Fire Pump #9 (softstarter) start 11.24hrs 7/11/15

0.1000kA/div — CH1 — CH2 — CH3

Inrush Current Event Graph [11/07 11:24:24.074] CH1, 2, 3
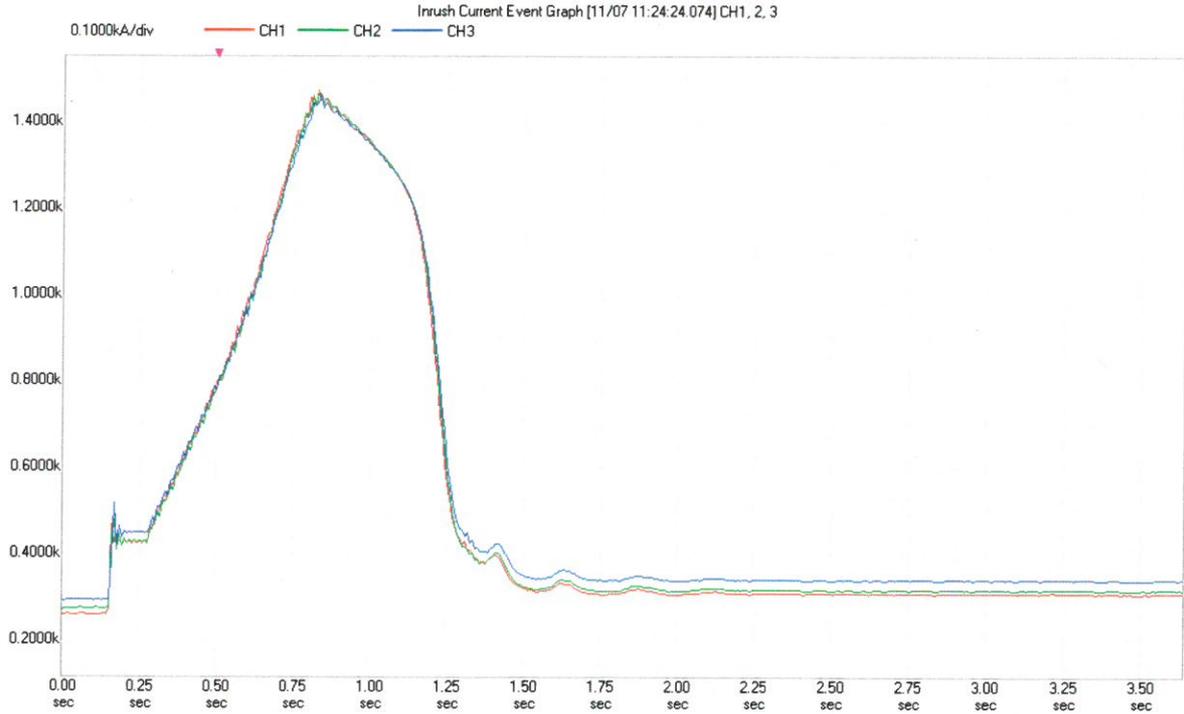
Fire Pump #6 (softstarter) start 13.50hrs 7/11/15

0.2000kA/div — CH1 — CH2 — CH3

Inrush Current Event Graph [11/07 13:50:28.843] CH1, 2, 3
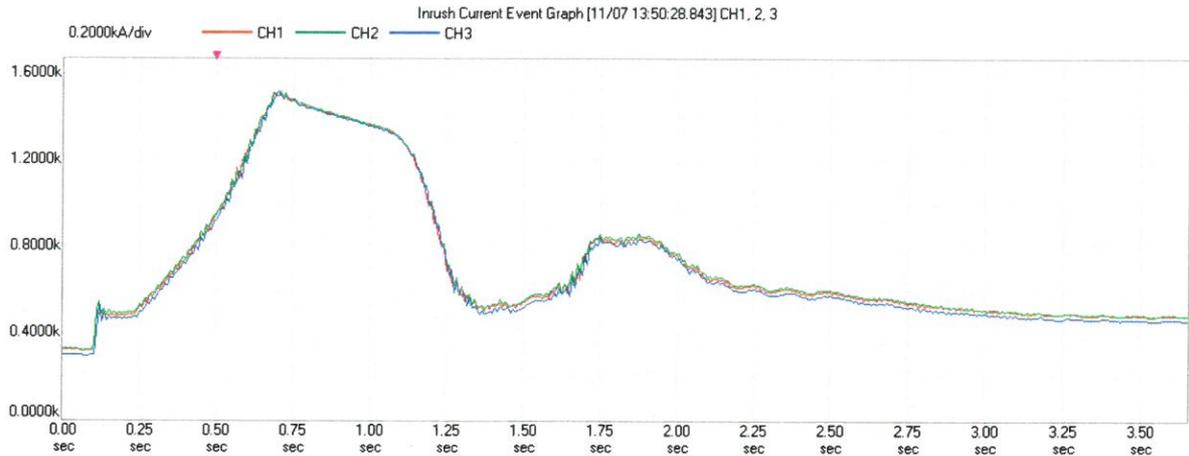
Fire Pump #3 (softstarter) start 11.44hrs 10/11/15

Inrush Current Event Graph [11/10 11:44:15.044] CH1, 2, 3
0.2000kA/div — CH1 — CH2 — CH3
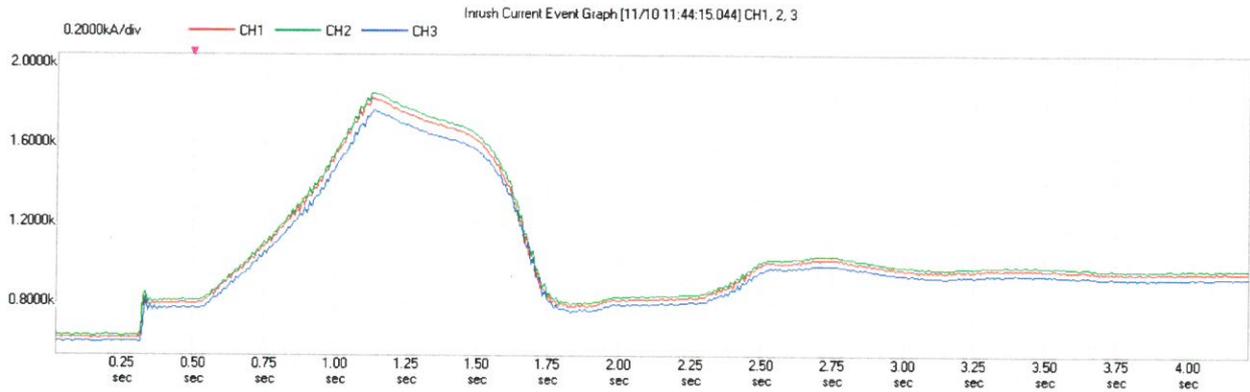
Fire Pump #6 (softstarter) start 15.43hrs 10/11/15

Inrush Current Event Graph [11/10 15:43:16.517] CH1, 2, 3
0.2000kA/div — CH1 — CH2 — CH3
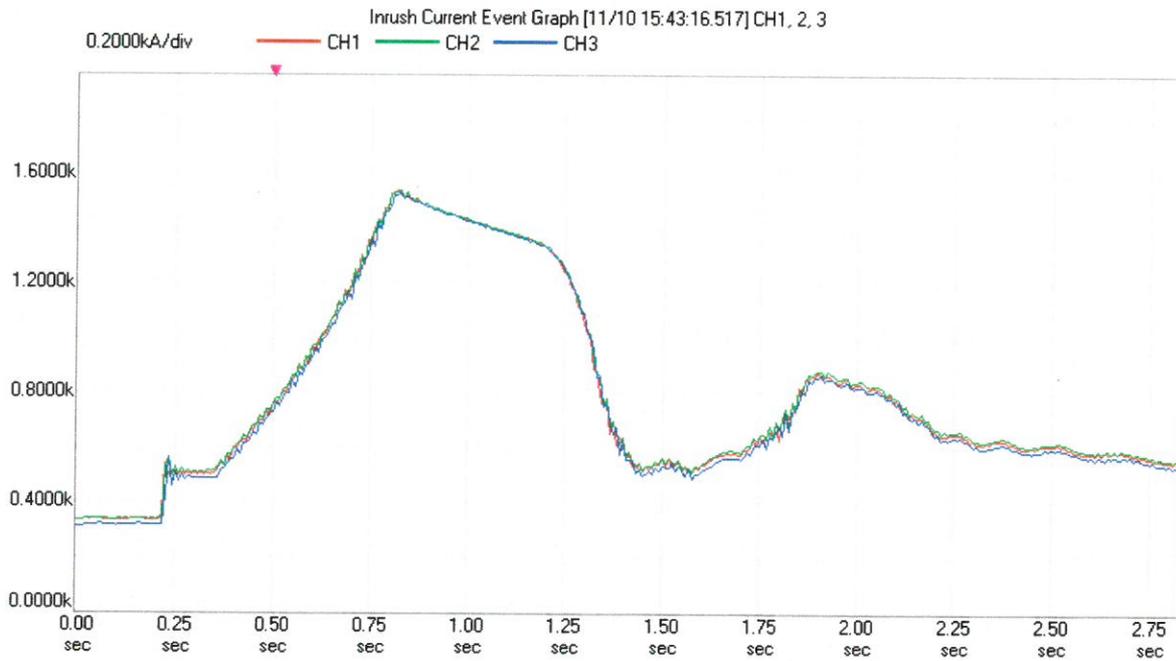
Fire Pump #6 (softstarter) start 23.16hrs 10/11/15

Inrush Current Event Graph [11/10 23:15:59.012] CH1, 2, 3
0.2000kA/div — CH1 — CH2 — CH3
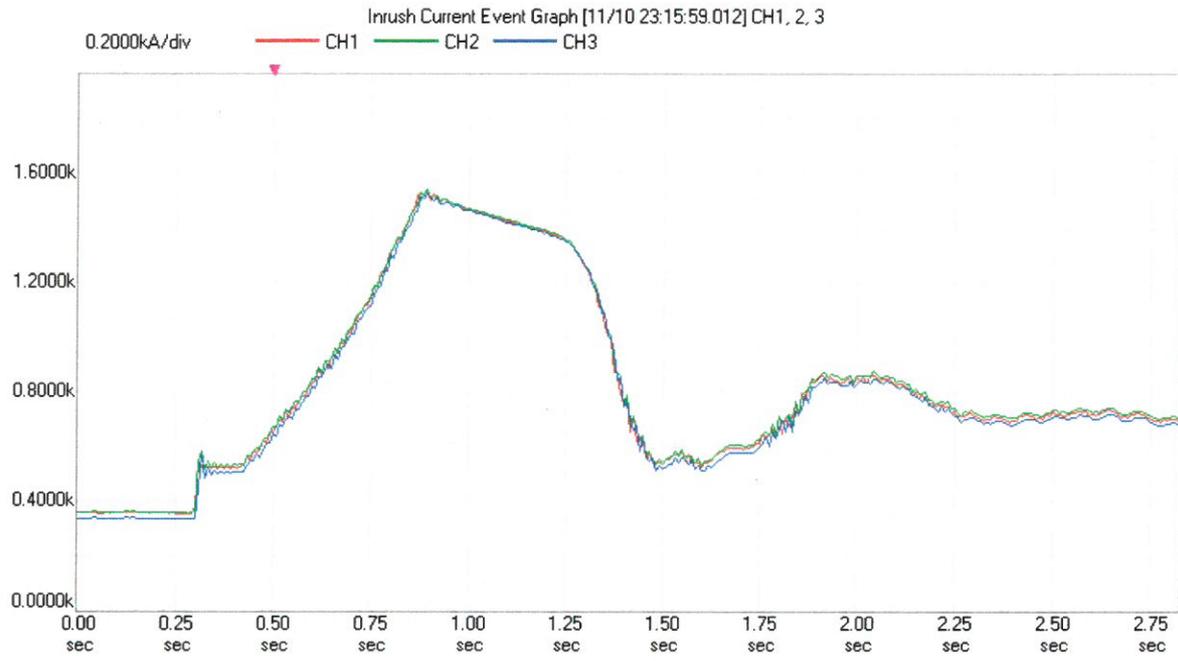
Altistart® 48
Y-Range Soft Start Controllers

Instruction Bulletin

S1A37491

01/2010

For use in the United States of America

Schneider Electric

Section 3—Technical Data

Technical Characteristics

Tables 3 and 4 (page 14) describe the technical characteristics of the ATS48 controller. The information is based on operation at a maximum ambient temperature of 40 °C without a shorting/bypass contactor and at 50 °C with a shorting/bypass contactor.

The ATS48 controller can be used in an ambient temperature of up to 60 °C as long as the maximum current rating for Class 10 thermal overload protection is derated by 2% for each degree above 40 °C without a shorting/bypass contactor or by 2% for each degree above 50 °C with a shorting/bypass contactor. The nominal motor current I_N must not exceed the maximum current rating for Class 10 thermal overload protection.

Table 3: Standard Duty Application, 208 to 690 V Supply (+10% to −15%, 50 or 60 Hz)

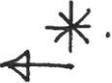| hp @ 208 V	hp @ 230 V	kW @ 440 V	hp @ 460 V	kW @ 500 V	hp @ 575 V	kW @ 690 V	Max. Current Rating for Class 10 Thermal Overload Protection	I_{CL} Rating	Catalog Number
3	5	7.5	10	9	15	15	17	17	ATS48D17Y
5	7.5	11	15	11	20	18.5	22	22	ATS48D22Y
7.5	10	15	20	18.5	25	22	32	32	ATS48D32Y
10	—	18.5	25	22	30	30	38	38	ATS48D38Y
—	15	22	30	30	40	37	47	47	ATS48D47Y
15	20	30	40	37	50	45	62	62	ATS48D62Y
20	25	37	50	45	60	55	75	75	ATS48D75Y
25	30	45	60	55	75	75	88	88	ATS48D88Y
30	40	55	75	75	100	90	110	110	ATS48C11Y
40	50	75	100	90	125	110	140	140	ATS48C14Y
50	60	90	125	110	150	160	170	170	ATS48C17Y
60	75	110	150	132	200	200	210	210	ATS48C21Y
75	100	132	200	160	250	250	250	250	ATS48C25Y
100	125	160	250	220	300	315	320	320	ATS48C32Y
125	150	220	300	250	350	400	410	410	ATS48C41Y
150	—	250	350	315	400	500	480	480	ATS48C48Y
—	200	355	400	400	500	560	590	590	ATS48C59Y
200	250	400	500	—	600	630	660	660	ATS48C66Y
250	300	500	600	500	800	710	790	790	ATS48C79Y
350	350	630	800	630	1000	900	1000	1000	ATS48M10Y
400	450	710	1000	800	1200	—	1200	1200	ATS48M12Y

Table 4: Severe Duty Application, 208 to 690 V Supply (+10% to −15%, 50 or 60 Hz)

hp @ 208 V	hp @ 230 V	kW @ 440 V	hp @ 460 V	kW @ 500 V	hp @ 575 V	kW @ 690 V	Max. Current Rating for Class 10 Thermal Overload Protection	I_{CL} Rating	Catalog Number
2	3	5.5	7.5	7.5	10	11	12	17	ATS48D17Y
3	5	7.5	10	9	15	15	17	22	ATS48D22Y
5	7.5	11	15	11	20	18.5	22	32	ATS48D32Y
7.5	10	15	20	18.5	25	22	32	38	ATS48D38Y
10	—	18.5	25	22	30	30	38	47	ATS48D47Y
—	15	22	30	30	40	37	47	62	ATS48D62Y
15	20	30	40	37	50	45	62	75	ATS48D75Y
20	25	37	50	45	60	55	75	88	ATS48D88Y
25	30	45	60	55	75	75	88	110	ATS48C11Y
30	40	55	75	75	100	90	110	140	ATS48C14Y
40	50	75	100	90	125	110	140	170	ATS48C17Y
50	60	90	125	110	150	160	170	210	ATS48C21Y
60	75	110	150	132	200	200	210	250	ATS48C25Y
75	100	132	200	160	250	250	250	320	ATS48C32Y
100	125	160	250	220	300	315	320	410	ATS48C41Y
125	150	220	300	250	350	400	410	480	ATS48C48Y
150	—	250	350	315	400	500	480	590	ATS48C59Y
—	200	355	400	400	500	560	590	660	ATS48C66Y
200	250	400	500	—	600	630	660	790	ATS48C79Y
250	300	500	600	500	800	710	790	1000	ATS48M10Y
350	350	630	800	630	1000	900	1000	1200	ATS48M12Y

Specifications

Table 5: Environmental Characteristics

Degree of protection	• IP20 for ATS48D17Y to C11Y • IP00 for ATS48C14Y to M12Y
Shock resistance	Conforms to IEC 60068-2-27: • 15 g, 11 ms
Vibration resistance	Conforms to IEC 60068-2-6, NCF 20706 and BV1: • 15 mm peak from 2 to 13 Hz • 1 gn from 13 to 200 Hz
Soft starter audible noise level	Audible noise measurements taken from 3 ft (1 m) away. The noise levels may change depending on the fan characteristics: • ATS48D17Y to D47Y: 52 dBA • ATS48D62Y to C11Y: 58 dBA • ATS48C14Y to C17Y: 50 dBA • ATS48C21Y to C32Y: 54 dBA • ATS48C41Y to C66Y: 55 dBA • ATS48C79Y to M12Y: 60 dBA
Resistance to electrostatic discharges	Conforms to IEC 61000-4-2, Level 3
Immunity to radio-electric interference	Conforms to IEC 61000-4-3, Level 3
Immunity to rapid electrical transients	Conforms to IEC 61000-4-4, Level 4

Table 5: Environmental Characteristics *(continued)*

Ambient air temperature	Storage: • -13 to +158 °F (-25 to +70 °C) Operation: • 14 to +104 °F (-10 °C to +40 °C) without derating. • Up to +140 °F (+60 °C), derate the current by 2% for each °C above 40 °C. • 14 to 122 °F (-10 °C to +50 °C) with user provided shorting/bypass contactor.
Maximum relative humidity	95% without condensation or dripping water conforming to IEC 60068-2-3
Maximum ambient pollution	Conforms to IEC 60664-1, Pollution Degree 3
Maximum operating altitude	3300 ft (1000 m) without derating. Above this, derate the nominal current by 2.2% for each additional 330 ft (100 m) to a maximum of 6600 ft (2000 m).
Operating position	Maximum vertical inclination ±10° with respect to the normal mounting position.

Table 6: Electrical Characteristics

Operating category	Conforms to IEC 60947-4-2, AC-53a
Three-phase supply voltage	208 Vac -15% to 690 Vac +10%, 50/60 Hz
Frequency	Automatic sensing (preset), ±5%: • 60 Hz: 56.6 to 63.8 Hz • 50 Hz: 47.6 to 52.6 Hz Manual selection, ±20%: • 50 Hz: 40 to 60 Hz • 60 Hz: 48 to 72 Hz
Rated current (I_{CL})	21 device ratings, 17 to 1200 A
Silicon control rectifiers (SCRs)	1800 V peak inverse voltage (PIV) rating
Motor power	3 to 1200 hp
Motor voltage	208 / 230 / 380 / 460 / 575 / 690 Vac
Soft starter control circuit supply voltage	110 Vac -15% to 230 +15% Vac, 50/60 Hz
Maximum control circuit consumption (with fans operating)	• ATS48D17Y to C17Y: 30 W • ATS48C21Y to C32Y: 50 W • ATS48C41Y to M12Y: 80 W
Protection	• Integrated thermal I^2t protection for motor (Class 2, 10, 10A, 15, 20, 25, 30 or no protection) and/or thermal protection with positive temperature coefficient (PTC) probes. • Motor underload settings • Current overload settings • Phase reversal • Phase loss • Automatic restart

Section 7—Programming

Programming and Setup

Preliminary Recommendations

> ## ⚠ WARNING
>
> **LOSS OF CONTROL—COMMUNICATION INTERRUPTION**
>
> - The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and overtravel stop.
> - Separate or redundant control paths must be provided for critical control functions.
> - System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.[1]
> - Each implementation of an ATS48 soft starter must be individually and thoroughly tested for proper operation before being placed into service.
>
> **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

[1] For additional information, refer to NEMA ICS 1.1 (latest edition), "Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control" and to NEMA ICS 7.1 (latest edition), "Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems."

If starting the soft starter from line power, limit operations to the duty cycle ratings described on page 37. Use inputs LI1 to LI4 to control the soft starter.

When changing the factory configuration, record your parameter settings in the Factory Settings table beginning on page 75.

When first commissioning an ATS48 controller on a 60 Hz system, perform a factory parameter reset (see FCS on page 56).

Programming the ATS48 controller is simplified by internal sequence selections and interlocks. For ease of setup, access the menus in the following order.
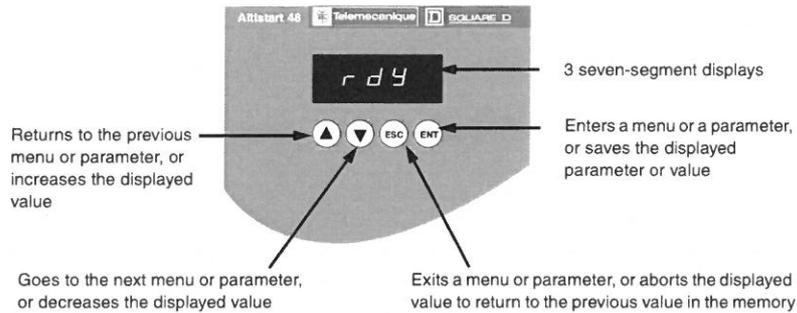
1. IO—Assignment of the inputs/outputs
2. drC—Advanced settings
3. SEt—Settings

Some steps may not be necessary.

Copy and use the Factory Settings table on pages 75–78 to record your settings.

Display Unit and Programming

Figure 22:   Display Functions

3 seven-segment displays

Returns to the previous menu or parameter, or increases the displayed value

Enters a menu or a parameter, or saves the displayed parameter or value

Goes to the next menu or parameter, or decreases the displayed value

Exits a menu or parameter, or aborts the displayed value to return to the previous value in the memory

NOTE: Pressing ▲ or ▼ does not store the choices. To store the displayed choice, press ENT. The display flashes when a value is stored.

Display Principle

The display principle for numbers differs depending on the maximum scale of the parameter and its value, see Table 17 for examples.
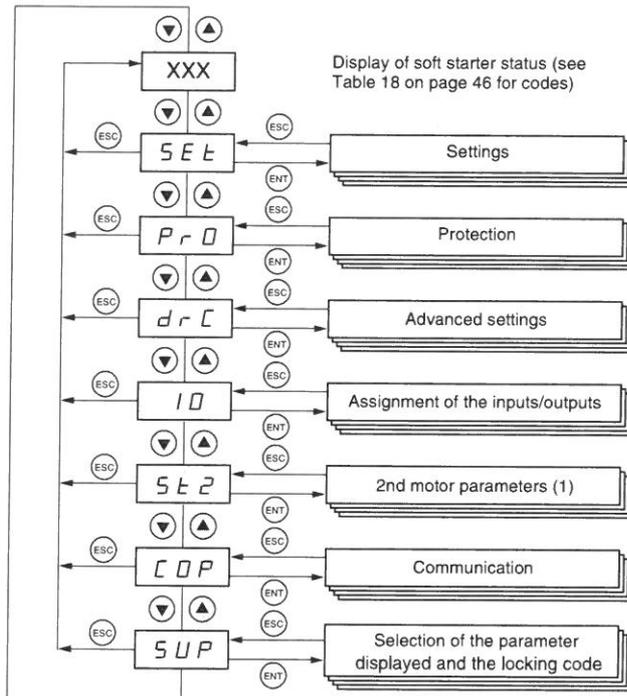
Table 17:   How to Read Displayed Numbers

Range	Example	
	Display	Value
Max. scale 9990		
0.1 to 99.9	05.5 55.0 55.5	5.5 55 55.5
100 to 999	555	555
1000 to 9990	5.55	5550
Max. scale 99900		
1 to 999	005 055 550	5 55 550
1000 to 9990	5.55	5550
10000 to 99900	55.5	55500

Menus

Menus are accessible in the order shown in Figure 23.

Figure 23: Accessing Menus

(1) Menu St2. is only available if the second set of motor parameters function is configured. See the I/O menu on page 57.

To store the displayed choice, press ENT. The display flashes when a value is stored. Navigate through the menus, depending upon the button pressed, as shown in Figure 24.
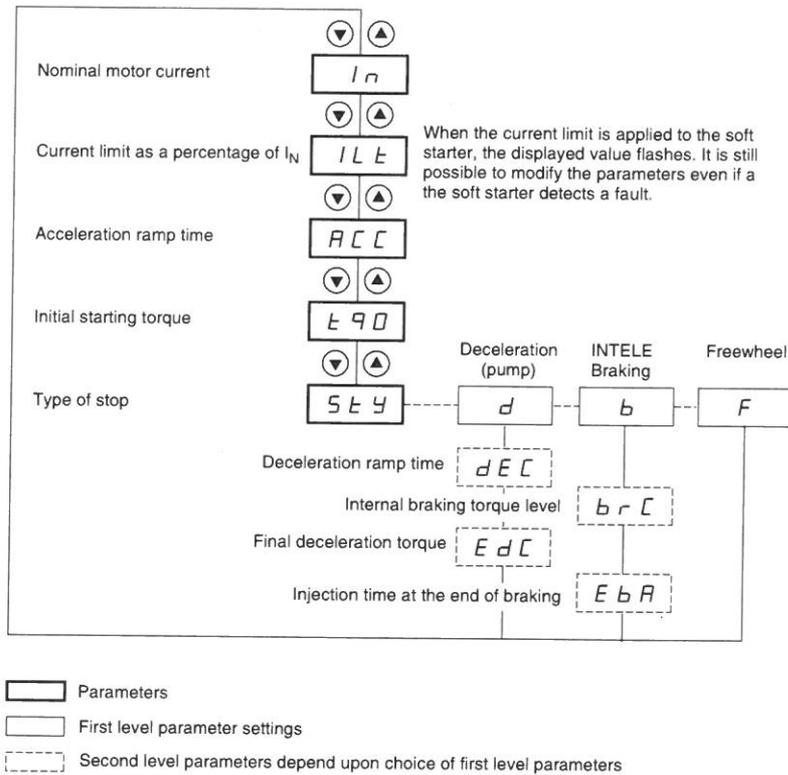
Figure 24: Accessing Parameters
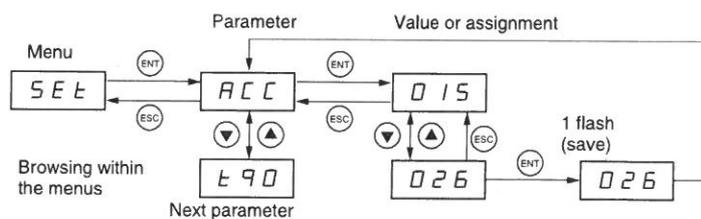
Refer to Table 18 for soft starter status codes after power up.

Table 18:   Soft Starter Display Status Codes After Power Up (Non-Programming Conditions)

Status Code	Condition
Error code (see pages 69–72)	Inoperative soft starter
nLP rdY	Soft starter without run command and: • Power not supplied • Power supplied
tbS	Starting time delay not elapsed
HEA	Motor heating in progress
Monitoring parameter selected by the user (SUP menu). Factory setting: motor current. See page 64.	Soft starter with run command
brL	Soft starter braking
Stb	Waiting for a command (RUN or STOP) in cascade mode

NOTE: Shaded rows indicate typically locked out features.

Figure 25:   Settings Menu

When the current limit is applied to the soft starter, the displayed value flashes. It is still possible to modify the parameters even if a the soft starter detects a fault.

Parameters

First level parameter settings

Second level parameters depend upon choice of first level parameters

To access the parameters, see Figure 24 on page 45.

Table 19: Settings Menu (SEt) Parameters

320A

400%

15s

20%

F

Code	Description	Setting Range	Factory Setting
I n	**Nominal motor current**	0.4 to 1.3 I_{CL}	*
	Adjust the value to the nominal motor current indicated on the motor nameplate. Ensure that the current is between 0.4 and 1.3 I_{CL} (I_{CL}: soft starter rating).		
	* The factory setting corresponds to the usual value of a 460 V standardized motor in accordance with NEC and with Class 10 thermal overload protection.		
IL t	**Current limit**	150 to 700% of I_N, limited to 500% of I_{CL}	400% of I_N
	The current limit ILt is expressed as a percentage of I_N. It is limited to 500% of I_{CL} (soft starter rating, see Tables 3 and 4 on pages 13 and 14. Current limit = ILt x I_N.		
	Example 1: I_N = 22 A, ILt = 300%, Current limit = 300% x 22 A = 66 A		
	Example 2: ATS48C21Y, with I_{CL} = 210 A		
	I_N = 195 A, ILt = 700%; Current limit = 700% x 195 = 1365, limited to 500% x 210 = 1050 A		
ACC	**Acceleration ramp time**	1 to 60 s	15 s
	This is the rise time of the soft starter torque between 0 and the nominal torque T_N (i.e., the gradient of the torque ramp on acceleration).		
	Reference torque as a percentage of T_N vs Time (s), ramp from 0 to 100 over ACC		
t q0	**Initial starting torque**	0 to 100% of T_N	20%
	Initial torque setting during the starting phases, varies from 0 to 100% of the nominal torque.		
	Cn vs Time (s), tq0 = 40		
St y	**Type of stop**	d-b-F	-F-
	Three types of stop are possible:		
	• **-d-**: Soft stopping by control of motor torque. The soft starter applies torque to the motor in order to decelerate progressively on the ramp, avoiding a rapid stop. This type of stop reduces the risk of water hammer on a pump.		
	• **-b-**: INTELE braking stop: The soft starter generates braking torque in the motor which will slow the motor down if there is considerable inertia. (See page 38.)		
	• **-F-**: Freewheel stop: The soft starter applies no torque to the motor.		

Table 19:   Settings Menu (SEt) Parameters *(continued)*

Code	Description		Setting Range	Factory Setting
dEC	**Deceleration ramp time**		1 to 60 s	15 s
	This parameter can only be accessed if StY is set to -d-. Selects the time (1 to 60 s) the soft starter will take to reduce the estimated torque to zero during a type -d- stop. This setting determines the gradient of the torque ramp on deceleration. This feature is useful in pumping applications to help prevent hydraulic shock which may occur if the motor decelerates too quickly.			

N/A

Estimated torque as a percentage of the nominal torque

EdC	**Final deceleration torque**		0 to 100%	20%
	This parameter can only be accessed if StY is set to -d- and if the CLP parameter in the drive menu (drC) is still set to On (the factory setting). Selects the final torque level (0 and 100% of estimated torque) during a type -d- stop. This is the threshold at which the controlled stop ends and the freewheel portion of the stop begins. If the estimated torque at the start of deceleration is below 20, (i.e., 20% of the nominal torque) controlled deceleration is not activated, and the motor changes to freewheel mode.			

N/A .

Estimated torque as a percentage of the nominal torque

Table 19:   Settings Menu (SEt) Parameters *(continued)*

Code	Description	Setting Range	Factory Setting
	Internal braking torque level		0 to 100%
$b \, r \, \Gamma$	This parameter can only be accessed if StY is set to -b-. Selects the braking torque level for stop type -b-. Braking is active up to 20% of the nominal speed. The total stop ramp depends on the setting of this parameter and also dependent on the motor loading. See EbA below. Impulse brake injection time: T2 = T1 x EbA **NOTE:** Time T1 is not determined by brC. T1 is the time required in seconds for the motor to fall from 100% of the nominal speed to 20% (depends on the motor and application characteristics).		
$E \, b \, A$	**Injection time at the end of braking**	20 to 100%	20%
	This parameter can only be accessed if StY is set to -b-. Selects adjustment of the current injection time at the end of braking for stop type -b-. Can be set at 20 to 100% of the INTELE braking time (T1). Example: INTELE braking = 10 s (T1) The stopping time can vary from 2 to 10 s (T2) EbA = 20 Corresponds to an injection time of 2 s EbA = 100 Corresponds to an injection time of 10 s Factory setting: 20		

N/A

N/A .

Figure 26: Motor Protection Menu (PrO)

	Parameters
	First level parameter settings
	Second level parameters depend upon choice of first level parameters
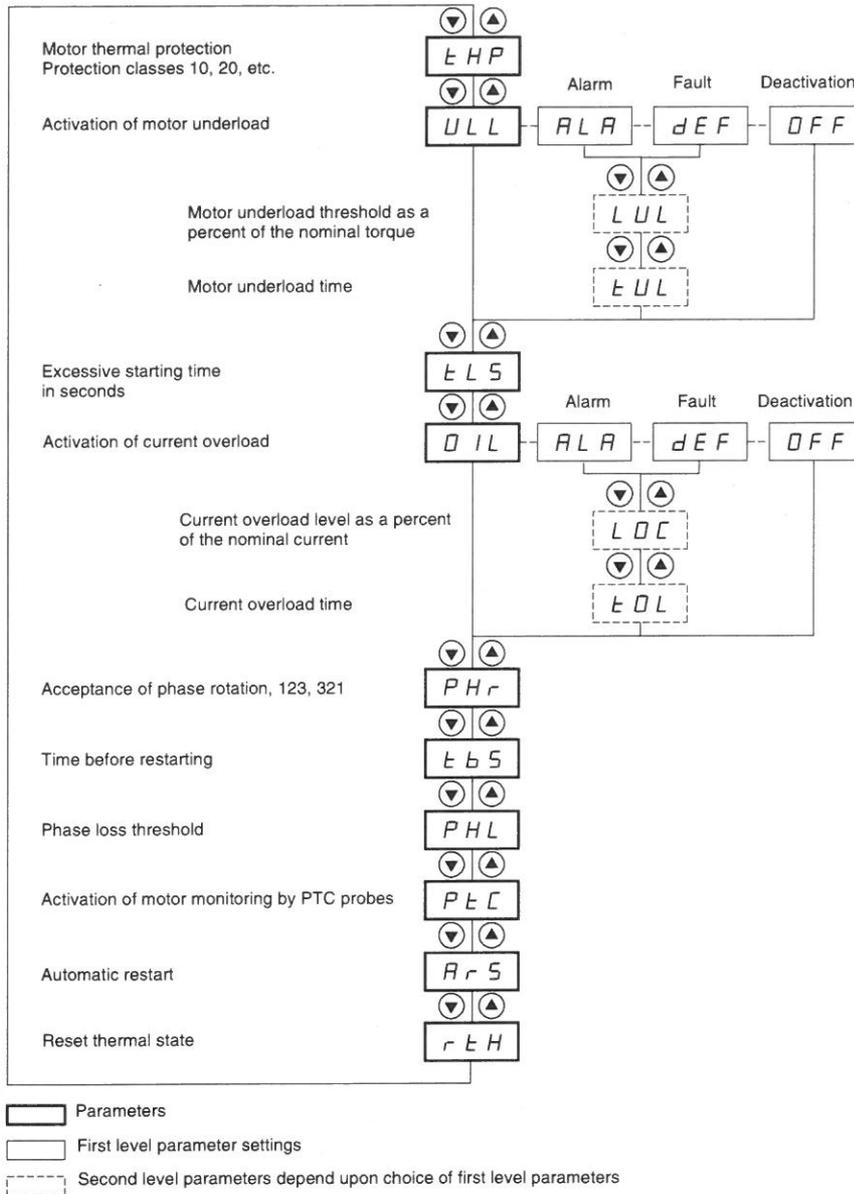
To access the parameters, see Figure 24 on page 45.

The protection parameters can only be modified when the motor is stopped.

<div style="border:1px solid black">

⚠ DANGER

UNINTENDED EQUIPMENT OPERATION

- The factory configuration of a monitoring alarm (ALA) indicates the presence of a detected fault, but will not directly protect the installation.
- When using automatic restart parameter ArS (see Table 20), ensure that an accidental start will not endanger personnel or equipment in any way.

Failure to follow these instructions will result in death or serious injury.

</div>

Table 20: Motor Protection Menu (PrO) Parameters

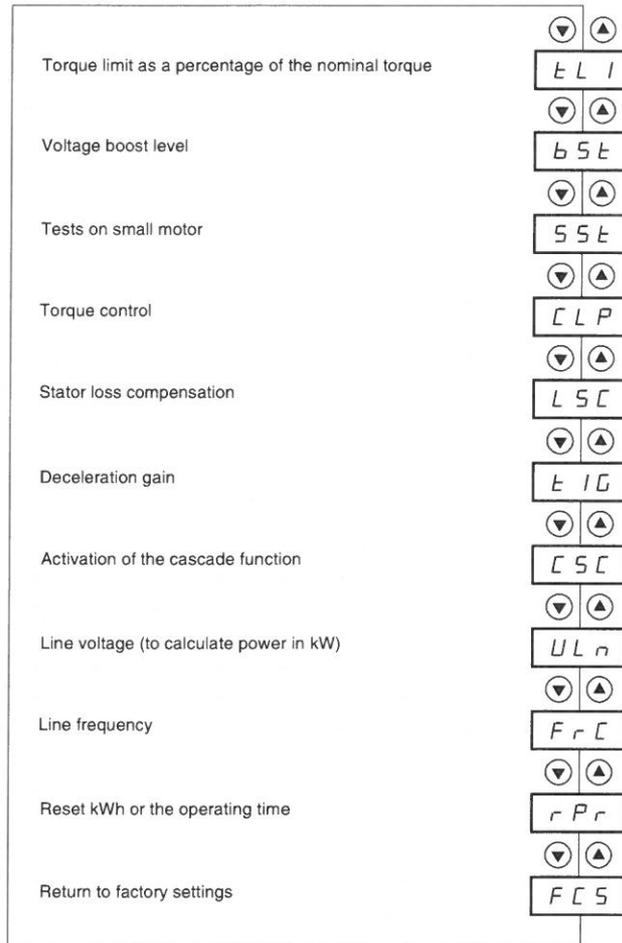| Code	Description	Setting Range	Factory Setting
	Motor thermal protection	—	10
t H P	See "Thermal Overload Protection" on page 39. • 30: Class 30 • 25: Class 25 • 20: Class 20 (severe application) • 15: Class 15 • 10: Class 10 (standard application) • 10A: Class 10A • 2: Sub-class 2 • OFF: no protection		
	Activation of motor underload	—	OFF
U L L	If the motor torque is less than threshold setting of parameter LUL for longer than the time parameter tUL is set for, one of the following occurs: • ALA: an alarm activates (internal bit and configurable logic output) • dEF: the soft starter will not run and the ULF error code displays • OFF: no protection 		
L U L	**Motor underload threshold**	20% to 100% of T_N	60%
	This parameter is not available if ULL is set to OFF. LUL can be set from 20% to 100% of the nominal motor torque.		
t U L	**Motor underload time**	1 to 60 s	60 s
	This parameter is not available if ULL is set to OFF. Time delay tUL activates as soon as the motor torque falls below threshold LUL. It resets to zero if the torque rises above this LUL threshold by + 10% (hysteresis).		
t L S	**Excessive starting time**	10 to 999 s or OFF	OFF
	If the starting time exceeds the value of tLS, the soft starter will not run and displays the StF error code. The conditions for the end of starting are: line voltage applied to the motor (min. firing angle) and motor current less than 1.3 I_N. • OFF: no protection		

(handwritten annotations in left margin: 10, OFF, N/A, N/A, OFF)

Table 20: Motor Protection Menu (PrO) Parameters (continued)

Code	Description	Setting Range	Factory Setting
O IL	**Activation of current overload**	—	OFF
	This function is only active in steady state. If the motor current exceeds the threshold setting of parameter LOC for longer than the time parameter tOL is set for, one of the following occurs: • ALA: an alarm activates (internal bit and configurable logic output) • dEF: the soft starter will not run and the OLC error code displays • OFF: no protection		

Code	Description	Setting Range	Factory Setting
L OC	**Current overload threshold**	50% to 300% of I_N	80%
	This parameter is not available if OIL is set to OFF. LOC can be set from 50% to 300% of the nominal motor current.		
t OL	**Current overload time**	0.1 to 60 s	10 s
	This parameter is not available if OIL is set to OFF. Time delay tOL activates when the motor current rises above threshold LOC. It resets to zero if the current falls below this LOC threshold again by at least 10% (hysteresis).		
P H r	**Protection against line phase inversion**	321, 123, or no	no
	If the line phases are not in the order configured, the soft starter locks and displays the PIF error code. This parameter tells the soft starter the line phase order. • 321: reverse (L3 - L2 - L1) • 123: forward (L1 - L2 - L3) • no: not monitoring		
t b S	**Time before starting**	0 to 999 s	2 s
	This parameter avoids starts in quick succession which may overheat the motor. The time delay starts when the motor changes to freewheel mode. In 2-wire control, the motor is restarted after the time delay if the RUN command input is still activated. In 3-wire control, the motor is restarted after the time delay if a new RUN command is sent (rising edge). The soft starter displays t b S during the time delay.		
P H L	**Phase loss threshold**	5 to 10%	10%
	If the motor current falls below this threshold in one phase for 0.5 s or in all three phases for 0.2 s, the soft starter will not run and displays the PHF error code. Can be set at between 5 and 10% of the I_{CL} soft starter rating.		
P t C	**Activation of motor monitoring by PTC probes**	—	OFF
	The PTC probes on the motor must be connected to the correct analog input. This protection is independent of the calculated thermal protection (tHP parameter). Both types of protection can be used simultaneously. • ALA: an alarm is activated (internal bit and assignable logic output) • dEF: the soft starter will not run and the OtF error code is displayed • OFF: no protection		

OFF

N/A

N/A.

No

2s

10%

No

Table 20: Motor Protection Menu (PrO) Parameters *(continued)*

Code	Description	Setting Range	Factory Setting
A r 5	**Automatic restart**	On - OFF	OFF
	If this function is active and the soft starter locks on a detected fault, the soft starter automatically restarts if the detected fault is cleared and the other operating conditions permit the restart. A series of automatic attempts are made to restart the soft starter at intervals of 60 s. If a restart has not been possible after 6 attempts, the procedure is abandoned and the soft starter will not run until it is switched off then switched on again or reset manually (see "Detected Fault and Operating Condition Management" on page 69). The following error codes permit this function: PHF, FrF, CLF, USF. The soft starter fault relay remains activated if this function is active. The run command must be maintained. This function can only be used in 2-wire control. • OFF: Function inactive • On: Function active		
r t H	**Reset motor thermal state calculated by the soft starter**	no - YES	no
	• no: Function inactive • YES: Function active		

OFF

NO

Figure 27: Advanced Setting Menu (drC)

Torque limit as a percentage of the nominal torque	$t L 1$
Voltage boost level	$b 5 t$
Tests on small motor	$5 5 t$
Torque control	$C L P$
Stator loss compensation	$L 5 C$
Deceleration gain	$t 1 G$
Activation of the cascade function	$C 5 C$
Line voltage (to calculate power in kW)	$U L n$
Line frequency	$F r C$
Reset kWh or the operating time	$r P r$
Return to factory settings	$F C 5$

☐ Parameters in menu

The Advanced setting parameters can only be modified when the motor is stopped.
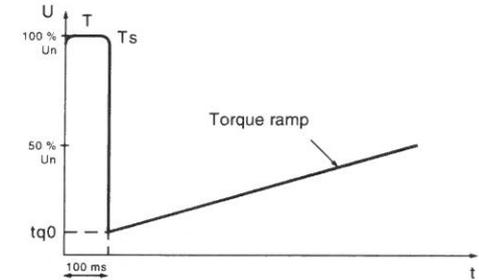
⚠ CAUTION

NO BRAKING

With parameter dLt, only freewheel type stopping is possible. Ensure that freewheel stopping is appropriate for the application:

- Cascading is not possible
- Preheating is not possible

Failure to follow these instructions can result in injury.

Table 21:   Advanced Setting Menu (drC) Parameters

Code	Description	Setting Range	Factory Setting
tLI	**Torque limit**	10 to 200% or OFF	OFF
	Use this parameter to limit the torque reference to avoid regenerative behavior in applications with high inertia. It can be used for constant torque starting if tq0 = tLI. • OFF: no limit • 10 to 200: limit set as a percentage of the nominal torque		
bSt	**Voltage boost level**	50 to 100% or OFF	OFF
	If active, this parameter applies a user-set voltage when a run command is present for 100 ms. Once this time has elapsed, the soft starter follows a standard acceleration ramp starting at the initial torque value set (tq0). This function can be used to avoid any starting torque (phenomenon caused by friction on stopping or by mechanical play). • OFF: Function inactive • 50 to 100: setting as a percentage of the nominal motor voltage NOTE: If the motor nominal current is greater than the ATS48 soft starter nominal current, and if the bSt value is set too high, the soft starter can nuisance trip as an overcurrent (OCF) error code.		
SSt	**Tests on small motor**	On - OFF	OFF
	Use this parameter to check the soft starter in a testing or maintenance environment, on a motor whose power is very much lower than the soft starter rating (in particular for high power soft starters). It automatically deactivates the torque control parameter, CLP. • OFF: function inactive • On: function active SSt returns to the OFF state as soon as the control voltage is disconnected. On the next power up, the PHF error code and the CLP parameter return to their initial configuration.		
CLP	**Torque control** (type of control)	On-OFF	On
	• OFF: function inactive • On: function active In the On position, starting and deceleration follow the torque ramp. In the OFF position, starting and deceleration are controlled by voltage variation. Voltage control is recommended for applications which use motors in parallel on one soft starter or a motor whose power is very low in relation to the soft starter rating. When tests on smaller motor, SSt, is active CLP is set to OFF.		

Handwritten annotations in left margin: OFF (tLI), OFF (bSt), OFF (SSt), ON (CLP)

Table 21:   Advanced Setting Menu (drC) Parameters *(continued)*

Code	Description	Setting Range	Factory Setting
L S C	**Stator loss compensation**	0 to 90%	50%
	Parameter active in acceleration phases (and deceleration phases if StY is set to -d-). In the event of torque oscillations, reduce this parameter gradually until the device is functioning correctly. Oscillations are most common if the soft starter is connected in motors with excessive slip.		
t I G	**Deceleration gain** (for torque control)	10 to 50%	40%
	This parameter can only be accessed if CLP is set to On and if the StY parameter (SEt Settings menu) is set to -d-. It can be used to eliminate instability during deceleration. Adjust the parameter in accordance with the oscillations.		
C S C	**Activation of the cascade function**	On-OFF	OFF
	• OFF: function inactive • On: function active		
	This parameter can only be accessed if relay R1 has previously been assigned to the isolation relay function and if the forced freewheel stop and motor preheating functions are not configured in parameters LI3 or LI4 (IO menu).		
	Assign an input LI = LIC. 255 motors max.		
U L n	**Line voltage**	180 to 790 V	460 V
	This parameter is used to calculate the power displayed (LPr and LAP parameters from the SUP menu). The display will only be accurate if this parameter has been set correctly.		
F r C	**Line frequency**	50-60- AUt	AUt
	• 50: 50 Hz (monitoring tolerance of frequency error code FrF = ± 20%). • 60: 60 Hz (monitoring tolerance of frequency error code FrF = ± 20%). • AUt: automatic recognition of the line frequency by the soft starter, with monitoring tolerance of frequency error code FrF = ± 5%.		
	Selections 50 and 60 are recommended if the power supply is provided by a generating set, given their high tolerance.		
r P r	**Reset kWh or the operating time**	no-APH- trE	no
	• no: function inactive • APH: kWh reset to zero[1] • trE: operating time reset to zero		
	The reset command must be confirmed with ENT. APH and trE take effect immediately. The parameter then automatically returns to no.		
F C S	**Return to factory settings**	no-YES	no
	This is used to reset all parameters to their factory settings.		
	• no: function inactive • YES: function active, must be pressed and held down (for approx. 2 s) in order to be accepted. The display flashes to confirm. The FCS parameter then automatically resets to no when you press ESC.		
	This parameter cannot be modified via the remote keypad display.		

[1] This information « kWh consumed » is only visible with the PowerSuite software workshop or online with Modbus (address W4074).

Handwritten annotations in left margin:
50
N|A
OFF
Change to 440V →
460V
Aut
NO.
No

Figure 28: I/O Menu (IO)

- Assignment of logic input LI3 — `L I3`
- Assignment of logic input LI4 — `L I4`

  - `no` — Not assigned
  - `L IA` — Forced freewheel stop
  - `L IE` — External fault
  - `L IH` — Motor preheating
  - `L IL` — Force to local control mode
  - `L I I` — Inhibits all protection
  - `L It` — Reset after motor thermal fault
  - `L IC` — Activation of the cascade function
  - `L Ir` — Reset after faults are cleared
  - `L I5` — Activation of second set of motor parameters

  Can be selected

- Preheating level (if preheating is selected) — `IPr`
- Time delay before preheating 0 to 999 s — `tPr`

  Parameters are visible if LIH is assigned

- Assignment of logic output LO1 — `LO1`
- Assignment of logic output LO2 — `LO2`
- Assignment of relay R1 — `r1` — Fault relay `rIF` — Isolation relay `rI I`
- Assignment of relay R3 — `r3`

  - `no` — Not assigned
  - `tA1` — Thermal alarm motor 1
  - `rn1` — Motor powered
  - `AIL` — Motor current alarm
  - `AUL` — Motor underload alarm
  - `APC` — PTC probe alarm
  - `AS2` — Second set of motor parameters activated

  Can be selected

- Assignment of analog output AO — `AO`
- Configuration of the analog output — `O-4`
- Scaling of the analog output — `ASC`

  - `no` — Not assigned
  - `Ocr` — Motor current
  - `Otr` — Motor torque
  - `OtH` — Motor thermal state
  - `OCO` — Power factor
  - `OPr` — Active power

  Can be selected

Legend:
- ☐ Parameters
- ☐ First level parameter settings
- ┌──┐ Second level parameters depend upon choice of first level parameters
- ☐ Typically locked out features.

To access the parameters, see Figure 24 on page 45.

NOTE: Logic input RUN, logic input STOP, and soft starter shorting/bypass contactor control (R2) cannot be assigned.

The I/O parameters can only be modified when the motor is stopped.

Table 22:   I/O Menu (IO) Parameters

Code	Description	Setting Range	Factory Setting
	Logic inputs	—	LIA LIL

The selected function is active if the input is powered up.

- no: not assigned.
- LIA: forced freewheel stop
  It forces the configuration of a freewheel type stop, but does not control the stop, as soon as a STOP command is received. This selection does not appear if the CSC parameter in the drC menu is set to On.
- LIE: external fault
  This enables the soft starter to detect a user-defined, external fault, such as level and pressure. The motor comes to a freewheel stop and the soft starter displays EtF.
- LIL: force to local control mode
  If a serial link is used and this function is set, the soft starter changes from link mode (control via serial link) to local mode (control via keypad displays).
- LIt: reset after motor thermal fault
- LIC: activation of the cascade function.
  This function disables motor thermal protection and requires that relay R1 be configured as an isolating relay. It can be used to start and decelerate several identical motors one after the other with a single soft starter.
- LIr: controller reset after faults are cleared
- LIS: activation of second set of motor parameters.
  This function allows start and deceleration of two different motors, one after the other, or one motor with two different configurations using a single soft starter.

- LIH: motor preheating
  This selection does not appear if the CSC parameter in the drC menu is set to On. It is used to prevent the motor from freezing or to prevent temperature deviations which may cause condensation. If the input is active, once the motor has stopped an adjustable current IPr flows through motor after an adjustable time delay tPr. This current heats the motor without causing it to rotate. IPr and tbr must be adjusted (see below).

(Code column, rows aligned: L 13, L 14)

Handwritten annotation:
LI3 = LIr
LI4 = LIL

NOTE: Shading indicates a typically locked function. To unlock the function see LI3, LI4 Logic inputs. In order for functions LIH and LII to take effect, ENT must be pressed for 10 s (confirmed by flashing display). **These parameters cannot be modified via the remote keypad display**.

When the input activates and the motor has stopped and after time delays tPr and tbS (PrO menu) have elapsed, preheating starts. Preheating stops if the input deactivates, if a run command is sent, or if the STOP input activates.

- LII: inhibits all protection

  NOTE: Use of this function invalidates the soft starter warranty.

  This is meant to be used to override the soft starter in the event of an emergency (smoke extraction system for example).

Code	Description	Setting Range	Factory Setting
	Preheating level	0 to 100%	0%

This parameter appears after LI3 or LI4 have been assigned to function LIH (motor preheating). It is used to set the preheating current. Use a true value current reading ammeter to set the motor current level. Parameter I_N has no effect on the IPr current.

(Code: IPr)

CAUTION

RISK OF DAMAGE TO THE MOTOR

If the line frequency fluctuates, you must use an external device to monitor the frequency and deactivate the preheating function in case of line frequency fluctuations.

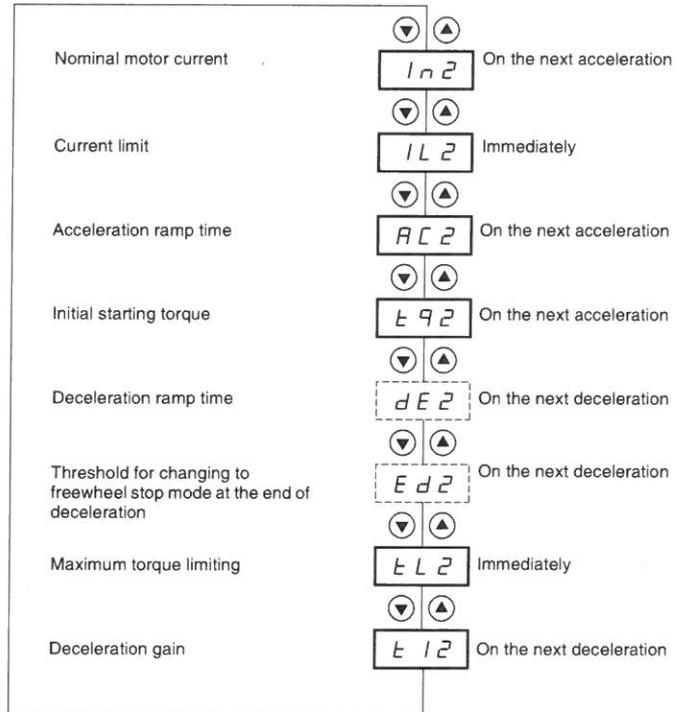**Failure to follow these instructions can result in equipment damage.**

Table 22:   I/O Menu (IO) Parameters (continued)

Code	Description	Setting Range	Factory Setting
tPr	**Time delay before preheating**	0 to 999 mn	5 mn
	This parameter appears after LI3 or LI4 have been assigned to function LIH (motor preheating). Preheating starts when the input activates, after time delays tPr and tbS (PrO menu) have elapsed.		
LO1 LO2	**Logic outputs**	—	tAl rnl
	• no: not assigned. • tAl: motor thermal alarm, see page 39. • rnl: motor powered. • AIL: motor current alarm (threshold OIL and time tOL of PrO menu exceeded). See page 52. • AUL: motor underload alarm (threshold LUL and time tUL of PrO menu exceeded). See page 51. • APC: motor PTC probe alarm. See PtC on page 52. • AS2: second set of motor parameters activated. See LIS on page 58.		
r1	**Relay R1**	—	r1F
	• r1F: fault relay. In this mode, relay R1 activates when the soft starter is powered up (minimum CL1/CL2 control). Relay R1 deactivates when a fault is detected, and the motor switches to freewheel mode. See the special case when the automatic restart function is activated and "Detected Fault and Operating Condition Management" on page 69. • r1I: isolation relay. Relay R1 is designed to control the line contactor on the basis of the RUN and STOP commands and to indicate detected faults. In this mode, relay R1 activates by a RUN command (or a preheating command). It deactivated at the end of braking or deceleration or when the motor switches to freewheel mode after a STOP command. It also deactivates when a fault is detected. The motor switches to freewheel mode at this point.		
r2	**End of Starting Relay R2**	—	—
	The end of starting relay R2 is activated when the soft starter is powered up, no faults are detected, and the motor has completed the start-up phase. It is deactivated in the event of a stop request or a detected fault. It has one normally open contact (N/O). It can be used to bypass the ATS48 soft starter at the end of the starting phase. This is not a programmable feature.		
r3	**Relay R3**	—	rnl
	• no: not assigned. • tAl: motor thermal alarm. See page 39. • rnl: motor powered. • AIL: motor current alarm (threshold OIL and time tOL of PrO menu exceeded). See page 52. • AUL: motor underload alarm (threshold LUL and time tUL of PrO menu exceeded). See page 51. • APC: motor PTC probe alarm. See PtC on page 52. • AS2: second set of motor parameters activated. See LIS on page 58.		
AO	**Analog output**	—	OCr
	• no: not assigned • OCr: motor current • Otr: motor torque • OtH: motor thermal state • OCO: power factor • OPr: active power		
O 4	**Configuration of the analog output AO**	020–420	020
	• 020: 0–20 mA signal • 420: 4–20 mA signal		
ASC	**Scaling of the analog output**	50 to 500%	200
	This parameter allows you to scale the analog output as a percentage of the nominal value of the parameter configured or, if the parameter is power factor, of 1 for the power factor.		

Figure 29:   Second Motor Parameters Menu (St2)

Parameters	
Parameter availability is dependent on the StY setting in the SET menu.	

This menu is only visible if a logic input is assigned to the function for activating a second set of motor parameters (LIS) in the I/O menu.

Table 23:   Second Motor Parameters Menu (St2) Parameters

Code	Description	Setting Range	Factory Setting
$In2$	**Nominal motor current**	0.4 to 1.3 I_{CL}	See note.
	Adjust the value of the nominal motor current indicated on the motor nameplate. Ensure that the current is between 0.4 and 1.3 I_{CL} (soft starter rating). See Tables 3 and 4 on pages 13 and 14. **NOTE:** The factory setting of In2 corresponds with the usual value of a 460 V standardized motor in accordance with NEC and with Class 10 thermal overload protection.		
$IL2$	**Current limit**	150 to 700% of I_N, limited to 500% of I_{CL}	400% of I_N
	The Current limit IL2 is expressed as a percentage of In2. It is limited to 500% of I_{CL} (see Tables 3 and 4 on pages 13 and 14). Current limit = IL2 x In2 Example 1: In2 = 21 A, IL2 = 300%, Current limit = 300% x 22 A = 66 A Example 2: ATS48C21Y, with I_{CL} = 210 A In2 = 195 A, IL2 = 700%, Current limit = 700% x 195 = 1365, limited to 500% x 210 = 1050 A		
$AC2$	**Acceleration ramp time**	1 to 60 s	15 s
	This is the rise time of the soft starter torque between 0 and the nominal torque T_N (i.e., the gradient of the torque ramp on acceleration). 		
$tq2$	**Initial starting torque**	0 to 100% of T_N	20%
	Initial torque setting during the starting phases, varies from 0 to 100% of the nominal torque. 		

Table 23:   Second Motor Parameters Menu (St2) Parameters
(continued)

Code	Description		Setting Range	Factory Setting
	Deceleration ramp time		1 to 60 s	15 s
	This parameter can only be accessed if StY is set to -d-.			
dE2	It sets a time, from 1 to 60 s, to switch from the estimated torque to zero torque (gradient of the torque ramp on deceleration when a -d- stop is applied). This modifies the progression of the deceleration and helps avoid hydraulic shocks in pump applications by modifying the gradient of the torque reference. 			
	Final deceleration torque		0 to 100%	20%
	This parameter can only be accessed if StY is set to -d- and if the CLP parameter in the drive menu (drC) is still set to the factory setting (On).			
Ed2	It sets the final torque level from 0 and 100% of the torque estimated at the beginning of deceleration. In pump applications, deceleration control is not necessarily below a load level set by Ed2. If the estimated torque at the start of deceleration is below 20, (i.e., 20% of the nominal torque) controlled deceleration does not activate and the motor changes to freewheel mode. 			
	Maximum torque limit		10 to 200% or OFF	OFF
tL2	This limits the torque reference to avoid regenerative behavior in applications with high inertia. It can be used for constant torque starting if tq2 = tLl. • OFF: no limit • 10 to 200: limit set as a percentage of the nominal torque			
	Deceleration gain (for torque control)		10 to 50%	40%
t 12	This parameter can only be accessed if CLP is set to On and if the StY parameter (SEt Settings menu) is set to -d-. It is used to eliminate instability during deceleration. Adjust the parameter in accordance with the oscillations.			

Figure 30: Communication Menu (COP)
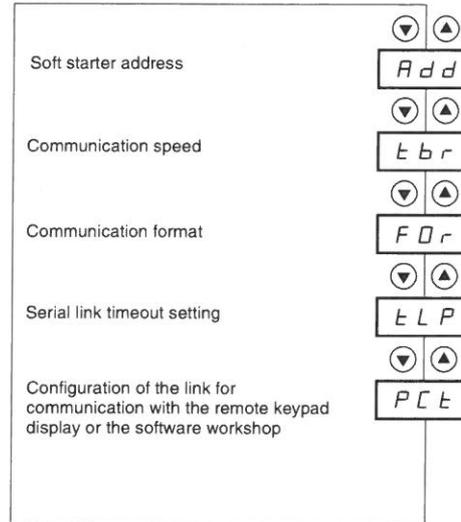
| Parameters

The communication menu parameters can only be modified when the motor is stopped. The internal protocol used is Modbus.

⚠ WARNING

LOSS OF COMMUNICATION CAN CAUSE LOSS OF PROTECTION

When using serial link timeout setting parameter tLP, ensure that the time set will not interfere with the safe operation of the machine.

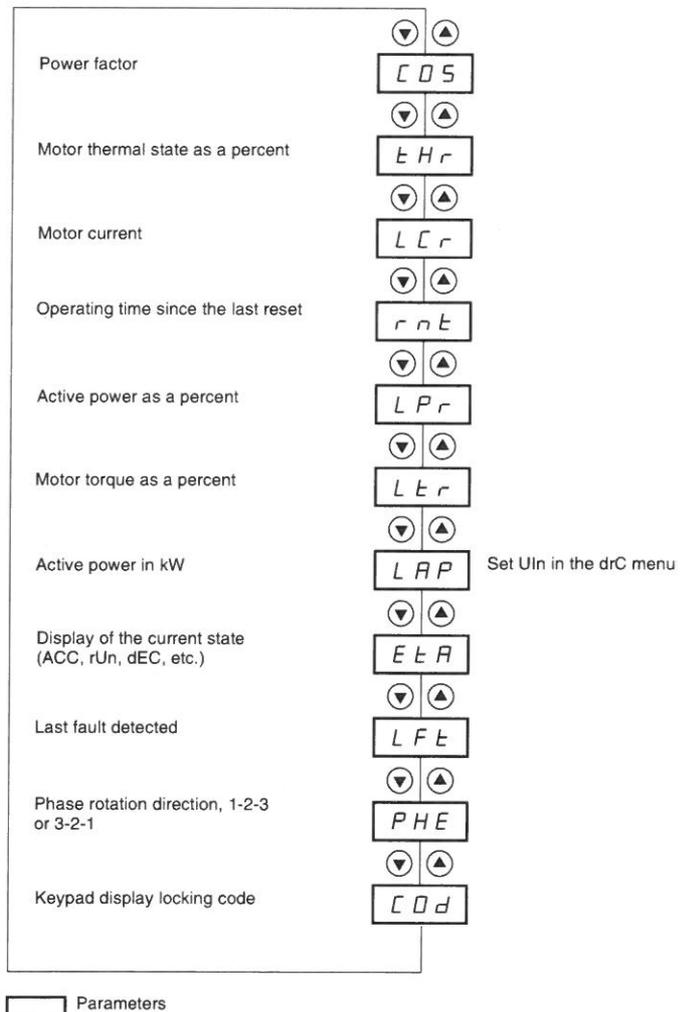**Failure to follow these instructions can result in death or serious injury.**

Table 24: Communication Menu (COP) Parameters

Code	Description	Setting Range	Factory Setting
Rdd	Soft starter address by the RS-485 serial link	0 to 31	0
tbr	Communication speed in kbps.	4.8 - 9.6 - 19.2	19.2
FOr	Communication format • 8o1: 8 data bits, odd parity, 1 stop bit • 8E1: 8 data bits, even parity, 1 stop bit • 8n1: 8 data bits, no parity, 1 stop bit • 8n2: 8 data bits, no parity, 2 stop bits	—	8n1

Table 24:   Communication Menu (COP) Parameters *(continued)*

Code	Description	Setting Range	Factory Setting
t L P	Serial link timeout setting	0.1 to 60 s	5 s
P C t	Configuration of the serial link for communication with the **remote keypad display** • On: function active. Temporarily configures the soft starter (tbr and FOr) for communication with the remote keypad display. • OFF: function inactive **PCt returns to the OFF state when the control voltage is disconnected. On the next power up, the tbr and FOr parameters return to their initial configuration.**	—	OFF

Figure 31:   Parameter Displayed Menu (SUP)

Power factor		C O S
Motor thermal state as a percent		t H r
Motor current		L C r
Operating time since the last reset		r n t
Active power as a percent		L P r
Motor torque as a percent		L t r
Active power in kW	Set UIn in the drC menu	L A P
Display of the current state (ACC, rUn, dEC, etc.)		E t A
Last fault detected		L F t
Phase rotation direction, 1-2-3 or 3-2-1		P H E
Keypad display locking code		C O d

☐ Parameters

The parameters in the SUP menu below can be modified with the motor stopped or running.

The factory setting displays the motor current (parameter LCr).

To save the chosen display:

- Press the ENT key once: the choice is temporary, it will be cleared at the next power up.
- Press the ENT key again for 2 seconds: the display flashes, the choice is permanent and cannot be modified.

Table 25: Parameter Displayed Menu (SUP) Parameters

Code	Parameter	Unit
C O S	**Power Factor**	0.01
t H r	**Motor thermal state** varies from 0 to 125%. 100% corresponds to the nominal thermal state for the current I_N set.	%
L C r	**Motor current** In amperes up to 999 A (examples: 01.5 is 1.5 A, 15.0 is 15 A, 150 is 150 A)	A or kA
	In kiloamperes starting at 1000 A (examples: 1.50 is 1500 A, 1.15 is 1150 A)	
r n t	**Operating time** in hours since the last reset. In hours up to 999 hrs (examples: 001 is 1 hr and 111 is 111 hrs) In kilo-hours from 1000 to 65535 (examples: 1.11 is 1110 hrs and 11.1 is 11100 hrs) Above 65535 hrs (65.5) the display resets to zero.	h or kh
	Operating time is counted when the motor is not stopped, i.e. when the thyristors are fired (heating, acceleration, steady state, deceleration, braking) and in continuous bypass operation.	
	The hour counter can be reset in the link mode using the control word or via the keypad display with the motor stopped. When the power is removed from the 115 Vac control power supply the hour counter is saved in the EEPROM.	
L P r	**Active power** varies from 0 to 255%. 100% corresponds to the power at nominal current and at full voltage.	%
L t r	**Motor torque** varies from 0 to 255%. 100% corresponds to the nominal torque.	%
L A P	**Active power in kW** This parameter requires configuration of the exact value of the line voltage ULn in the drC menu.	kW
E t A	**Display of the current state** • nLP: soft starter without run command and power not supplied • rdY: soft starter without run command and power supplied • tbS: starting time delay not elapsed • ACC: acceleration in progress • dEC: deceleration in progress • rUn: steady state operation • brL: braking in progress • CLI: soft starter in current limiting mode • nSt: force to freewheel stop by a logic input or the serial link	—
L F t	**Error code for last detected fault** (see page 69). If no error codes have been saved, the display shows n O F. If faults have been inhibited, the display shows i n h.	—

Table 25: Parameter Displayed Menu (SUP) Parameters *(continued)*

Code	Parameter	Unit
PHE	**Phase rotation direction** as viewed from the soft starter • 123: forward (L1 - L2 - L3) • 321: reverse (L3 - L2 - L1)	—
COd	**Keypad display locking code** enables the soft starter configuration to be protected using an access code (password). **OFF**: no access locking codes • **To lock access**, enter a code (2 to 999). The number displayed can be increased using the ▲ key. Now press ENT. On appears on the screen to indicate that the parameters have been locked. **On**: a code is locking access (2 to 999) • **To unlock access**, enter the code (increasing the number displayed using the ▲ key) and press ENT. The code remains on the display and access is unlocked until the next power down. Parameter access will be locked again on the next power-up. • **If an incorrect code is entered**, On appears on the display and the parameters remain locked. **XXX**: parameter access is unlocked (the code remains on the screen). • **To reactivate locking with the same code** when the parameters have been unlocked, return to On using the ▼ button and then press ENT. On appears on the screen to indicate that the parameters have been locked. • **To lock access with a new code** when the parameters have been unlocked, enter a new code (change the number displayed using the ▲ or ▼ keys) and press ENT. On appears on the screen to indicate that the parameters have been locked. • **To clear locking** when the parameters have been unlocked, return to OFF using the ▼ button and press ENT. OFF remains on the screen. The parameters are unlocked and will remain unlocked until the next restart. **Remember to document your access code (password). Failure to do so could prevent use of the keypad in programming and configuration modes.**	—

When access is locked using a code, only the monitoring parameters can be accessed, and with only a temporary choice of parameter displayed.

The choice of application functions can be limited by the incompatibility between certain functions. The functions that are not listed in this table are not incompatible with any other functions.

Figure 32: Compatibility

Functions	Soft stop	INTELE braking stop	Force freewheel stop	Thermal protection	Loss of a motor phase	Test on small motor	Cascade	Preheating (3)
Soft stop								
INTELE braking stop								
Force freewheel stop								
Thermal protection								(2)
Loss of a motor phase								(1)
Test on small motor								
Cascade								
Preheating (3)				(2)	(1)			

☐ Compatible functions
▨ Incompatible functions
▨ Not significant

(1) Motor phase loss not detected

(2) While the motor is preheating, the thermal protection is disabled. Set the preheating current IPr.

(3) In order for this feature to take effect, press ENT for 10 s (confirmed by flashing display). This parameter cannot be modified via the remote keypad display.