



*Commissioning guide*

---

**Dynec+ with Unidrive  
M700, M701, M702  
with position feedback**

---

Reference: 6085 en - 2023.06 / b

**LEROY-SOMER™**

## 1 - INTRODUCTION

Before setting up the drive, please follow the safety and installation instructions for Dyneo+ motors and Unidrive M70x drives described in their respective manuals.

Dyneo+ motors:

[http://www.leroy-somer.com/documentation\\_pdf/5411\\_en.pdf](http://www.leroy-somer.com/documentation_pdf/5411_en.pdf)

Unidrive M70x drive:

See the Getting Started Guide and associated Power Installation Guide (available from the Control Techniques website).



- **The installation and commissioning must be carried out by qualified, competent and authorised personnel.**

Then proceed with the quick commissioning described in 2 from the factory setting.

### Requirements:

- Ensure the drive has a firmware version equal or higher than V01.20.00.00.

## 2 - COMMISSIONING WITH UNIDRIVE M70x WITH POSITION FEEDBACK

### RFC-S mode for interchangeable Dyneo+ permanent magnet motors without position feedback

Action	Description
<b>Before power-up</b>	<p>Ensure:</p> <ul style="list-style-type: none"> <li>The drive enable signal is not given (terminal 31 on Unidrive M700/M701 and terminals 11 &amp; 13 on Unidrive M702)</li> <li>The Run signal is not given</li> <li>Motor and feedback device are connected</li> </ul>
<b>Power-up the drive</b>	<p>If RFC-S mode is displayed when the drive is powered up:</p> <ul style="list-style-type: none"> <li>If the frequency of the mains supply is 60Hz, set <b>Pr 00.000</b> = 1244, otherwise if the frequency of the mains is 50Hz, set <b>Pr 00.000</b> = 1233.</li> </ul> <p>If Open Loop or RFC-A mode is displayed when the drive is powered up:</p> <ul style="list-style-type: none"> <li>Set <b>Pr 00.048</b> = RFC-S (3).</li> <li>If the frequency of the mains supply is 60Hz, set <b>Pr 00.000</b> = 1254, otherwise if the frequency of the mains is 50Hz, set <b>Pr 00.000</b> = 1253.</li> </ul> <p>Press the red Reset button or toggle the Reset logic input. These actions will leave the drive in RFC-S mode with defaulted parameters. The drive will be in a tripped state, but the associated trips are addressed by settings within this procedure.</p>
<b>Advanced menu access from the keypad</b>	<p>To access all menus required for commissioning, set <b>Pr 00.0049</b> = All Menus (1).</p> <p>Reminder: Select the menus using the left and right arrows. The parameters are selected using the up and down arrows.</p>
<b>Set motor feedback parameters</b>	<p>Set the following parameters depending on the position feedback device type used:</p> <ul style="list-style-type: none"> <li><b>Resolver</b> <ul style="list-style-type: none"> <li>P1 Device Type (<b>Pr 03.038</b>) = Resolver (14)</li> <li>P1 Resolver Poles (<b>Pr 03.065</b>) = 2 (resolver provided by Nidec Leroy-Somer)</li> <li>P1 Resolver Excitation (<b>Pr 03.066</b>) = 6kHz 2V FAST (6) (resolver provided by Nidec Leroy-Somer)</li> </ul> </li> <li><b>SC EnDat</b> <ul style="list-style-type: none"> <li>P1 Device Type (<b>Pr 03.038</b>) = SC EnDat (9)</li> <li>P1 Supply Voltage (<b>Pr 03.036</b>) = 5V (0)</li> <li>P1 Comms Baud Rate (<b>Pr 03.037</b>) = 2M (7)</li> <li>P1 Error Detection Level (<b>Pr 03.040</b>) = 3 (Bit 1 set to enable Phase Error Detection)</li> </ul> </li> </ul> <p>Press the Reset button or toggle the Reset logic input initialise the encoder. For SC EnDat and EnDat encoders, the remaining encoder parameters are auto configured.</p> <p>The fitting of options (forced ventilation for example) affects the mounting position of the position feedback device, which may result in the reversal of the position feedback polarity. To check the polarity, monitor Speed Feedback (<b>Pr 03.002</b>) and rotate the motor in the intended forward direction. If the monitored value is negative, then P1 Feedback Reverse (<b>Pr 03.056</b>) = on (1) to correct the feedback polarity.</p>
<b>Motor thermistor set-up</b>	<p>The motor PTC thermistor must be connected to the drive:</p> <ul style="list-style-type: none"> <li>M700/M701: Connect thermistor to analogue input 3 (terminals 8 and 11).</li> <li>M702 (with date code 1710 or later): Connect thermistor to digital input 5 / analogue input 3 (terminals 8 and 10).</li> </ul> <p>For the drive to manage the thermistor:</p> <ul style="list-style-type: none"> <li>Set Analogue Input 3 Mode <b>Pr 07.015</b> = Therm short Cct (7).</li> </ul> <p>If connection of the thermistor leaves insufficient inputs, then it may be necessary to fit an SI-I/O module.</p>

Action	Description																																																																																																																																										
Enter motor nameplate details	<p>Refer to the Dyneo+ motors tables located in the Appendix.                      Select the table corresponding to the motor speed range (1500 or 3000 rpm). Then depending on the motor type and its power, select the line that corresponds to the voltage, the supply frequency and the rated speed of the application. From this line, set in the drive the values of all the parameters listed in the table.                      If the load is a high inertia, <b>Pr 03.010</b> may need to be increased.</p> <p><b>NOTE : If the motor type does not appear in the table, then it is from the Compact range. In this case, please contact Control Techniques Technical Support.</b></p> <p>Example:                      For the 1500 range motor, LSHRM 160MR1 - 11 kW 400V - 50Hz with a rated speed of 1500 rpm, parameter values to set in the drive are the ones of the green line as indicated below:</p> <table border="1"> <thead> <tr> <th colspan="16">1500 rpm RANGE</th> </tr> <tr> <th rowspan="2">MOTOR Type</th> <th rowspan="2">kW</th> <th rowspan="2">DRIVE M70x</th> <th rowspan="2">Coupling</th> <th rowspan="2">Hz</th> <th colspan="11">PARAMETERS</th> </tr> <tr> <th>#03.010</th> <th>#03.011</th> <th>#04.015</th> <th>#05.007</th> <th>#05.008</th> <th>#05.009</th> <th>#05.017</th> <th>#05.033</th> <th>#05.069</th> <th>#05.075</th> <th>#05.078</th> <th>#05.082</th> <th>#05.084</th> <th>#05.087</th> </tr> <tr> <th></th> <th></th> <th></th> <th></th> <th></th> <th>Speed Gain Kp</th> <th>Speed Gain Ki</th> <th>Thermal constant (s)</th> <th>Rated current (A)</th> <th>Rated speed (rpm)</th> <th>Rated voltage (V)</th> <th>Stator Resistance (Ω)</th> <th>BEMF (V/krpm)</th> <th>Over-current trip level (%)</th> <th>Iq (%)</th> <th>Lq @ Iq (mH)</th> <th>Id (%)</th> <th>Lq @ Id (mH)</th> <th>Torque Angle (°)</th> </tr> </thead> <tbody> <tr> <td rowspan="4">LSHRM 160 MR1</td> <td>11</td> <td>44-00172</td> <td>Y</td> <td>50</td> <td>0.005</td> <td>0.05</td> <td>800</td> <td>21.0</td> <td>1500</td> <td>400</td> <td>0.31582</td> <td>72.1</td> <td>236</td> <td>73</td> <td>44.845</td> <td>-108</td> <td>68.540</td> <td>56</td> </tr> <tr> <td>11</td> <td>44-00172</td> <td>Y</td> <td>60</td> <td>0.005</td> <td>0.05</td> <td>800</td> <td>20.3</td> <td>1800</td> <td>400</td> <td>0.31582</td> <td>72.1</td> <td>244</td> <td>73</td> <td>44.845</td> <td>-108</td> <td>68.540</td> <td>56</td> </tr> <tr> <td>12.7</td> <td>44-00172</td> <td>Y</td> <td>60</td> <td>0.005</td> <td>0.05</td> <td>800</td> <td>21.2</td> <td>1800</td> <td>460</td> <td>0.31582</td> <td>72.1</td> <td>233</td> <td>73</td> <td>44.845</td> <td>-108</td> <td>68.540</td> <td>56</td> </tr> <tr> <td>19.1</td> <td>64-00420</td> <td>D</td> <td>87</td> <td>0.005</td> <td>0.05</td> <td>800</td> <td>38.2</td> <td>2600</td> <td>400</td> <td>0.10527</td> <td>41.6</td> <td>218</td> <td>73</td> <td>14.948</td> <td>-108</td> <td>22.850</td> <td>56</td> </tr> </tbody> </table> <p>NOTE: When setting <b>Pr 05.069</b>, it may be necessary to increase the value entered, to ensure that the actual trip level displayed in <b>Pr 05.068</b> is close to (but not greater than) the required value.</p>	1500 rpm RANGE																MOTOR Type	kW	DRIVE M70x	Coupling	Hz	PARAMETERS											#03.010	#03.011	#04.015	#05.007	#05.008	#05.009	#05.017	#05.033	#05.069	#05.075	#05.078	#05.082	#05.084	#05.087						Speed Gain Kp	Speed Gain Ki	Thermal constant (s)	Rated current (A)	Rated speed (rpm)	Rated voltage (V)	Stator Resistance (Ω)	BEMF (V/krpm)	Over-current trip level (%)	Iq (%)	Lq @ Iq (mH)	Id (%)	Lq @ Id (mH)	Torque Angle (°)	LSHRM 160 MR1	11	44-00172	Y	50	0.005	0.05	800	21.0	1500	400	0.31582	72.1	236	73	44.845	-108	68.540	56	11	44-00172	Y	60	0.005	0.05	800	20.3	1800	400	0.31582	72.1	244	73	44.845	-108	68.540	56	12.7	44-00172	Y	60	0.005	0.05	800	21.2	1800	460	0.31582	72.1	233	73	44.845	-108	68.540	56	19.1	64-00420	D	87	0.005	0.05	800	38.2	2600	400	0.10527	41.6	218	73	14.948	-108	22.850	56
1500 rpm RANGE																																																																																																																																											
MOTOR Type	kW	DRIVE M70x	Coupling	Hz	PARAMETERS																																																																																																																																						
					#03.010	#03.011	#04.015	#05.007	#05.008	#05.009	#05.017	#05.033	#05.069	#05.075	#05.078	#05.082	#05.084	#05.087																																																																																																																									
					Speed Gain Kp	Speed Gain Ki	Thermal constant (s)	Rated current (A)	Rated speed (rpm)	Rated voltage (V)	Stator Resistance (Ω)	BEMF (V/krpm)	Over-current trip level (%)	Iq (%)	Lq @ Iq (mH)	Id (%)	Lq @ Id (mH)	Torque Angle (°)																																																																																																																									
LSHRM 160 MR1	11	44-00172	Y	50	0.005	0.05	800	21.0	1500	400	0.31582	72.1	236	73	44.845	-108	68.540	56																																																																																																																									
	11	44-00172	Y	60	0.005	0.05	800	20.3	1800	400	0.31582	72.1	244	73	44.845	-108	68.540	56																																																																																																																									
	12.7	44-00172	Y	60	0.005	0.05	800	21.2	1800	460	0.31582	72.1	233	73	44.845	-108	68.540	56																																																																																																																									
	19.1	64-00420	D	87	0.005	0.05	800	38.2	2600	400	0.10527	41.6	218	73	14.948	-108	22.850	56																																																																																																																									
Set maximum speed	Set the maximum speed in <b>Pr 01.006</b> (rpm).																																																																																																																																										
Set acceleration and deceleration rates	<p>Régler :</p> <ul style="list-style-type: none"> <li>• Acceleration rate in <b>Pr 02.011</b> (s up to <b>Pr 01.006</b>)</li> <li>• Deceleration rate in <b>Pr 02.021</b> (s up to <b>Pr 01.006</b>)</li> <li>• Ramp Rate Units <b>Pr 02.039</b> = On (1)</li> </ul> <p>A ramp value of 20s suites most applications. If a braking resistor is installed, set <b>Pr 02.004</b> = Fast (0). Also ensure <b>Pr 10.030</b>, <b>Pr 10.031</b> and <b>Pr 10.061</b> are set correctly, otherwise premature «Brake R Too Hot» trips may be seen.</p>																																																																																																																																										
Additional settings	<p>Set :</p> <ul style="list-style-type: none"> <li>• RFC Feedback Mode (<b>Pr 03.024</b>) = Feedback (0)</li> <li>• P1 Thermistor Fault Detection (<b>Pr 03.123</b>) = None (0)</li> <li>• Motoring Current Limit (<b>Pr 04.005</b>) = 120% max</li> <li>• Regenerating Current Limit (<b>Pr 04.006</b>) = 120% max</li> <li>• Symmetrical Current Limit (<b>Pr 04.007</b>) = 120% max</li> <li>• Current Reference Filter 1 Time Constant (<b>Pr 04.012</b>) = 1 ms</li> <li>• Thermal Protection Mode (<b>Pr 04.016</b>) = Disabled (4)</li> <li>• User Current Maximum Scaling (<b>Pr 04.024</b>) = 120% max</li> <li>• Maximum Switching Frequency (<b>Pr 05.018</b>) = 3kHz (1)</li> <li>• Enable High Speed Mode (<b>Pr 05.022</b>) = Enable (2)</li> <li>• Minimum Switching Frequency (<b>Pr 05.038</b>) = 3kHz (1)</li> <li>• Voltage Headroom <b>Pr 05.041</b> = 5%. [Do not set a lower value. Increase this value to 10%, if the motor is unstable in the field weakening area]</li> <li>• Saliency Torque Control Select <b>Pr 05.065</b> = Auto (3) [Ensure that <b>Pr 05.066</b> = High (2) otherwise check the value entered for <b>Pr 05.087</b> from the table]</li> <li>• Inverted Saturation Characteristic (<b>Pr 05.070</b>) = On (1)</li> <li>• Stop Mode (<b>Pr 06.001</b>) = Ramp (1)</li> <li>• Hold Zero Speed (<b>Pr 06.008</b>) = Disabled (0)</li> </ul>																																																																																																																																										

Action	Description
<b>Autotune</b>	<p>With the Dyneo<sup>+</sup> motor, it is necessary to perform a stationary autotune. The motor must be at a standstill before an autotune is performed.</p> <p>A stationary autotune is performed to locate the flux axis of the motor to allow the correct alignment of currents. The stationary autotune measures stator resistance, flux axis inductance, no-load torque axis inductance and values relating to deadtime compensation. Measured values are used to calculate the current loop gains, and at the end of the test the values in <b>Pr 04.013</b> and <b>Pr 04.014</b> are updated.</p> <p>To perform an autotune:</p> <ul style="list-style-type: none"> <li>• Set <b>Pr 05.012</b> = 1 for a stationary autotune.</li> <li>• Close the run signal (terminal 26 or 27 on Unidrive M700/M701 and terminal 7 or 8 on Unidrive M702).</li> <li>• Close the drive enable signal (terminal 31 on Unidrive M700/M701 and terminals 11 and 13 on Unidrive M702). During a the test a symbol will flash in the top right-hand corner of the display, unless the display has returned to status mode, where the upper row of the display will flash «Autotune».</li> <li>• Wait for the parameter value to return to «None», or for the the drive to display «Inhibit» (in status mode).</li> </ul> <p>If the drive trips, remove the enable and run signals, address the cause of the trip, then repeat the test.</p> <ul style="list-style-type: none"> <li>• Remove the drive enable and run signal from the drive.</li> </ul>
<b>Save parameters</b>	Select «Save Parameters» in <b>Pr mm.000</b> and press the red reset button or toggle the reset digital input.
<b>Start-up</b>	Drive is ready to start-up.









**APPENDIX**

COMPACT RANGE 3000 rpm																		
MOTOR	kW	Drive M70x	Coupling	Hz	PARAMETERS													
					#03.010	#03.011	#04.015	#05.007	#05.008	#05.009	#05.017	#05.033	#05.069	#05.075	#05.078	#05.082	#05.084	#05.087
					Speed Gain Kp	Speed Gain Ki	Thermal Constant (s)	Rated Current (A)	Rated Speed (min <sup>-1</sup> )	Rated Voltage (V)	Stator Resistance (Ω)	BEMF (V/kmin <sup>-1</sup> )	Trip Current (%)	Iq (%)	Lq @ Iq (mH)	Id (%)	Lq @ Id (mH)	Torque angle (°)
LSHRM 132 MU3	32	74-00660	Y	100	0,005	0,05	800	61	3000	400	0,07480	36,1	156	63	9,920	-114	17,135	61
	32	74-00660	Y	120	0,005	0,05	800	69,6	3600	400	0,07480	36,1	136	63	9,920	-114	17,135	61
	37	74-00660	Y	120	0,005	0,05	800	59,6	3600	460	0,07480	36,1	159	63	9,920	-114	17,135	61
	56	84-01340	D	173	0,005	0,05	800	110	5200	400	0,02493	20,8	140	63	3,307	-114	5,712	61
LSHRM 160 LR3	37	74-00660	Y	100	0,005	0,05	800	70,1	3000	400	0,06720	39,3	150	61	9,680	-115	16,972	62
	37	74-00660	Y	120	0,005	0,05	800	69,3	3600	400	0,06720	39,3	152	61	9,680	-115	16,972	62
	43	74-00660	Y	120	0,005	0,05	800	69,2	3600	460	0,06720	39,3	152	61	9,680	-115	16,972	62
	65	84-01340	D	173	0,005	0,05	800	123	5200	400	0,02240	22,7	140	61	3,227	-115	5,657	62
LSHRM 180 L1M	64	84-01340	Y	100	0,03	0,1	1000	126	3000	400	0,02190	33,4	160	69	4,220	-110	5,988	58
	64	84-01340	Y	120	0,03	0,1	1000	121	3600	400	0,02190	33,4	168	69	4,220	-110	5,988	58
	74	84-01340	Y	120	0,03	0,1	1000	123	3600	460	0,02190	33,4	165	69	4,220	-110	5,988	58
LSHRM 200 LR1	75	84-01570	Y	100	0,03	0,1	1000	148	3000	400	0,01750	33,4	159	69	3,600	-110	5,126	58
	75	84-01570	Y	120	0,03	0,1	1000	141	3600	400	0,01750	33,4	167	69	3,600	-110	5,126	58
	86	84-01570	Y	120	0,03	0,1	1000	145	3600	460	0,01750	33,4	162	69	3,600	-110	5,126	58
LSHRM 225MG1M	172	104-03770	Y	100	0,005	0,1	1200	327	3000	400	0,00465	35,8	165	61	1,860	-115	3,203	62
	172	104-03770	Y	120	0,005	0,1	1200	318	3600	400	0,00465	35,8	169	61	1,860	-115	3,203	62
	198	104-03770	Y	120	0,005	0,1	1200	314	3600	460	0,00465	35,8	171	61	1,860	-115	3,203	62
LSHRM 250 MF1	206	114-04170	Y	100	0,005	0,1	1200	382	3000	400	0,00390	38,3	165	61	1,700	-115	2,937	62
	206	114-04170	Y	120	0,005	0,1	1200	384	3600	400	0,00390	38,3	164	61	1,700	-115	2,937	62
	248	114-04170	Y	120	0,005	0,1	1200	388	3600	460	0,00390	38,3	163	61	1,700	-115	2,937	62

COMPACT RANGE 3600 rpm																		
MOTOR	kW	Drive M70x	Coupling	Hz	PARAMETERS													
					#03.010	#03.011	#04.015	#05.007	#05.008	#05.009	#05.017	#05.033	#05.069	#05.075	#05.078	#05.082	#05.084	#05.087
					Speed Gain Kp	Speed Gain Ki	Thermal Constant (s)	Rated Current (A)	Rated Speed (min <sup>-1</sup> )	Rated Voltage (V)	Stator Resistance (Ω)	BEMF (V/kmin <sup>-1</sup> )	Trip Current (%)	Iq (%)	Lq @ Iq (mH)	Id (%)	Lq @ Id (mH)	Torque angle (°)
LSHRM 132 MU3	38	74-00770	Y	120	0,005	0,05	800	73	3600	400	0,04780	29,5	156	63	6,750	-114	11,471	61
LSHRM 160 LR3	40	74-00770	D	120	0,005	0,05	800	75,6	3600	400	0,04367	31,8	169	85	2,300	-98	11,089	49
LSHRM 180 L1M	75	84-01570	Y	120	0,03	0,1	1000	146	3600	400	0,01610	28,6	159	70	3,110	-110	4,399	58
LSHRM 200 LR1	87	84-01570	Y	120	0,03	0,1	1000	167	3600	400	0,01460	30,6	153	68	2,980	-111	4,307	58
LSHRM 225MG1M	181	114-04170	D	120	0,005	0,1	1200	337	3600	400	0,00365	32,4	174	63	1,570	-114	2,637	61
LSHRM 250 MF1	230	114-04170	D	120	0,005	0,1	1200	430	3600	400	0,00283	33,2	167	63	1,280	-114	2,203	61

COMPACT RANGE 4500 rpm																		
MOTOR	kW	Drive M70x	Coupling	Hz	PARAMETERS													
					#03.010	#03.011	#04.015	#05.007	#05.008	#05.009	#05.017	#05.033	#05.069	#05.075	#05.078	#05.082	#05.084	#05.087
					Speed Gain Kp	Speed Gain Ki	Thermal Constant (s)	Rated Current (A)	Rated Speed (min <sup>-1</sup> )	Rated Voltage (V)	Stator Resistance (Ω)	BEMF (V/kmin <sup>-1</sup> )	Trip Current (%)	Iq (%)	Lq @ Iq (mH)	Id (%)	Lq @ Id (mH)	Torque angle (°)
LSHRM 132 MU3	48	74-01000	D	150	0,005	0,05	800	93,4	4500	400	0,03467	24,6	143	61	4,550	-115	7,977	62
LSHRM 160 LR3	50	74-01000	D	150	0,005	0,05	800	96,4	4500	400	0,02723	25	164	65	4,160	-113	6,845	60
LSHRM 180 L1M	88	94-02000	Y	150	0,03	0,1	1000	170	4500	400	0,01137	23,9	160	70	2,190	-110	3,055	58
LSHRM 200 LQ1	88	94-02000	Y	150	0,03	0,1	1000	170	4500	400	0,01137	23,9	160	70	2,190	-110	3,055	58
LSHRM 225MG1M	185	114-04170	D	150	0,005	0,1	1200	369	4500	400	0,00254	26,5	190	69	1,100	-110	1,765	58
LSHRM 250 SF1	240	114-04170	D	150	0,005	0,1	1200	441	4500	400	0,00227	29,5	181	65	1,070	-113	1,741	60

COMPACT RANGE 6000 rpm																		
MOTOR	kW	Drive M70x	Coupling	Hz	PARAMETERS													
					#03.010	#03.011	#04.015	#05.007	#05.008	#05.009	#05.017	#05.033	#05.069	#05.075	#05.078	#05.082	#05.084	#05.087
					Speed Gain Kp	Speed Gain Ki	Thermal Constant (s)	Rated Current (A)	Rated Speed (min <sup>-1</sup> )	Rated Voltage (V)	Stator Resistance (Ω)	BEMF (V/kmin <sup>-1</sup> )	Trip Current (%)	Iq (%)	Lq @ Iq (mH)	Id (%)	Lq @ Id (mH)	Torque angle (°)
LSHRM 132 MU3	57	84-01340	D	200	0,005	0,05	800	112	6000	400	0,02023	18,9	150	63	2,810	-114	4,72	61
LSHRM 160 LR3	65	84-01340	D	200	0,005	0,05	800	126	6000	400	0,01593	19,3	157	65	2,470	-113	4,087	60
LSHRM 180 L1M	80	84-01570	Y	200	0,03	0,1	1000	146	6000	400	0,01137	23,9	186	74	2,350	-107	3,055	56
LSHRM 200 LR1	90	84-01570	Y	200	0,03	0,1	1000	167	6000	400	0,00800	22,3	201	76	1,810	-105	2,278	54
LSHRM 225SG1	185	114-04170	Y	200	0,005	0,1	1200	341	6000	400	0,00252	25,5	213	71	1,080	-109	1,634	57
LSHRM 250 SF1S	220	114-04170	D	200	0,005	0,1	1200	409	6000	400	0,00177	25,8	219	71	0,890	-109	1,333	57





***Nidec***  
All for dreams

**LEROY-SOMER<sup>™</sup>**



Moteurs Leroy-Somer  
Headquarter: Boulevard Marcellin Leroy - CS 10015  
16915 ANGOULÊME Cedex 9

Limited company with capital of 38,679,664 €  
RCS Angoulême 338 567 258

[www.leroy-somer.com](http://www.leroy-somer.com)