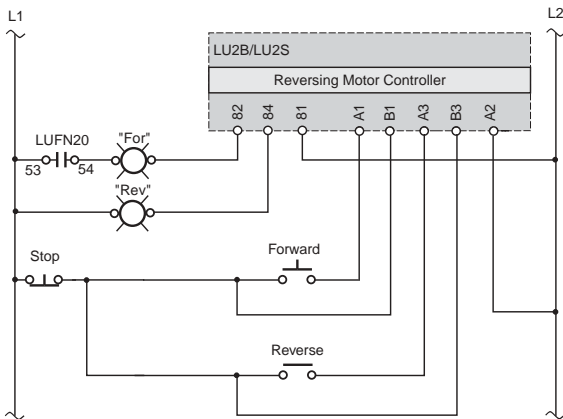
## Reversing Power Bases LU2B



### LU2B/LU2S 2-wire control via 3-position switch

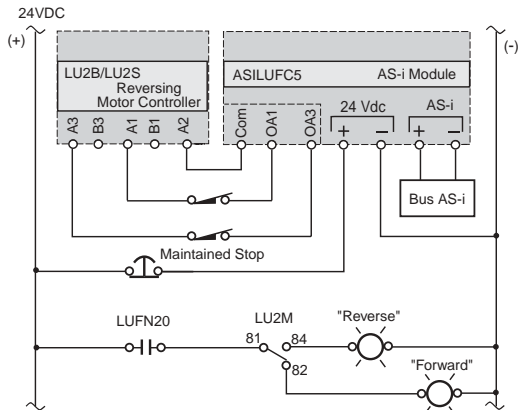


### LU2B/LU2S 3-wire control, momentary start push buttons



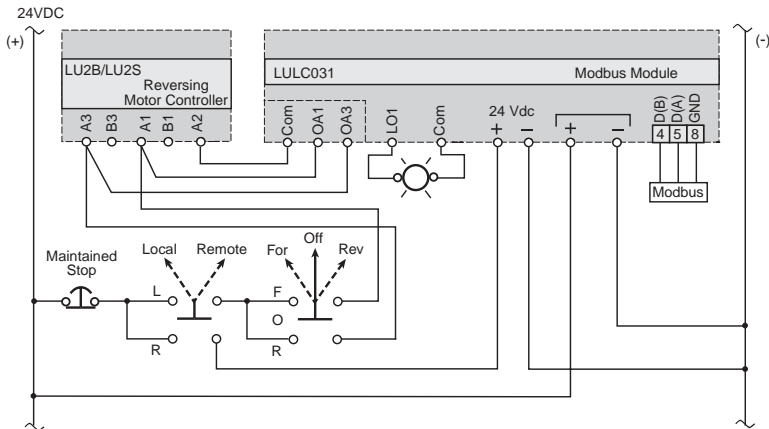
### Control via communication module ASILUFC5

Without pre-wired coil connection  
With emergency stop, running direction pilot lights and limit switches



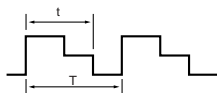
### Control via Modbus® communication module LULC031

Without pre-wired coil connection  
With emergency stop and local remote switch, “forward-off-reverse” switch and pilot light





## TERMS AND DEFINITIONS

Altitude	The low oxygen atmosphere at high altitudes reduces the dielectric strength of the air and hence the rated operational voltage of the contactor. It also reduces the cooling effect of the air and hence the rated operational current of the contactor (unless the temperature drops at the same time). No derating is necessary up to 3000 m (9,840 ft.). Derating factors to be applied above this altitude for main pole operational voltage and current (AC supply) are as follows.				
	Altitude	3500 m (11,480 ft.)	4000 m (13,120 ft.)	4500 m (14,760 ft.)	5000 m (16,400 ft.)
	Rated operational voltage	0.90	0.80	0.70	0.60
	Rated operational current	0.92	0.90	0.88	0.86
Ambient air temperature	The temperature of the air surrounding the device, measured near to the device. The operating characteristics are given: <ul style="list-style-type: none"><li>• with no restriction for temperatures between –5 and +55 °C (+23 and +131 °F)</li><li>• with restrictions, if necessary, for temperatures between –50 and +70 °C (–58 and +149 °F)</li></ul>				
Rated operational current (Ie)	This is defined taking into account the rated operational voltage, operating rate and duty, utilization category and ambient temperature around the device.				
Rated conventional thermal current (Ith) <sup>1</sup>	The current which a closed contactor can sustain for a minimum of 8 hours without its temperature rise exceeding the limits given in the standards.				
Permissible short time rating	The current which a closed contactor can sustain for a short time after a period of no load, without dangerous overheating.				
Rated operational voltage (Ue)	The voltage value which, in conjunction with the rated operational current, determines the use of the contactor or starter, and on which the corresponding tests and the utilization category are based. For three-phase circuits it is expressed as the voltage between phases. Apart from exceptional cases such as rotor short-circuiting, the rated operational voltage Ve is less than or equal to the rated insulation voltage Ui.				
Rated control circuit voltage (Uc)	The rated value of the control circuit voltage, on which the operating characteristics are based. For AC applications, the values are given for a near sinusoidal wave form (less than 5% total harmonic distortion).				
Rated insulation voltage (Ui)	The voltage value used to define the insulation characteristics of a device and referred to in dielectric tests determining leakage paths and creepage distances. As the specifications are not identical for all standards, the rated value given for each of them is not necessarily the same.				
Rated impulse withstand voltage (Uimp)	The peak value of a voltage surge which the device is able to withstand without breaking down.				
Rated operational power (expressed in kW)	The rated power of the standard motor which can be switched by the contactor, at the stated operational voltage.				
Rated breaking capacity <sup>2</sup>	The current value which the contactor can break in accordance with the breaking conditions specified in the IEC standard.				
Rated making capacity <sup>2</sup>	The current value which the contactor can make in accordance with the making conditions specified in the IEC standard.				
On-load factor (m)	<div><div><math display="block">m = \frac{t}{T}</math></div><div>Cycle duration: duration of current flow + time at zero current</div></div>				
Pole impedance	The impedance of one pole is the sum of the impedance of all the circuit components between the input terminal and the output terminal. The impedance comprises a resistive component (R) and an inductive component (X=Lω). The total impedance therefore depends on the frequency and is normally given for 50 Hz. This average value is given for the pole at its rated operational current.				
Electrical durability	The average number of on-load operating cycles which the main pole contacts can perform without maintenance. The electrical durability depends on the utilization category, the rated operational current and the rated operational voltage.				
Mechanical durability	The average number of on-load operating cycles (i.e. with zero current flow through the main poles) which the contactor can perform without mechanical failure				

<sup>1</sup> Conventional thermal current, in free air, conforming to IEC standards.

<sup>2</sup> For AC applications, the breaking and making capacities are expressed by the rms value of the symmetrical component of the short-circuit current. Taking into account the maximum asymmetry which may exist in the circuit, the contacts therefore have to withstand a peak asymmetrical current which may be twice the rms symmetrical component.

**NOTE:** These definitions are extracted from standard IEC 60947-1.

## TeSys® U-Line Motor Starters

# TeSys® U-Line Motor Starter

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