

USER MANUAL

 Longo programmable controller LPC-3.IOU.001
 Input Output Universal PLC

Version 3

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User Manual

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STANDARDS AND PROVISIONS: Standards, recommendations, regulations and provisions of the country in which the devices will operate, must be considered while planning and setting up electrical devices. Work on 100 .. 230 V AC network is allowed for authorized personnel only.

DANGER WARNINGS: Devices or modules must be protected from moisture, dirt and damage during transport, storing and operation.

WARRANTY CONDITIONS: For all modules LONGO LPC-3 - if no modifications are performed upon and are correctly connected by authorized personnel - in consideration of maximum allowed connecting power, warranty of 24 months is valid from the date of sale to the end buyer, but not more than 36 months after delivery from Smarteh. In case of claims within warranty time, which are based on material malfunctions the producer offers free replacement. The method of return of malfunctioned module, together with description, can be arranged with our authorized representative. Warranty does not include damage due to transport or because of unconsidered corresponding regulations of the country, where the module is installed.

This device must be connected properly by the provided connection scheme in this manual. Misconnections may result in device damage, fire or personal injury.

Hazardous voltage in the device can cause electric shock and may result in personal injury or death.

NEVER SERVICE THIS PRODUCT YOURSELF!

This device must not be installed in the systems critical for life (e.g. medical devices, aircrafts, etc.).

If the device is used in a manner not specified by the manufacturer, the degree of protection provided by the equipment may be impaired.

Waste electrical and electronic equipment (WEEE) must be collected separately!

LONGO LPC-3 complies to the following standards:

- EMC: EN 61000-6-3:2007 + A1:2011, EN 61000-6-1:2007, EN 61000-3-2:2006 + A1:2009 + A2: 2009, EN 61000-3-3:2013,
- LVD: IEC 61010-1:2010 (3rd Ed.), IEC 61010-2-201:2013 (1st Ed.)

Smarteh d.o.o. operates a policy of continuous development. Therefore we reserve the right to make changes and improvements to any of the products described in this manual without any prior notice.

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1 DESCRIPTION

Smarteh third generation of customizable PLCs (Programmable Logic Controller) is ideal solution for the automation of machines and production lines where high number of various input, output and communication connections per single PLC is desirable. LPC-3 controllers offers through its innovative design a very attractive solution for a competitive price. The modules are designed with special attention to the machine building market.

LPC-3.10U.001 (Input Output Universal) is an innovative PLC with software selection of the type and function for each of the 16 inputs and 2 analog outputs. Each of 16 inputs can be individually configured as digital (-12 ... 30 V) input with a settable range of switching voltages, as analog voltage (-10 ... 10 V) or current (-20 ... 20 mA) input. In addition 8 high accuracy analog inputs can be individually selected for direct connection of up to 8 thermocouples (E, J, K, N, R, S, T), 8 thermistors (Pt100, Pt200, Pt500, Pt1000, Ni1000, NTC 10 k Ω), 8 voltage 0 ... 1 V or 8 current 0 ... 10 mA sources. Up to 2 fast counters and 2 quadrature encoders can also be selected.

16 galvanic isolated transistor outputs (2 groups of 8 outputs) guarantee a current source up to 1.2 A. Outputs are current and thermal protected. 2 selectable voltage (-10 .. 10 V) or current (-20 .. 20 mA) analog outputs are also integrated.

LPC-3.IOU.001 is equipped with Ethernet connection and can be used as a Modbus TCP Slave device, with an USB port, used for programming and debugging. It also includes 2 galvanic isolated CAN bus, used for local or remote connection to other LPC-3 PLCs.

Integrated "Setting Storage FLASH", "RTC" and "NV RAM", doesn't need the battery for it's functioning.

Smarteh IDE (Integrated Development Environment) software tool is used with all the PLCs from the LPC-3 family and it supports all five standard PLC programmable languages (FBD, LD, SFC, ST, IL). It also supports "off line", "on line" debugging and local program transferring. Distributed processing is supported, which makes it possible to handle fast operations.

Controller is powered from external power supply.

NOTE: For proper connection please refer to CONNECTION & CONFIGURATION GUIDE and for proper system configuration and data allocation please refer to PROGRAMMING GUIDE chapter of this user manual.





2 FEATURES



Figure 1: LPC-3.IOU.001 PLC.

Table 1: Technical data

Ethernet connectivity with Modbus TCP slave (server) functionality

USB port for Debugging, Application and Default parameters transfer

2 galvanic isolated (2500 V DC) CAN ports

RTC and 32 kB non-volatile memory with super capacitor for needed energy storage

4 kb Flash memory available for parameter storage

	digital	-12 30 V (up to 2 fast counters or quadrature encoders)
16 individually software selectable inputs	analog	-10 10 V -20 20 mA 0 1 V (up to 8 thermocouples or/and thermistors,) 0 10 mA

2 individually selectable analog outputs -10 \dots 10 V or -20 \dots 20 mA

16 digital outputs 11 . . 30 V, 1.2 A galvanic isolated (500 V AC) outputs, over current and thermal protected

Disconnect-able spring type connectors

Double PLC power supply and CAN port connectors for easy integration

35 status LEDs

Quality design



3 INSTALLATION

3.1 Block diagram

Figure 2: PLC block diagram¹



¹ **Coloured areas** represents different voltage domains - galvanic isolated areas. **Please refer** to TECHNICAL SPECIFICATIONS for details.



3.2 Input & output function type selection

Table 2: PLC input function type selection ²																	
			Available inputs														
Input function	No. of inputs	11	12	13	14	15	16	17	18	19	110	111	112	113	114	115	116
Digital	16	~	~	~	~	~	~	~	~	~	✓	✓	~	✓	~	~	\checkmark
Fast counter	2									~				~			
Quadrature encoder	2											✓				✓	
Analog -10 10 V unipolar	16	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
Analog -10 10 V differential	8		1		✓		~	,	/		✓		✓		✓		~
Analog -20 20 mA unipolar	16	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
Analog -20 20 mA differential	8		√		✓		√	,	/		✓		~		✓		~
Analog 0 1 V unipolar	8	~	~	~	~	~	~	~	~								
Analog 0 1 V differential	4		1		~		✓	,	1								
Analog 0 10 mA differential	8	~	~	~	~	~	~	~	~								
Thermocouple unipolar	8	~	~	~	~	~	~	~	~								
Thermocouple differential	4	✓ ✓ ✓		~	 ✓ 												
Thermistor unipolar	8	~	~	~	~	~	~	~	~								

Table 3: PLC analog output function type selection ³							
Output							
Output type	No. of outputs	A01	AO2				
Analog -10 10 V	2	\checkmark	✓				
Analog -20 20 mA	2	\checkmark	✓				
High Z	2	\checkmark	\checkmark				

³ Column No. of outputs represents maximum number of analog outputs that can be selected per one LPC-3.IOU PLC. Each output can only be used as voltage, current or High Z type at the time. Please refer to PROGRAMMING GUIDE for details.



² Column No. of inputs represents maximum number of individual input functions. that can be selected per one LPC-3.IOU PLC. Note that, all together there are physically 16 inputs (input connections) available. For differential analog/quadrature encoder input selection, two/three inputs will be used per one analog/digital input function. Each input can only be connected to one function at the time. Please refer to PROGRAMMING GUIDE for details.



Table 4: PLC digital outputs⁴

			Output														
Output type	No. of outputs	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16
Digital	16	✓	✓	✓	✓	✓	✓	✓	✓	✓	~	✓	\checkmark	✓	~	~	\checkmark

Table 5: External Power Supply⁵

PS1.1 (+)	PLC power supply	830 V DC, 1 A
PS1.2 (-)	Reference point $(^{\perp})$	0 V
PS1.3 (+)	PLC power supply	830 V DC, 1 A
PS1.4 (-)	Reference point ($^{\perp}$)	0 V
PS2.1 (+)	Digital output Q1Q8 power supply	11 30 V DC, 8 A
PS2.2 (-)	Digital output Q1Q8 reference point	0 V to PS2.1/PS2.3
PS2.3 (+)	Digital output Q1Q8 power supply	11 30 V DC, 8 A
PS2.4 (-)	Digital output Q1Q8 reference point	0 V to PS2.3/PS2.1
PS3.1 (+)	Digital output Q9Q16 power supply	11 30 V DC, 8 A
PS3.2 (-)	Digital output Q9Q16 reference point	0 V to PS3.1/PS3.3
PS3.3 (+)	Digital output Q9Q16 power supply	11 30 V DC, 8 A
PS3.4 (-)	Digital output Q9Q16 reference point	0 V to PS3.3/PS3.1

Table 6: Switch

S1	Operation mode (RUN/STOP)	<i>RUN</i> : PLC normal operational mode <i>STOP</i> : application not running, connected PLCs outputs in their off state
S2	CAN1 bus termination	On: corresponding channel is internally terminated with 120 Ω Off: no internal termination present
\$3	CAN2 bus termination	On: corresponding channel is internally terminated with 120 Ω Off: no internal termination present

Table 7: LED.I1 LED.I16 ⁶						
Input status LED	On: LED is switched On Off: LED is switched Off					

Table 8: LED.Q1 LED.Q16						
Output status LED	<i>On</i> : source voltage present, LED is switched On <i>Off</i> : output Off or over current /over temperature protection active, LED is switched Off					

⁴ **Column No.** of outputs represents maximum number of digital outputs, that can be used per one LPC-3.IOU PLC. Please refer to PROGRAMMING GUIDE for details.

⁶ LED.11 .. LED.116 can be switched On/Off by Smarteh IDE software. LED.11 .. LED.116 are not directly connected to individual input I1..116. Please refer to CONNECTION & CONFIGURATION GUIDE for details.



⁵ Wires connected to the module must have cross sectional area at least 0.75 mm². Minimum temperature rating of wire insulation must be 85 °C.



Table 9: LED								
LED1	Application running (RUN)	<i>On</i> : application is running <i>Off</i> : application is stopped or PLC in boot mode						
LED2	USB connectivity (USB)	On: USB connection established Off: no USB connection						
LED3	Power (PWR)	On: PLC is powered On Off: PLC has no power supply						

Table 10: CAN ⁷							
Master	CAN1.1	CAN1 Low (Lo)	0 5 1				
	CAN1.2	CAN1 High (Hi)	05V				
CAN1 M	CAN1.3	CAN1 reference point (Gnd1)	0 V to CAN1				
Slave	CAN2.1	CAN2 Low (Lo)	0 51				
	CAN2.2	CAN2 High (Hi)	- U JV				
CAN2 S	CAN2.3	CAN2 reference point (Gnd2)	0 V to CAN2				
Master	CAN1.4	CAN1 Low (Lo)	0 5 1/				
	CAN1.5	CAN1 High (Hi)	05V				
CAN1 M	CAN1.6	CAN1 reference point (Gnd1)	0 V to CAN1				
Slave	CAN2.4	CAN2 Low (Lo)	0 5 1				
	CAN2.5	CAN2 High (Hi)	- U JV				
CAN2 S	CAN2.6	CAN2 reference point (Gnd2)	0 V to CAN2				

Table 11: Analog output ⁸								
		Set as voltage output	Set as current output	Disabled				
AO1.1	Analog output 1	-10 10 V,5 mA	-20 20 mA	High Z				
AO1.2	Reference point ($^{\perp}$)	0 V						
AO2.1	Analog output 2	-10 10 V,5 mA	-20 20 mA	High Z				
AO2.2	Reference point ($^{\perp}$)		0 V					

⁸ Wires connected to the module must have cross sectional area at least 0.75 mm². Minimum temperature rating of wire insulation must be 85 °C. Type (voltage, current or High Z) of both analog outputs can be individually set by Smarteh IDE software. Please refer to CONNECTION & CONFIGURATION GUIDE for details.



⁷ Wires connected to the module must have cross sectional area at least 0.14 mm². Use twisted-pair cables of type CAT5+ or better, shielding is recommended. Minimum temperature rating of wire insulation must be 85 °C. Galvanic isolation of 2500 V DC between CAN1, CAN2 and rest of the PLC circuit is provided.



Table 12: Input ²								
		Input set as						
	Digital	Digital	Fast counter	Quadrature encoder				
	-12 30 V R _{in} = 3.9 kΩ Max. input freq. = 25 Hz	-12 30 V R _{in} = 3.9 kΩ Max. input freq.= 50 Hz	-12 30 V R _{in} = 3.9 kΩ Max. input freq.= 100 kHz	-12 30 V R _{in} = 3.9 kΩ Max. input freq.= 50 kHz				
11	Digital input 1							
12	Digital input 2							
13	Digital input 3							
14	Digital input 4							
15	Digital input 5							
16	Digital input 6							
17	Digital input 7							
18	Digital input 8							
19		Digital input 9	Fast counter 1, count input					
110		Digital input 10		Quad. encoder 1, input (A)				
111		Digital input 11		Quad. encoder 1, input (B)				
112		Digital input 12		Quad. encoder 1, (Reset) input				
113		Digital input 13	Fast counter 2, count input					
114		Digital input 14		Quad. encoder 2, input (A)				
115		Digital input 15		Quad. encoder 2, input (B)				
116		Digital input 16		Quad. encoder 2, (Reset) input				

⁹ Wires connected to the module must have cross sectional area at least 0.75 mm². Minimum temperature rating of wire insulation must be 85 °C. Input I1..18 can be set as digital -12 .. 30 V, voltage -10 .. 10 V, current -20 .. 20 mA, voltage 0 .. 1 V (used for thermocouple, thermistor, ... connection) or 0 .. 10 mA. In addition, input filter can also be selected. Input I9..116 can be set as digital -12 .. 30 V, voltage -10 .. 10 V and current -20 .. 20 mA. 2 fast counters or quadrature encoders can be selected. In addition, input filter can also be selected. Please refer to CONNECTION & CONFIGURATION GUIDE for details.



Tab	Table 13: Input ¹⁰								
	Input set as								
	Analog								
	-10 10 V R _{in} = 200 kΩ Unipolar	-10 10 V R _{in} = 400 kΩ Differential	-20 20 mA ¹¹ R _{in} = 100 Ω Unipolar	-20 20 MA^{11} R_{in} = 100 Ω Differential	01V R _{in} > 2 MΩ Unipolar	0 10 mA ¹² R _{in} = 100 Ω Unipolar			
11	Analog input 1	Analog	Analog input 1	Analog	Analog input 1	Analog input 1			
12	Analog input 2	input 1	Analog input 2	input 1	Analog input 2	Analog input 2			
13	Analog input 3	Analog	Analog input 3	Analog	Analog input 3	Analog input 3			
14	Analog input 4	input 2	Analog input 4	input 2	Analog input 4	Analog input 4			
15	Analog input 5	Analog	Analog input 5	Analog	Analog input 5	Analog input 5			
16	Analog input 6	input 3	Analog input 6	input 3	Analog input 6	Analog input 6			
17	Analog input 7	Analog	Analog input 7	Analog	Analog input 7	Analog input 7			
18	Analog input 8	input 4	Analog input 8	input 4	Analog input 8	Analog input 8			
19	Analog input 9	Analog	Analog input 9	Analog					
I10	Analog input 10	input 5	Analog input 10	input 5					
l11	Analog input 11	Analog	Analog input 11	Analog					
112	Analog input 12	input 6	Analog input 12	input 6					
113	Analog input 13	Analog	Analog input 13	Analog					
114	Analog input 14	input 7	Analog input 14	input 7					
l15	Analog input 15	Analog	Analog input 15	Analog					
116	Analog input 16	input 8	Analog input 16	input 8					

¹² Take care when -20 .. 20 mA, 0 .. 10 mA, Pt100 or Pt200 is selected not to exceed <-3 or > 3 V of input voltage on corresponding input. 100 Ω internal resistor can permanently be damaged and it can result in wrong measurement or measurement out of specified tolerances. Please refer to CONNECTION & CONFIGURATION GUIDE for details.



¹⁰ Wires connected to the module must have cross sectional area at least 0.75 mm². Minimum temperature rating of wire insulation must be 85 °C. Input I1..18 can be set as digital -12 .. 30 V, voltage -10 .. 10 V, current -20 .. 20 mA, voltage 0 .. 1 V (used for thermocouple, thermistor, ... connection) or 0 .. 10 mA. In addition, input filter can also be selected. Inputs I9..116 can be set as digital -12 .. 30 V, voltage -10 .. 10 V and current -20 .. 20 mA. 2 fast counters or quadrature encoders can be selected. In addition, input filter can also be selected. Please refer to CONNECTION & CONFIGURATION GUIDE for details.

¹¹ Take care when -20 .. 20 mA, 0 .. 10 mA, Pt100 or Pt200 is selected not to exceed <-3 or > 3 V of input voltage on corresponding input. 100 Ω internal resistor can permanently be damaged and it can result in wrong measurement or measurement out of specified tolerances. Please refer to CONNECTION & CONFIGURATION GUIDE for details.



Table 13: Input (continue) ¹³						
		Input set as				
	Thermocouples	The	rmistors			
	E, J, K, N, R, S, T	Pt100	Pt200 Pt500 Pt1000 NTC 10 kΩ Ni1000			
	01 V R _{in} > 2 ΜΩ	$0 1 V^{14}$ R _{in} = 100 Ω	01V R _{in} = 3.9 kΩ			
11	Analog input 1	Analog input 1	Analog input 1			
12	Analog input 2	Analog input 2	Analog input 2			
13	Analog input 3	Analog input 3	Analog input 3			
14	Analog input 4	Analog input 4	Analog input 4			
15	Analog input 5	Analog input 5	Analog input 5			
16	Analog input 6	Analog input 6	Analog input 6			
17	Analog input 7	Analog input 7	Analog input 7			
18	Analog input 8	Analog input 8	Analog input 8			
19						
I10						
I11						
l12						
l13						
l14						
l15						
l16						

¹⁴ Take care when -20 .. 20 mA, 0 .. 10 mA, Pt100 or Pt200 is selected not to exceed <-3 or > 3 V of input voltage on corresponding input. 100 Ω internal resistor can permanently be damaged and it can result in wrong measurement or measurement out of specified tolerances. Please refer to CONNECTION & CONFIGURATION GUIDE for details.



¹³ Wires connected to the module must have cross sectional area at least 0.75 mm². Minimum temperature rating of wire insulation must be 85 °C. Input I1..18 can be set as digital -12 .. 30 V, voltage -10 .. 10 V, current -20 .. 20 mA, voltage 0 .. 1 V (used for thermocouple, thermistor, ... connection) or 0 .. 10 mA. In addition, input filter can also be selected. Inputs I9..116 can be set as digital -12 .. 30 V, voltage -10 .. 10 V and current -20 .. 20 mA. 2 fast counters or quadrature encoders can be selected. In addition, input filter can also be selected. Please refer to CONNECTION & CONFIGURATION GUIDE for details.



Table	Table 14: Digital output ¹⁵					
	Source 11 30 V DC ¹⁶ Max. current per output = 1.2 A Max. output frequency = 50 Hz	Source 11 30 V DC ¹⁷ Max. current per output = 1.2 A Max. output frequency = 50 Hz				
Q1	Digital output 1					
Q2	Digital output 2					
Q3	Digital output 3					
Q4	Digital output 4					
Q5	Digital output 5					
Q6	Digital output 6					
Q7	Digital output 7					
Q8	Digital output 8					
Q9		Digital output 9				
Q10		Digital output 10				
Q11		Digital output 11				
Q12		Digital output 12				
Q13		Digital output 13				
Q14		Digital output 14				
Q15		Digital output 15				
Q16		Digital output 16				

¹⁷ Digital outputs Q9..Q16 are source type of outputs in reference to PS2.1/PS2.3 negative (-) voltage. Positive power supply is provided from PS3.1 (+) / PS3.3 (+) connection. Please refer to CONNECTION & CONFIGURATION GUIDE for details.



¹⁵ Wires connected to the module must have cross sectional area at least 0.75 mm². Minimum temperature rating of wire insulation must be 85 °C. Galvanic isolation (500 V AC) between digital outputs Q1..Q8, PS2.1, PS2.2, PS2.3, PS2.4 and digital outputs Q9..Q16, PS3.1, PS3.2, PS3.3, PS3.4 and rest of the PLC circuit is provided.

¹⁶ Digital outputs Q1..Q8 are source type of outputs in reference to PS2.1/PS2.3 negative (-) voltage. Positive power supply is provided from PS2.1 (+) / PS2.3 (+) connection. Please refer to CONNECTION & CONFIGURATION GUIDE for details.



3.3 Mounting instructions

Figure 3: Housing dimensions



Module surrounding area must be free for optimal cooling.

EXTERNAL SWITCH OR CIRCUIT-BREAKER AND EXTERNAL OVERCURRENT PROTECTION: The unit is allowed to be connected to installation with over current protection that has nominal value of 6 A or less.

RECOMMENDATION ON SWITCH OR CIRCUIT-BREAKER PROTECTION: There should be two poles main switch in the installation in order to switch off the unit. The switch should meet the requirements of standard IEC60947 and have a nominal value at least 6 A. The switch or circuit-breaker should be within easy reach of the operator. It should be marked as the disconnecting device for the equipment. All connections, PLC attachments and assembling must be done while PLC is not connected to the main power supply.

Wires connected to the PLC must have cross sectional area at least 0.75 mm². Minimum temperature rating of wire insulation must be 85 $^{\circ}$ C.

- 1. Switch OFF external power supply PS1, PS2 and PS3.
- 2. Mount LPC-3 PLC to the provided place inside an electrical panel (DIN EN50022-35 rail mounting).
- 3. Mount other LPC-3 PLC (if required). Mount each PLC to the DIN rail first and then make required connections or connect disconnect-able connectors.
- 4. Connect needed input, output and communication wires.
- 5. Switch ON power supply PS1, PS2 and PS3.





4 TECHNICAL SPECIFICATIONS

Table 15: General technical specifications					
LPC-3.IOU.001 external power supply PS1	8 30 V DC				
LPC-3.IOU.001 external power consumption PS1	Max. 5 W				
PS1 rated isolation voltage to PS2 and PS3	500 V AC				
Digital output Q1Q8 power supply PS2	11 30 V DC				
Maximum PS2 current	8 A				
PS2 rated isolation voltage to PS1 and PS3	500 V AC				
Digital output Q9Q16 power supply PS3	11 30 V DC				
Maximum PS3 current	8 A				
PS3 rated isolation voltage to PS1 and PS2	500 V AC				
CAN1 isolation voltage to CAN2	2500 V DC				
CAN1 or CAN2 isolation voltage to PS1, PS2, PS3	2500 V DC				
Connection type	Disconnect-able spring type connectors for stranded wire 0.14 to 2.5 mm ²				
Ethernet	RJ-45 10/100T IEEE 802.3i				
USB	B connector type, device mode, low speed, full speed				
RTC	capacitor backed up with retention of cca. 30 days.				
Dimensions (L x W x H)	110 x 100 x 35 mm				
Weight	350 g				
Ambient temperature	0 to 50 °C				
Ambient humidity	max. 95 %, no condensation				
Maximum altitude	2000 m				
Mounting position	vertical				
Transport and storage temperature	-20 to 60 °C				
Pollution degree	2				
Over-voltage category	II				
Electrical equipment	Class II (double insulation)				
Protection class	IP 30				



Table 16: Analog output technical specifications¹⁸

	Set as analog output type		
	Voltage -10 10 V	Current -20 20 mA	
Analog output range	-10 10 V	-20 20 mA	
Max. current source or sink current on full scale	5 mA per output	20 mA per output	
Max. short circuit source or sink current	40 mA per output	20 mA per output	
Load resistance for analog outputs	R > 2000 Ω	R < 500 Ω	
Analog output accuracy of the full scale value for ambient temperature range 0 \ldots 50 $^\circ C$	±0.35 %	±0.50 %	
DAC resolution	min. 3600 levels	min. 3600 levels	
Max. transition time per channel	5 mili sec.	5 mili sec.	

Table 17: Input technical specifications for inputs set asexternal voltage source digital input¹⁹

	Input I118 Input I911			.116	
Digital input range	-12 30 V				
Input resistance	3.9 kΩ				
Max. input frequency, ADC set to 14 bit	25 Hz	50 Hz			
Max. input frequency, ADC set to 20 bit	1 Hz	50 Hz			
Input "Off" threshold voltage ²⁰	-10 10 V DC	1 3 7 16 V DC		16 V DC	
Input "ON" threshold voltage ²⁰	-10 10 V DC	4	6	10	20 V DC

Table 18: Input technical specifications for inputs set asexternal voltage source fast counter input²¹

	Fast Counter 1; Input I9 Fast Counter 2; Input I13			19 113
Fast counter input range	-12 30 V			
Input resistance	3.9 kΩ			
Max. input frequency, input filter Off ²²	100 kHz			
Max. input frequency, input filter On ²²	500 Hz			
Input "Off" threshold voltage ²⁰	1 3 7 16 V DC			
Input "ON" threshold voltage ²⁰	4 6 10 20 V DC			20 V DC

²² Input filters are programmed by Smarteh IDE software. Please refer to CONNECTION & CONFIGURATION GUIDE for details.



¹⁸ Analog output voltages and currents are measured to analog output reference point ($^{\perp}$).

¹⁹ **Digital input** voltages are measured to digital input reference point (\perp) .

²⁰ Threshold programmed by Smarteh IDE software. Please refer to CONNECTION & CONFIGURATION GUIDE for details.

²¹ **Fast counter** input voltages are measured to fast counter input reference point (\perp) .



Table 19: Input technical specifications for inputs set as external voltage source quadrature encoder input²³

			-	
	Quadrature Encoder 1; Input I10(A), I11(B), I12(Reset) Quadrature Encoder 2; Input I14(A), I15(B), I16(Reset)			
Quadrature encoder input range	-12 30 V			
Input resistance	3.9 kΩ			
Max. input frequency, input filter Off ²⁴	50 kHz			
Max. input frequency, input filter On ²⁴	500 Hz			
Input "Off" threshold voltage ²⁵	1	3	7	16 V DC
Input "On" threshold voltage ²⁵	4	6	10	20 V DC

Table 20: Input technical specifications for inputs 11..116 set as analog input -10 .. 10 V²⁶

	ADC resolution set to		
	14 bit	20 bit	
Analog input range	-10 10 V		
Input resistance in unipolar connection	200	kΩ	
Input resistance in differential connection	400 kΩ		
Analog input accuracy of the full scale value for temperatures 20 \therefore 30 $^{\circ}C$ (unipolar and differential)	±0.25 %		
Analog output accuracy of the full scale value for temperatures 0 50 °C (unipolar and differential)	±0.35 %		
ADC resolution when	Min. 56000 levels Min. 900000 level		
Max. input frequency I1I8	25 Hz 1 Hz		
Max. input frequency, input filter Off 19116	25 Hz 1 Hz		
Max. input frequency, input filter On 19116	10 Hz 1 Hz		

24 Input filters are programmed by Smarteh IDE software. Please refer to CONNECTION & CONFIGURATION GUIDE for details.

²⁶ Analog input -10 .. 10 V voltages are measured to analog input reference point (\perp). Note: ADC set to 14bit resolution is recommended for differential input setting.



²³ Quadrature encoder input voltages are measured to quadrature encoder input reference point ($^{\perp}$).

²⁵ Threshold is programmed by Smarteh IDE software. Please refer to CONNECTION & CONFIGURATION GUIDE for details.



analog input -20 20 mA ²⁷					
	ADC resolution set to				
	14 bit	20 bit			
Analog input range	-20 20 mA				
Input resistance unipolar connection	100 Ω				
Input resistance differential connection	200 Ω				
Analog input accuracy of the full scale value for temperatures 20 \dots 30 °C (unipolar and differential)	±0.45 %				
Analog input accuracy of the full scale value for temperatures 0 50 $^\circ\text{C}$ (unipolar and differential)	±0.65 %				
ADC resolution when	Min. 56000 levels Min. 900000 levels				
Max. input frequency	25 Hz 1 Hz				

Table 21. Input technical specifications for inputs 11, 18 set as

Table 22: Input technical specifications for inputs I9..I16 set as analog input -20..20 mA²⁷

51	5 1					
	ADC resolution set to					
	14 bit 20 bit					
Analog input range	-20 2	20 mA				
Input resistance unipolar connection	100 Ω					
Input resistance differential connection	200 Ω					
Analog input accuracy of the full scale value for temperatures 20 \therefore 30 °C unipolar and differential	±0.65 %					
Analog input accuracy of the full scale value for temperatures 0 50 $^\circ\text{C}$ unipolar and differential	±0.85 %					
ADC resolution when	Min. 56000 levels Min. 900000 levels					
Max. input frequency off	25 Hz 1 Hz					
Max. input frequency on	10 Hz 1 Hz					



²⁷ Analog input -20 .. 20 mA currents are measured to analog input reference point (1). Note: ADC set to 14 bit resolution is recommended.



Table 23: Input technical specifications for inputs 11..18 set as unipolar analog input 0..1 V²⁸

unipolar analog input 0 i v	
Analog input range	0 1 V
Input resistance unipolar and differential	>2 MΩ
Analog input accuracy of the full scale value for temperatures 20 \dots 30 $^\circ C$ unipolar	±0.02 %
Analog input accuracy of the full scale value for temperatures 0 50 $^\circ\text{C}$ unipolar	±0.03 %
Analog input accuracy of the full scale value for 0 $$ 100 mV input voltage and temperatures 20 $$ 30 $^\circ C$	±0.005 %
Analog input accuracy of the full scale value for 0 \dots 100 mV input voltage and temperatures 0 \dots 50 $^\circ C$	±0.007 %
ADC resolution (ADC set to 20 bit)	Min. 1000000 levels
Max. input frequency	1 Hz

Table 24: Input technical specifications for inputs 11..18 set as unipolar analog input 0.. 10 mA²⁹

Analog input range	0 10 mA
Input resistance	100 Ω
Analog input accuracy of the full scale value for temperatures 20 30 $^\circ\text{C}$	±0.20 %
Analog output accuracy of the full scale value for temperatures 0 50 $^\circ\text{C}$	±0.30 %
ADC resolution (ADC set to 20 bit)	Min. 1000000 levels
Max. input frequency	1 Hz

Table 25: Input technical specifications for 100 Ω input 1118 resistors ³⁰						
Input resistance for temperatures 20 30 $^\circ\text{C}$	±0.15 %					
Input resistance for temperatures 0 \dots 50 $^{\circ}$ C	±0.20 %					

Table 26: Input technical specifications for 100 Ω input 19..116 resistors

Input resistance for temperatures 0 50 $^\circ\text{C}$	±0.50 %

^{30 100} Ω internal resistors on inputs 11..18 are factory calibrated. Input resistor values are measured to input reference point (¹). Please refer to CONNECTION & CONFIGURATION GUIDE for details.



²⁸ Analog input 0 .. 1 V voltages are measured to analog input reference point (\perp). Please refer to CONNECTION & CONFIGURATION GUIDE for details. Accuracies for thermocouple temperature measurements are written in Thermocouple programming guide and accuracies for thermistor temperature measurements are written in Thermistor programming guide chapter. Please refer to PROGRAMMING GUIDE chapter for details.

²⁹ Analog input 0 .. 10 mA currents are measured to analog input reference point ($^{\perp}$). Please refer to CONNECTION & CONFIGURATION GUIDE for details.



Table 27: Input technical specifications for	3.9 k Ω input 1118 resistors ³¹
Table 27: Input technical specifications for 3.9 kΩ input 1118 resistors 31Input resistance for temperatures 20 30 °C±0.15 %Input resistance for temperatures 0 50 °C±0.20 %	
Input resistance for temperatures 0 50 $^\circ\text{C}$	±0.20 %

Table 28: Input technical specifications for	3.9 kΩ input 19116 resistors
Input resistance for temperatures 0 \dots 50 $^\circ$ C	±0.50 %

Table 29: Input technical specifications for 11..18 average junction temperature measurement³²

•	
Junction temperature measurement range ³³	-40 125 °C
Resolution	< 0.1 °C
Junction temperature measurement error 0 50 $^\circ\text{C}$	< ±4 °C
Junction temperature measurement error 20 30 $^\circ\text{C}$	< ±2 °C

³³ Note that LPC-3.IOU.001 can only operate when ambient temperature is in range between 0 .. 50 °C. Junction temperature measurement range is theoretical temperature range, that can be read.



^{31 3.9} k Ω internal resistors on inputs 11..18 are factory calibrated. Input resistor values are measured to input reference point (\perp). Please refer to CONNECTION & CONFIGURATION GUIDE for details. Additional more accurate results can be achieved by manually calibrate.

³² Junction temperature is typically used for thermocouple junction temperature compensation. It is average temperature of 11..18 terminals. For proper junction temperature measurement only PLC self cooling is allowed. Avoid external forced cooling or heating of the PLC (e.g. fan cooling). Cooling required space around PLC must be respected, as written in MOUNTING INSTRUCTIONS. For more accurate thermocouple junction temperature measurement, external compensation temperature sensor must be provided and connected to properly selected and programmed PLC input. Please refer to CONNECTION & CONFIGURATION GUIDE and PROGRAMMING GUIDE for details.



Table 50. Output technical specifications for digital outputs								
Source, P channel FET output								
11 30 V DC								
1.2 A								
50 Hz								
200 µs								
250 μs								
3 A								
-1.5 A								
10 J								
1 J								
limited by digital outputs internal thermal protection								
350 mΩ								
50 µA								
Yes								
Yes								

Table 30: Output technical specifications for digital outputs³⁴

³⁵ **Sum current** on power supply pin for transistors outputs can not exceed 8 A. **Please refer to INSTALLATION GUIDE** for details.



³⁴ Digital outputs Q1..Q8 voltages and currents are measured to digital outputs Q1..Q8 reference point PS2.1/PS2.3. Digital outputs Q9..Q16 voltages and currents are measured to digital outputs Q9..Q16 reference point PS3.1/PS3.3. Please refer to CONNECTION & CONFIGURATION GUIDE for details.



5 CONNECTION & CONFIGURATION GUIDE

5.1 Main connection scheme & configuration



36 Coloured areas represents galvanic isolated areas. Please refer to General technical specifications in chapter TECHNICAL SPECIFICATIONS for details.



Figure 5: Grounding possibilities³⁷



a) All PLC negative power supply poles connected together on to the Protective Earth (PE) \bigoplus functional earthing.



b) All PLC negative power supply poles connected together but not to the Protective Earth (PE) (-) functional earthing.

³⁷ **Potential differences** between any two negative power supply poles could not exceed prescribed values. **Please refer to** TECHNICAL SPECIFICATIONS for details.





Figure 5: Grounding possibilities³⁸



c) Not any PLC negative power supply poles connected together or to the Protective Earth (PE) \bigoplus functional earthing.



d) Mixed connection where required, selected PLC negative power supply poles connected together and/or to the Protective Earth (PE) (1) functional earthing.

³⁸ **Potential differences** between any two negative power supply poles could not exceed prescribed values. **Please refer to** TECHNICAL SPECIFICATIONS for details.





Figure 6: Main configuration of the PLC³⁹



Smarteh IDE configuration interface.

oject Help > IOU (Main	n Control Module	/ CPU)								
		Flash uploader page								
		Device	User data							
		-	NVMEM Page 1 [1 -	100]						
© Q1	I10	Read Write	▼ NVMEM 1-20			NVMEM 21-40			NVMEM 41-60	_
Q2 Q3	12 - 13 -	- Ethornot sottings	NVMEM_W_1	0	0	NVMEM_W_21	0	0	NVMEM_W_41	C
Q4 Q5	14	MAC Address	NVMEM W 2	0	0	NVMEM W 22	0	0	NVMEM W 42	0
Q6	16 0		NVAEN W 2	0		NU/MEN4 14/ 22	0		NUMERA W 42	
Q8	17	IP Address	INVINEM_W_3	0	0	INVMEM_VV_23	U	0	INVINEM_W_43	_
SMART) Feh		NVMEM_W_4	0	0	NVMEM_W_24	0	0	NVMEM_W_44	
LPC-3.IO	U.001	MASK	NVMEM_W_5	0	0	NVMEM_W_25	0	0	NVMEM_W_45	
		Gateway	NVMEM_W_6	0	0	NVMEM_W_26	0	0	NVMEM_W_46	
● PWR			NVMEM W 7	0	0	NVMEM W 27	0	0	NVMEM W 47	
Q9	19 0	Primary DNS		_			-			
⊂Q10 ⊂Q11	110		NVMEM_W_8	0	0	NVMEM_W_28	0	0	NVMEM_W_48	
Q12	112	Secondary DNS	NVMEM_W_9	0	0	NVMEM_W_29	0	0	NVMEM_W_49	
⊂Q13 ⊂Q14	113 - 114 -		NVMEM_W_10	0	0	NVMEM_W_30	0	0	NVMEM_W_50	
= Q15 = Q16	115 - 116 -	PTC cottings	NVMEM_W_11	0	0	NVMEM_W_31	0	0	NVMEM_W_51	(
		Offset register	NVMEM W 12	0	0	NVMEM W 32	0	0	NVMEM W 52	-
		-		•			•			
			NVMEM_W_13	0	0	NVMEM_W_33	U	0	NVMEM_W_53	
			NIVMEM W 14	٥		NVMEM W 34	٥	0	NIVMEM W 54	- (
/24W						OFFLINE << ON	LINE			
dule is CPU.										

Smarteh IDE flash uploader page.

39 Configuration of the PLC is done using Smarteh IDE software tool. Please refer to PROGRAMMING GUIDE for details.



5.2 Digital input connection scheme & configuration guide

Figure 7: Digital input I1..116 connection scheme⁴⁰



a) Voltage free contact connection to PLC input.



b) Active voltage source or push/pull output connection to PLC input.



c) Active voltage sink output connection to PLC input.

⁴⁰ Inputs 11..116 are not galvanic isolated between each other and to the rest of the PLC circuit on the same reference potential ([⊥]). For galvanic isolation of the PLC 11..116 inputs to inputs on other LPC-3.IOU, use CAN1/CAN2 galvanic isolated communication ports for data exchanging. Digital outputs Q1..Q8 and Q9..Q16 on the same LPC-3.IOU PLC are galvanic isolated to inputs 11..116. Use galvanic isolated free contacts and/or digital input voltage sources.







Inputs/Outputs channel settings												
11+	ADC Resolution ADC Resolution	ution 20 B	Input I9.I16 DI threshold level	© 6V on, 3V	off 💿 10V on, 7V off 💿 20V on, 16V off							
12 - 13 -	IO channel	Used	Function		Function setting							
14 -	11		Input Range -1010V/-2020mA	Ŧ	-10V10V, max freq. 25Hz (14bit) / 1Hz (20bit)	~						
15 -	I2		Input Range -1010V/-2020mA	Ŧ	-10V10V, max freq. 25Hz (14bit) / 1Hz (20bit)	-						
17 -	I3		Input Range -1010V/-2020mA	Ŧ	-10V10V, max freq. 25Hz (14bit) / 1Hz (20bit)	-						
18	I4		Input Range -1010V/-2020mA	Ŧ	-10V10V, max freq. 25Hz (14bit) / 1Hz (20bit)	-						
ен	15		Input Range -1010V/-2020mA	Ŧ	-10V10V, max freq. 25Hz (14bit) / 1Hz (20bit)	-						
J.001	16		Input Range -1010V/-2020mA		-10V10V, max freq. 25Hz (14bit) / 1Hz (20bit)	-						
	17		Input Range -1010V/-2020mA	Ŧ	-10V10V, max freq. 25Hz (14bit) / 1Hz (20bit)	-						
RUN	18		Input Range -1010V/-2020mA	Ŧ	-10V10V, max freq. 25Hz (14bit) / 1Hz (20bit)	Ŧ						
	19		Input Range -1010V/-2020mA	*	-10V10V, max freq. 25Hz	-						
19	I10		Input Range -1010V/-2020mA	Ŧ	-10V10V, max freq. 25Hz	Ŧ						
111 =	I11		Input Range -1010V/-2020mA	Ŧ	-10V10V, max freq. 25Hz	-						
112	I12		Input Range -1010V/-2020mA	*	-10V10V, max freq. 25Hz	Ŧ						
114 0	I13		Input Range -1010V/-2020mA	Ŧ	-10V10V, max freq. 25Hz	Ŧ						
115	I14		Input Range -1010V/-2020mA	Ŧ	-10V10V, max freq. 25Hz	Ŧ						
116-	I15		Input Range -1010V/-2020mA	Ŧ	-10V10V, max freq. 25Hz	-						
	I16		Input Range -1010V/-2020mA	Ŧ	-10V10V, max freq. 25Hz	Ŧ						
	AO1		Analog output	Ŧ	-10V10V	Ŧ						
	AO2		Analog output	Ŧ	-10V10V	-						







5.3 Digital output connection scheme & configuration guide

Figure 9: Digital output Q1..Q16 connection scheme⁴¹



a) PLC digital output Q1..Q8 connection to loads.



b) PLC digital output Q9..Q16 connection to loads.

NOTE: Digital output Q1..Q16 signals are always available in Smarteh IDE.

⁴¹ **Outputs Q1..Q8 are galvanic isolated** to outputs Q9..Q16, to inputs I1..I16 and to the rest of the PLC circuit on the same reference potential (⊥).



5.4 Analog input -10 .. 10 V connection scheme & configuration guide

Figure 10: Analog input I1.. I16, -10 .. 10 V connection scheme⁴²



a) Unipolar connection of active voltage source/transducer -10 .. 10 V to PLC input.



b) Differential connection of active voltage source/transducer -10 .. 10 V to PLC input.

⁴² Inputs 11..116 are not galvanic isolated between each other and to the rest of the PLC circuit on the same reference potential (⊥). For galvanic isolation of the PLC 11..116 inputs to inputs on other LPC-3.IOU, use CAN1/CAN2 galvanic isolated communication ports for data exchanging. Digital outputs Q1..Q8 and Q9..Q16 on the same LPC-3.IOU PLC are galvanic isolated to inputs 11..116. Cables for wiring analog signals must be shielded twisted-pair type. This reduce but not eliminate interferences. Potential difference between the cable shield end and earth potential may cause current through the shield which cause unwanted disturbance. To avoid this effect ground only one end of the cable shielding. Use galvanic isolated analog input voltage sources.







a > 100 (Man Control Module / CPU) a Inputs/Outputs channel settings ADC Resolution Input 19.116 D1 threshold level a 14 Bit 20 Bit b 14 Bit 20 Bit C Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / 1Hz (20bit) C Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / 1Hz (20bit) B Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / 1Hz (20bit) IS Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / 1Hz (20bit) IS Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / 1Hz (20bit) IS Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / 1Hz (20bit) IS Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / 1Hz (20bit) IS Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / 1Hz (20bit) IS Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / 1Hz (20bit) IS Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz V ID Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz V ID Input Range -1						(0011)		h IDE	Dec Smarter Project Help Collection
01 H 02 H 03 H 04 H 05 H 06 H 07 H 08 H 09 H 10 Channel Used 11 Input Range -10.10V/-20.20mA 12 Input Range -10.10V/-20.20mA 13 Input Range -10.10V/-20.20mA 14 Input Range -10.10V/-20.20mA 15 Input Range -10.10V/-20.20mA 16 Input Range -10.10V/-20.20mA 15 Input Range -10.10V/-20.20mA 16 Input Range -10.10V/-20.20mA 16 Input Range -10.10V/-20.20mA 17 Input Range -10.10V/-20.20mA 18 Input Range -10.10V/-20.20mA 19 Input Range -10.10V/-20.20mA 100 Input Range -10.10V/-20.20mA 11 Input Range -10.10V/-20.20mA 101 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td>e / CPU)</td> <td>odule</td> <td>lain Control Mi</td> <td>« > 100 (Ma</td>						e / CPU)	odule	lain Control Mi	« > 100 (Ma
ADC Resolution input 19.116 DI threshold level 14 Bit 20 Bit Not used 4V on, 1V off 6V on, 3V off 10V on, 7V off 20V on, 16V off 14 Bit 20 Bit Not used 4V on, 1V off 20V on, 3V off 20V on, 16V off 10 channel Used Function Function setting 11 V Input Range 10.10V/20.20mA - 10V.10V, max freq.25Hz (14bit) / 1Hz (20bit) + 12 V Input Range 10.10V/20.20mA - 10V.10V, max freq.25Hz (14bit) / 1Hz (20bit) + 13 V Input Range 10.10V/20.20mA - 10V.10V, max freq.25Hz (14bit) / 1Hz (20bit) + 14 V Input Range 10.10V/20.20mA - 10V.10V, max freq.25Hz (14bit) / 1Hz (20bit) + 15 Input Range 10.10V/20.20mA - 10V.10V, max freq.25Hz (14bit) / 1Hz (20bit) + 16 Input Range 10.10V/20.20mA - 10V.10V, max freq.25Hz (14bit) / 1Hz (20bit) + 17 V Input Range 10.10V/20.20mA - 10V.10V, max freq.25Hz (14bit) / 1Hz (20bit) + 18 V Input Range 10.10V/20.20mA - 10V.10V, max freq.25Hz (14bit) / 1Hz (20bit) + 19 V Input Range 10.10V/20.20mA - 10V.10V, max freq.25Hz (14bit) / 1Hz (20bit) + 10 Input Range 10.10V/20.20mA - 10V.10V, max freq.25Hz + 10Hit) / 1Hz (20bit) + 110 V Input Range 10.10V/20.20mA - 10V.10V, max freq.25Hz + 111 20 Input Range 10.10V/20.20mA - 10V.10V, max freq.25Hz + 111 20 Input Range 10.10V/20.20mA - 10V.10V, max freq.25Hz + 111 20 Input Range 10.10V/20.20mA - 10V.10V, max freq.25Hz + 111 20 Input Range 10.10V/20.20mA - 10V.10V, max freq.25Hz + 111 20 Input Range 10.10V/20.20mA - 10V.10V, max freq.25Hz + 111 20 Input Range 10.10V/20.20mA - 10V.10V, max freq.25Hz + 113 20 Input Range 10.10V/20.20mA - 10V.10V, max freq.25Hz + 113 20 Input Range 10.10V/20.20mA - 10V.10V, max freq.25Hz + 115 20 Input Range 10.10V/20.20mA - 10V.10V, max freq.25Hz + 115 20 Input Range 10.10V/20.20mA - 10V.10V, max freq.25Hz + 116 20 Input Range 10.10V/20.20mA - 10V.10V, max freq.25Hz + 116 20 Input Range 10.10V/20.20mA - 10V.10V, max freq.25Hz + 116 20 Input Range 10.10V/20.20mA - 10V.10V, max freq.25Hz + 116 20 Input Range 10.10V/20.20mA - 10V.10V, max freq.25Hz + 116 20 Input Range 10.10V/20.20mA - 10V.10V + 10V.10V + 10V				nnel settings	puts cha	Inputs/Out			
ADC Resolution Input I9.116 DI threshold level 01 14 Bit 20 Bit Not used 4V on, 1V off 6V on, 3V off 10V on, 7V off 20V on, 16V off 03 18 Input Range -10.10V/-20.20mA Input Range -10.10V/-20.20mA Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / 1Hz (20bit) • 12 Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / 1Hz (20bit) • 13 Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / 1Hz (20bit) • 14 Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / 1Hz (20bit) • 14 Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / 1Hz (20bit) • 15 Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / 1Hz (20bit) • 16 Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / 1Hz (20bit) • 10 Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / 1Hz (20bit) • 10 Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / 1Hz (20bit) • 10 Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / 1Hz (20bit) •									
Q1 If Q2 IP Q3 IP Q3 IP Q4 IP Q3 IP Q4 IP				Input I9.I16 DI threshold level	ution —	- ADC Resol	L II	1	
02 12 03 11 10 Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / 1Hz (20bit) 05 15 12 11 <td< td=""><td></td><td>off 💿 10V on, 7V off 💿 20V on, 16V off</td><td>6V on, 3V 8</td><td>it 💿 Not used 💿 4V on, 1V off</td><td>© 20 E</td><td>14 Bit</td><td>ш</td><td></td><td>©Q1</td></td<>		off 💿 10V on, 7V off 💿 20V on, 16V off	6V on, 3V 8	it 💿 Not used 💿 4V on, 1V off	© 20 E	14 Bit	ш		©Q1
3 13 4 11 V Input Range -10.10V/-20.20mA -10V10V, max freq. 25Hz (14bit) / 1Hz (20bit) 05 15 12 V Input Range -10.10V/-20.20mA -10V10V, max freq. 25Hz (14bit) / 1Hz (20bit) • 12 V Input Range -10.10V/-20.20mA -10V10V, max freq. 25Hz (14bit) / 1Hz (20bit) • 14 V Input Range -10.10V/-20.20mA -10V10V, max freq. 25Hz (14bit) / 1Hz (20bit) • 15 V Input Range -10.10V/-20.20mA -10V10V, max freq. 25Hz (14bit) / 1Hz (20bit) • 16 V Input Range -10.10V/-20.20mA -10V10V, max freq. 25Hz (14bit) / 1Hz (20bit) • 16 V Input Range -10.10V/-20.20mA -10V10V, max freq. 25Hz (14bit) / 1Hz (20bit) • 17 V Input Range -10.10V/-20.20mA -10V10V, max freq. 25Hz (14bit) / 1Hz (20bit) • 18 V Input Range -10.10V/-20.20mA -10V10V, max freq. 25Hz (14bit) / 1Hz (20bit) • 19 V Input Range -10.10V/-20.20mA -10V10V, max freq. 25Hz • 10 V Input Range -10.10V/-20.20mA -10V10V, max freq. 25Hz • 11		Function setting		Function	Used	IO channel	ш	12	Q2
05 15 06 16 07 17 08 18 19 1	•	-10V10V, max freq. 25Hz (14bit) / 1Hz (20bit)	•	Input Range -1010V/-2020mA	V	I1	ш	i3 ⊕ i4 ⊕	= Q4
08 16 07 17 08 18 19 10 14 10 10 10 11 10 12 10 13 10 14 10 15 10 16 10 17 10 18 10 19 10 10 10 10 10 11 10 11 10 11 10 11 10 11 10 11 10 11 10 11 10 110 10 111 10 111 10 111 10 111 10 111 10 111 10 111 10 111 10 111 10 111 10 111 10 <td>•</td> <td>-10V10V. max freq. 25Hz (14bit) / 1Hz (20bit)</td> <td>•</td> <td>Input Range -10,,10V/-20,,20mA</td> <td>1</td> <td>12</td> <td>ш</td> <td>15 0</td> <td>©Q5</td>	•	-10V10V. max freq. 25Hz (14bit) / 1Hz (20bit)	•	Input Range -10,,10V/-20,,20mA	1	12	ш	15 0	©Q5
Q8 18 14 V Input Range -1010V/-20.20mA -10V10V, max freq. 25Hz (14bit) / Hz (20bit) SMARTEEH LPC-3.IOU.001 15 V Input Range -1010V/-20.20mA -10V10V, max freq. 25Hz (14bit) / Hz (20bit) 16 V Input Range -1010V/-20.20mA -10V10V, max freq. 25Hz (14bit) / Hz (20bit) - 17 V Input Range -1010V/-20.20mA -10V10V, max freq. 25Hz (14bit) / Hz (20bit) - 17 V Input Range -1010V/-20.20mA -10V10V, max freq. 25Hz (14bit) / Hz (20bit) - 18 V Input Range -1010V/-20.20mA -10V10V, max freq. 25Hz (14bit) / Hz (20bit) - 19 V Input Range -1010V/-20.20mA -10V10V, max freq. 25Hz (14bit) / Hz (20bit) - 10 V Input Range -1010V/-20.20mA -10V10V, max freq. 25Hz (14bit) / Hz (20bit) - 10 V Input Range -1010V/-20.20mA -10V10V, max freq. 25Hz (14bit) / Hz (20bit) - 110 V Input Range -1010V/-20.20mA -10V10V, max freq. 25Hz (14bit) / Hz (20bit) - 111 V Input Range -1010V/-20.20mA -10V10V, max freq. 25Hz (14bit) / Hz (20bit) - 112	•	-10V10V. max freq. 25Hz (14bit) / 1Hz (20bit)	•	Input Range -10,,10V/-20,,20mA	1	I3	ш	16 - 17 -	⊂Q6 ⊂Q7
SMARTEH LPC-3.IOU.001 Input Range -10.10V/-20.20mA Investigation IS Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / Hz (20bit) IS Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / Hz (20bit) IS Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / Hz (20bit) IS Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / Hz (20bit) IS Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / Hz (20bit) IS Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / Hz (20bit) IS Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / Hz (20bit) IS Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / Hz (20bit) IS Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / Hz (20bit) IS Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / Hz (20bit) IS Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / Hz (20bit) IS Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / Hz (20bit) IS Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz (14bit) / Hz (20bit) IS Input Range -10.10V/-2	-	-10V.10V max freq. 25Hz (14bit) / 1Hz (20bit)	•	Input Range -1010V/-2020mA	v	14	ш	18	© Q8
LPC-3.IOU.001 Input Range 10.10V/20.20mA Invertex (25Hz) (14bit) / 1Hz (20bit) IF Input Range 10.10V/20.20mA IOV.10V, max freq. 25Hz (14bit) / 1Hz (20bit) IF Input Range 10.10V/20.20mA IOV.10V, max freq. 25Hz (14bit) / 1Hz (20bit) IF Input Range 10.10V/20.20mA IOV.10V, max freq. 25Hz (14bit) / 1Hz (20bit) IF Input Range 10.10V/20.20mA IOV.10V, max freq. 25Hz (14bit) / 1Hz (20bit) IF Input Range 10.10V/20.20mA IOV.10V, max freq. 25Hz (14bit) / 1Hz (20bit) IF Input Range 10.10V/20.20mA IOV.10V, max freq. 25Hz (14bit) / 1Hz (20bit) IF Input Range 10.10V/20.20mA IOV.10V, max freq. 25Hz (14bit) / 1Hz (20bit) IF Input Range 10.10V/20.20mA IOV.10V, max freq. 25Hz IF Input Range 10.10V/20.20mA IOV.10	•	-10V 10V max freq. 25Hz (14bit) / 1Hz (20bit)	•	Input Range -10.10V/-20.20mA	V	15	ш		SMAR
NUN 10 Input Range 10.10V/-20.20mA IOV.10V, max freq. 25Hz (14bit) / 1Hz (20bit) IP Input Range -10.10V/-20.20mA IOV.10V, max freq. 25Hz (14bit) / 1Hz (20bit) IP Input Range -10.10V/-20.20mA IOV.10V, max freq. 25Hz (14bit) / 1Hz (20bit) IP Input Range -10.10V/-20.20mA IOV.10V, max freq. 25Hz (14bit) / 1Hz (20bit) IP Input Range -10.10V/-20.20mA IOV.10V, max freq. 25Hz (14bit) / 1Hz (20bit) IP Input Range -10.10V/-20.20mA IOV.10V, max freq. 25Hz (14bit) / 1Hz (20bit) III Input Range -10.10V/-20.20mA IOV.10V, max freq. 25Hz IIII Input Range -10.10V/-20.20mA	•	-10V 10V max freq. 25Hz (14bit) / 1Hz (20bit)	•	Input Range -10 10V/-20 20mA	J	16	ш	IOU.001	LPC-3.I
BUN US Input Range 1010V/-2020mA USU-10V, max freq. 25Hz (14bit) / 1Hz (20bit) IN I Input Range -1010V/-2020mA IOV10V, max freq. 25Hz (14bit) / 1Hz (20bit) IN I Input Range -1010V/-2020mA IOV10V, max freq. 25Hz (14bit) / 1Hz (20bit) IN I Input Range -1010V/-2020mA IOV10V, max freq. 25Hz (14bit) / 1Hz (20bit) IN I Input Range -1010V/-2020mA IOV10V, max freq. 25Hz III IN I Input Range -1010V/-2020mA IOV10V, max freq. 25Hz III IN I Input Range -1010V/-2020mA IOV10V, max freq. 25Hz IIII IN Input Range -1010V/-2020mA IOV10V, max freq. 25Hz IIII IIII IN Input Range -1010V/-2020mA IOV10V, max freq. 25Hz IIII IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	•	-10V 10V max freq. 25Hz (14bit) / 1Hz (20bit)	•	Input Range -10, 10V/-20, 20mA		17	ш		
WR USB ID	-	-10V 10V max freq. 25Hz (14bit) / 1Hz (20bit)	•	Input Range -10 10V/-20 20mA		18	=	RUN	
Q9 19 10 Input Range 10.10V/-20.20mA 10V.10V, max freq. 25Hz 110 II Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz - 111 II Input Range -10.10V/-20.20mA -10V.10V, max freq. 25Hz - 111 II Input Range -10.10V/-20.20mA - -10V.10V, max freq. 25Hz - 113 II Input Range -10.10V/-20.20mA - -10V.10V, max freq. 25Hz - 113 II Input Range -10.10V/-20.20mA - -10V.10V, max freq. 25Hz - 113 II Input Range -10.10V/-20.20mA - -10V.10V, max freq. 25Hz - 114 Input Range -10.10V/-20.20mA - -10V.10V, max freq. 25Hz - - 115 Input Range -10.10V/-20.20mA - -10V.10V, max freq. 25Hz - - 116 Input Range -10.10V/-20.20mA - -10V.10V, max freq. 25Hz - - 116 Input Range -10.10V/-20.20mA - -10V.10V - - 116 Input Range output - -10V.10V - - 102 Analog o	•	-10V 10V max freq 25Hz	•	Input Range -10 10V/-20 20mA	J	10		USB	PWR
010 110 Input Range 1000/2020MA 10010/, max freq. 25Hz 011 111 Input Range -1010V/-2020mA -10V10V, max freq. 25Hz - 013 113 112 Input Range -1010V/-2020mA -10V10V, max freq. 25Hz - 013 113 Input Range -1010V/-2020mA -10V10V, max freq. 25Hz - 014 113 Input Range -1010V/-2020mA -10V10V, max freq. 25Hz - 015 115 Input Range -1010V/-2020mA - -10V10V, max freq. 25Hz - 115 Input Range -1010V/-2020mA - -10V10V, max freq. 25Hz - - 116 Input Range -1010V/-2020mA - -10V10V, max freq. 25Hz - - 116 Input Range -1010V/-2020mA - -10V10V, max freq. 25Hz - - 116 Input Range -1010V/-2020mA - -10V10V - - - 2/24W Itic Input Range output - -10V.10V - -	-	-10V.10V, max freq. 25Hz	•	Input Range -10.10V/-20.20mA		110	ш	I9 O	Q9
a12 H2 Input kange 1000/2020mA EU010V, max freq. 25H2 a13 H3 Input kange 1010V/2020mA -10V10V, max freq. 25H2 - a14 H4 Input kange 1010V/2020mA -10V10V, max freq. 25H2 - a15 H6 Input kange 1010V/2020mA -10V10V, max freq. 25H2 - 114 Input kange 1010V/2020mA -10V10V, max freq. 25H2 - 115 Input kange 1010V/2020mA -10V10V, max freq. 25H2 - 116 Input kange 1010V/2020mA -10V10V, max freq. 25H2 - A01 Analog output -10V10V - A02 Analog output -10V10V - 2/24W Itic Input kange output -		10V 10V max freq. 25Hz		Input Range 10.10V/ 20.20mA		110	ш	110	Q10
013 H3 014 H3 015 H3 016 H6 117 Input Range -1010V/-2020mA • 118 Input Range -1010V/-2020mA • 119 Input Range -1010V/-2020mA • 110 Input Range -1010V/-2020mA • 116 Input Range -1010V/-2020mA • 115 Input Range -1010V/-2020mA • 116 Input Range -1010V/-2020mA • A01 Analog output • A02 Analog output • 402 Analog output • • • • • • • • • • • • • • • • • • • • • • • • • <td></td> <td>10V 10V max freq. 25Hz</td> <td></td> <td>Input Range -10.10V/-20.20mA</td> <td></td> <td>112</td> <td>ш</td> <td>1120</td> <td>Q12</td>		10V 10V max freq. 25Hz		Input Range -10.10V/-20.20mA		112	ш	1120	Q12
115 Imput kange 1000/2020mA ■ 100100, max freq. 25Hz ■ 116 Input kange 10100/2020mA ■ 100100, max freq. 25Hz ■ 115 Input kange 10100/2020mA ■ 100100, max freq. 25Hz ■ 116 Input kange 10100/2020mA ■ 100100, max freq. 25Hz ■ 116 Input kange 10100/2020mA ■ 100100, max freq. 25Hz ■ 116 Input kange 10100/2020mA ■ 100100, max freq. 25Hz ■ AO1 Analog output ■ 100100 ■ AO2 Analog output ■ 100100 ■	-	10V 10V max freq. 25Hz		Input Range -10.10V/-20.20mA		112	ш	113	Q13
016 114 ▼ Input kange 1010V/2020mA ▼ =10010V, max freq. 25Hz ▼ 115 ✓ Input kange -1010V/2020mA ▼ =10V10V, max freq. 25Hz ▼ 116 ✓ Input kange -1010V/2020mA ▼ =10V10V, max freq. 25Hz ▼ 116 ✓ Input kange -1010V/2020mA ▼ =10V10V, max freq. 25Hz ▼ AO1 Analog output ▼ =10V10V ▼ AO2 Analog output ▼ =10V10V ▼		10V 10V max freq. 25Hz		Input Range -10.10V/-20.20mA		115	ш	114	=Q14 =Q15
115 ▼ Input kange 1010V/-2020mA ▼ -10V10V, max freq. 25Hz ▼ 116 ▼ Input kange -1010V/-2020mA ▼ -10V10V, max freq. 25Hz ▼ AO1 □ Analog output ▼ -10V10V ▼ AO2 □ Analog output ▼ -10V10V ▼		-10V.10V, max freq. 25Hz	•	Input Range -10.10V/-20.20mA		114	ш	l16 =	©Q16
110 Input Kange - 1010V/-2020mA -10V10V, max freq. 25H2 • AO1 Analog output -10V10V • AO2 Analog output • -10V.10V • 2/24W E Analog output • -10V.10V •	-	-10V.10V, max freq. 25Hz	•	Input Range -10.10V/-20.20MA		115	11		
AO1 Analog output -100.10V * AO2 Analog output * -100.10V * 2/24W E Analog output * -100.10V *	•	-10V.10V, max freq. 25Hz	•	Input Range -1010V/-2020mA	v	110			
2/24W	-	-10V10V *	*	Analog output		AO1			
2/24W		-104"104	Ŧ	Analog output		A02		-	
									2/24W
						J			
Iodule is CPU. onsumes 2W. adds 24W.							-	J. I. adds 24W.	lodule is CPU. onsumes 2W
Inselect Home IOU -							•	ne IOU •	

43 Configuration of the PLC is done using Smarteh IDE software tool. Please refer to PROGRAMMING GUIDE for details.



5.5 Analog input -20 .. 20 mA connection scheme & configuration guide

Figure 12: Analog input 11..116, -20 .. 20 mA connection scheme⁴⁴



a) Unipolar connection of active current source/transducer -20 .. 20 mA to PLC input.



b) Differential connection of active voltage source/transducer -20 .. 20 mA to PLC input.

⁴⁴ Inputs 11..116 are not galvanic isolated between each other and to the rest of the PLC circuit on the same reference potential (⊥). For galvanic isolation of the PLC 11..116 inputs to inputs on other LPC-3.IOU, use CAN1/CAN2 galvanic isolated communication ports for data exchanging. Digital outputs Q1..Q8 and Q9..Q16 on the same LPC-3.IOU PLC are galvanic isolated to inputs 11..116. Cables for wiring analog signals must be shielded twisted-pair type. This reduce but not eliminate interferences. Potential difference between the cable shield end and earth potential may cause current through the shield which cause unwanted disturbance. To avoid this effect ground only one end of the cable shielding. Use galvanic isolated analog input voltage sources.





Figure 13: Analog input I1..I16, -20 .. 20 mA configuration⁴⁵

🕜 Lpc Smartel	h IDE							- 0 -X
Designt Usin								
<pre>violect Help </pre> <pre>« > IOU (Mage)</pre>	, ain Control Mc	odule	/ CPU)					
			,,					
		ń	Inputs/Out	puts cha	nnel settings			•
			ADC Resol	ution —	Input I9116 DI threshold level			
©Q1	110		I4 Bit	© 20 E	it 💿 Not used 💿 4V on, 1V off	6V on, 3V 8	off 💿 10V on, 7V off 💿 20V on, 16V off	
Q2	12		IO channel	llsed	Function		Function setting	
Q3 Q4	13 - 14 -		II II	V	Input Range -10, 10V/-20, 20mA	•	-20mA_20mA max freq. 25Hz (14bit) / 1Hz (20bit)]
Q5	15 0		12	v	Input Range -10, 10V/-20, 20mA	•	-20mA20mA max freq. 25Hz (14bit) / 1Hz (20bit)	,
= Q6 = Q7	16		B	1	Input Range -1010V/-2020mA	•	-20mA20mA. max freq. 25Hz (14bit) / 1Hz (20bit)	
© Q8	18		14	-	Input Range -10,.10V/-20,.20mA	•	-20mA20mA. max freq. 25Hz (14bit) / 1Hz (20bit)	
SMAR	O TEH		IS	1	Input Range -1010V/-2020mA	•	-20mA20mA. max freq. 25Hz (14bit) / 1Hz (20bit)	
LPC-3.I	OU.001		16	1	Input Range -1010V/-2020mA	•	-20mA20mA, max freq. 25Hz (14bit) / 1Hz (20bit)	í
			17	1	Input Range -1010V/-2020mA	•	-20mA20mA, max freq. 25Hz (14bit) / 1Hz (20bit)	í
- 814/0	RUN	Ξ	18	1	Input Range -1010V/-2020mA	•	-20mA20mA, max freq. 25Hz (14bit) / 1Hz (20bit)	1
PWK	USB		19	1	Input Range -1010V/-2020mA	•	-20mA20mA, max freq. 10Hz 🔹	-
© Q9	I9 I		I10	1	Input Range -1010V/-2020mA	•	-20mA20mA, max freq. 10Hz 🔹	j l
©Q11	111 =		I11	1	Input Range -1010V/-2020mA	•	-20mA20mA, max freq. 10Hz 🔹	j l
©Q12	112		I12	1	Input Range -1010V/-2020mA	•	-20mA20mA, max freq. 10Hz 🔹	j l
©Q14	114 -		I13	1	Input Range -1010V/-2020mA	•	-20mA20mA, max freq. 25Hz 🔹	
©Q15 ©Q16	115 116		I14	1	Input Range -1010V/-2020mA	•	-20mA20mA, max freq. 25Hz 🔹	
			I15	1	Input Range -1010V/-2020mA	•	-20mA20mA, max freq. 25Hz 🔹	
			I16	1	Input Range -1010V/-2020mA	•	-20mA20mA, max freq. 25Hz 🔹	
			AO1		Analog output	Ŧ	-10V10V -	
	-		AO2		Analog output	Ŧ	-10V10V -	
2/24W								
2,2.07								
Module is CPU	, adds 24W	-						
Uncoloct Hon								
Hon	100 V							

45 Configuration of the PLC is done using Smarteh IDE software tool. Please refer to PROGRAMMING GUIDE for details.



5.6 Analog input 0 .. 1 V connection scheme & configuration guide





Unipolar connection of active voltage source/transducer 0 .. 1 V to PLC input.

⁴⁶ Inputs 11..116 are not galvanic isolated between each other and to the rest of the PLC circuit on the same reference potential (⊥). For galvanic isolation of the PLC 11..116 inputs to inputs on other LPC-3.IOU, use CAN1/CAN2 galvanic isolated communication ports for data exchanging. Digital outputs Q1..Q8 and Q9..Q16 on the same LPC-3.IOU PLC are galvanic isolated to inputs 11..116. Cables for wiring analog signals must be shielded twisted-pair type. This reduce but not eliminate interferences. Potential difference between the cable shielded end and earth potential may cause current through the shield which cause unwanted disturbance. To avoid this effect ground only one end of the cable shielding. Use galvanic isolated analog input voltage sources.





		Inputs/Outp	outs chi	annel settings	
		ADC Resolu	ution -	Input I9116 DI threshold level	
	110	14 Bit	0 20	Bit 💿 Not used 💿 4V on, 1V off 💿 6V on, 3	V off 💿 10V on, 7V off 💿 20V on, 16V off
	12	IO channel	Used	Function	Function setting
s 1	13 - 14 -	10 channel	V	Input Range 01V/010mA	0.1V
5	15 0	12		Input Range 01V/010mA	0.1
	16 - 17 -	В	1	Input Range 01V/010mA	0.1
	18	14		Input Range 01V/010mA	0.1
MAR	O IFEH	IS	-	Input Range 01V/010mA	0.1
PC-3.IC	DU.001	16	-	Input Range 01V/010mA	0.1V ·
		17	-	Input Range 01V/010mA	0.1V
	RUN	≡ I8	1	Input Range 01V/010mA	0.1V
VR	USB	19		Input Range -1010V/-2020mA -	-20mA20mA, max freq. 10Hz 🔹
)	19	I10		Input Range -1010V/-2020mA -	-20mA20mA, max freq. 10Hz
1	111 =	I11		Input Range -1010V/-2020mA	-20mA20mA, max freq. 10Hz 🔹
2	112	I12		Input Range -1010V/-2020mA	-20mA20mA, max freq. 10Hz 🔹
4	114	I13		Input Range -1010V/-2020mA -	-20mA20mA, max freq. 25Hz 🔹
5	115	I14		Input Range -1010V/-2020mA -	-20mA20mA, max freq. 25Hz 🔹
	116-	I15		Input Range -1010V/-2020mA -	-20mA20mA, max freq. 25Hz 🔹
		I16		Input Range -1010V/-2020mA -	-20mA20mA, max freq. 25Hz 🔹
		AO1		Analog output 👻	-10V10V ·
		AO2		Analog output 👻	-10V10V ·
-)				
	J				

Figure 15: Analog input I1..I8, 0 .. 1 V configuration⁴⁷

47 Configuration of the PLC is done using Smarteh IDE software tool. Please refer to PROGRAMMING GUIDE for details.



5.7 Analog input 0 .. 10 mA connection scheme & configuration guide

Figure 16: Analog input I1..18, 0 .. 10 mA connection scheme⁴⁸



Unipolar connection of active current source/transducer 0 .. 10 mA to PLC input.

⁴⁸ Inputs 11..116 are not galvanic isolated between each other and to the rest of the PLC circuit on the same reference potential (⊥). For galvanic isolation of the PLC 11..116 inputs to inputs on other LPC-3.IOU, use CAN1/CAN2 galvanic isolated communication ports for data exchanging. Digital outputs Q1..Q8 and Q9..Q16 on the same LPC-3.IOU PLC are galvanic isolated to inputs 11..116. Cables for wireing analog signals must be shilded twiste-pair type. This reduce but not eliminate interfrences. Potential difference between the cable shild end and earth potential may cause current through the shild which cause anwanted disturbance. To avoid this effect ground only one end of the cable shielding. Use galvanic isolated analog input voltage sources.







roject Help < > IOU (Ma	in Control Mod	dule / CPU)					
		Inputs/Out	puts cha	nnel settings			
		ADC Resol	ution —	Input I9116 DI threshold level			
Q1	I10	🔘 14 Bit	0 20	Bit 🔍 Not used 🔍 4V on, 1V off	🔘 6V on, 3V	off 💿 10V on, 7V off 💿 20V on, 16V off	
© Q2	12 0	IO channel	llced	Function		Function setting	
Q3 Q4	13 ● 14 ●	10 channel	V	Input Range 0.,1V/0.,10mA	•	010mA	•
© Q5	I5 O	12		Input Range 01V/010mA	•	010mA	•
Q6 Q7	16 ⊂ 17 ⊂	B	-	Input Range 01V/010mA	•	010mA	•
Q8	18	14	-	Input Range 01V/010mA	•	010mA	-
SMAR	O TEH	15	1	Input Range 01V/010mA	•	010mA	•
LPC-3.I	DU.001	16	-	Input Range 01V/010mA	•	010mA	•
		17	-	Input Range 01V/010mA	•	010mA	•
	RUN	≡ I8	1	Input Range 01V/010mA	•	010mA	-
• PWR	USB	19		Input Range -1010V/-2020mA	~	-10V10V, max freq. 100Hz	-
Q9	I9 =	I10		Input Range -1010V/-2020mA	Ŧ	-10V10V, max freq. 100Hz	
©Q11	111 =	I11		Input Range -1010V/-2020mA	Ŧ	-10V10V, max freq. 100Hz	Ŧ
Q12	112	I12		Input Range -1010V/-2020mA	+	-10V10V, max freq. 100Hz	Ŧ
©Q14	114 0	I13		Input Range -1010V/-2020mA	Ŧ	-10V10V, max freq. 100Hz	-
©Q15	115	I14		Input Range -1010V/-2020mA	Ŧ	-10V10V, max freq. 100Hz	
	116 -	I15		Input Range -1010V/-2020mA	Ŧ	-10V10V, max freq. 100Hz	-
		I16		Input Range -1010V/-2020mA	Ŧ	-10V10V, max freq. 100Hz	-
		AO1		Analog output AO1, AO2	v	-10V10V	-
		AO2		Analog output AO1, AO2	Ŧ	-10V10V	-
2/24W	adde 24W	A02		Analog output AO1, AO2	Ŧ	-10V10V	T

49 Configuration of the PLC is done using Smarteh IDE software tool. Please refer to PROGRAMMING GUIDE for details.



5.8 Thermocouple connection scheme & configuration guide

Figure 18: Analog input 11..18, thermocouple connection scheme⁵⁰



Unipolar connection of thermocouple temperature sensing element to PLC input.

NOTE: Using this method only allows measuring temperatures higher than junction temperature.

⁵⁰ Inputs 11..116 are not galvanic isolated between each other and to the rest of the PLC circuit on the same reference potential (\perp). For galvanic isolation of the PLC 11..116 inputs to inputs on other LPC-3.IOU, use CAN1/CAN2 galvanic isolated communication ports for data exchanging. Digital outputs Q1..Q8 and Q9..Q16 on the same LPC-3.IOU PLC are galvanic isolated to inputs 11..116. Cables for wiring analog signals must be shielded twisted-pair type. This reduce but not eliminate interferences. Potential difference between the cable shielded end and earth potential may cause current through the shield which cause unwanted disturbance. To avoid this effect ground only one end of the cable shielding. Use galvanic isolated analog input voltage sources. Accuracies for thermocouple temperature measurements are written in Thermocouple programming guide chapter. Please refer to PROGRAMMING GUIDE chapter for details.







Figure 19: Analog input 11..18, thermocouple configuration⁵¹

51 Configuration of the PLC is done using Smarteh IDE software tool. Please refer to PROGRAMMING GUIDE for details.



5.9 Thermistor connection scheme & configuration guide





a) Pt100 connection of thermistor temperature sensing element to PLC input.



b) Pt200, Pt500, Pt1000, Ni1000, NTC10 $k\Omega$ connection of thermistor temperature sensing element to PLC input.

⁵² Inputs 11..116 are not galvanic isolated between each other and to the rest of the PLC circuit on the same reference potential (⊥). For galvanic isolation of the PLC 11..116 inputs to inputs on other LPC-3.IOU, use CAN1/CAN2 galvanic isolated communication ports for data exchanging. Digital outputs Q1..Q8 and Q9..Q16 on the same LPC-3.IOU PLC are galvanic isolated to inputs 11..116. Cables for wiring analog signals must be shielded twisted-pair type. This reduce but not eliminate interferences. Potential difference between the cable shielded end and earth potential may cause current through the shield which cause unwanted disturbance. To avoid this effect ground only one end of the cable shielding. Use galvanic isolated analog input voltage sources. Accuracies for thermistor temperature measurements are written in Thermistor programming guide chapter. Please refer to PROGRAMMING GUIDE chapter for details.







Figure 21: Analog input 11..18, thermistor configuration⁵³





5.10 Fast counter connection scheme & configuration guide

Figure 22: Fast counter digital input I9 & I13 connection scheme⁵⁴



a) Voltage free contact fast counter connection to PLC input.



b) Active voltage source or push/pull fast counter output connection to PLC input.



c) Active voltage sink fast counter output connection to PLC input.

⁵⁴ Inputs 11..116 are not galvanic isolated between each other and to the rest of the PLC circuit on the same reference potential (\perp). For galvanic isolation of the PLC 11..116 inputs to inputs on other LPC-3.IOU, use CAN1/CAN2 galvanic isolated communication ports for data exchanging. Digital outputs Q1..Q8 and Q9..Q16 on the same LPC-3.IOU PLC are galvanic isolated to inputs 11..116. Use galvanic isolated free contacts and/or digital input voltage sources.







		Inputs/Out	tputs cha	nnel settings		
	11-	ADC Resol	lution — © 20 E	Input 19.116 DI threshold level Site Input 19.116 DI threshold level	0	10V on, 7V off 🛛 💿 20V on, 16V off
	12 13	IO channel	Used	Function		Function setting
	14 0	11		Input Range -1010V/-2020mA	Ŧ	-10V10V, max freq. 25Hz (14bit) / 1Hz (20bit)
	15 0	12		Input Range -1010V/-2020mA	-	-10V10V, max freq. 25Hz (14bit) / 1Hz (20bit)
	17 0	I3		Input Range -1010V/-2020mA	-	-10V10V, max freq. 25Hz (14bit) / 1Hz (20bit)
-	18	14		Input Range -1010V/-2020mA	-	-10V10V, max freq. 25Hz (14bit) / 1Hz (20bit)
R	EH	15		Input Range -1010V/-2020mA		-10V10V, max freq. 25Hz (14bit) / 1Hz (20bit)
3.IOL	U.001	16		Input Range -1010V/-2020mA	-	-10V10V, max freq. 25Hz (14bit) / 1Hz (20bit)
		17		Input Range -1010V/-2020mA	*	-10V10V, max freq. 25Hz (14bit) / 1Hz (20bit)
	RUN	18		Input Range -1010V/-2020mA	*	-10V10V, max freq. 25Hz (14bit) / 1Hz (20bit)
_	058	19	1	Fast counter	•	Max frequency: 100kHz
	19 ·	I10		Input Range -1010V/-2020mA	Ŧ	-10V10V, max freq. 25Hz
	111 0	I11		Input Range -1010V/-2020mA	-	-10V10V, max freq. 25Hz
					_	-10V.,10V. max freg, 25Hz
	112	I12		Input Range -1010V/-2020mA		
	12 13 14	I12 I13		Input Range -1010V/-2020mA Fast counter	•	Max frequency: 500Hz
	112 113 114 115	112 113 114	 Image: A state of the state of	Input Kange -1010V/-2020mA Fast counter Input Range -1010V/-2020mA	•	Max frequency: 500Hz -10V10V, max freq. 25Hz
	112 113 114 115 116	112 113 114 115		Input Kange -1010V/-2020mA Fast counter Input Range -1010V/-2020mA Input Range -1010V/-2020mA	•	Max frequency: 500Hz -10V10V, max freq. 25Hz -10V10V, max freq. 25Hz
	112 113 114 115 116	112 113 114 115 116		Input Kange -1010V/-2020mA Fast counter Input Range -1010V/-2020mA Input Range -1010V/-2020mA Input Range -1010V/-2020mA	* * *	Max frequency: 500Hz -10V.10V, max freq. 25Hz -10V.10V, max freq. 25Hz -10V.10V, max freq. 25Hz
	112 113 114 115 116	112 113 114 115 116 AO1		Input Kange -1010V/-2020mA Fast counter Input Range -1010V/-2020mA Input Range -1010V/-2020mA Input Range -1010V/-2020mA Analog output	•	Max frequency: 500Hz -10V.10V, max freq. 25Hz -10V.10V, max freq. 25Hz -10V.10V, max freq. 25Hz -10V.10V, max freq. 25Hz

Fast counter options are 100 kHz or 500 Hz.





5.11 Quadrature encoder connection scheme & configuration guide

Figure 24: Quadrature encoder digital input 110, 111, 112 & 114, 115, 116 connection scheme⁵⁶



a) Voltage free contact fast counter connection to PLC input.



b) Active voltage source or push/pull fast counter output connection to PLC input.



- c) Active voltage sink fast counter output connection to PLC input.
- 56 Inputs 11..116 are not galvanic isolated between each other and to the rest of the PLC circuit on the same reference potential (\perp). For galvanic isolation of the PLC 11..116 inputs to inputs on other LPC-3.10U, use CAN1/CAN2 galvanic isolated communication ports for data exchanging. Digital outputs Q1..Q8 and Q9..Q16 on the same LPC-3.10U PLC are galvanic isolated to inputs 11..116. Use galvanic isolated free contacts and/or digital input voltage sources.







	h i	Inputs/Out	puts cha	nnel settings	
		- ADC Resol	ution	_ Input 19.116 DI threshold level	
1	110	14 Bit	© 20	Bit	10V on, 7V off 20V on, 16V off
2	12	IO channel	Used	Function	Function setting
4	14 0	I1		Input Range -1010V/-2020mA	-10V10V, max freq. 25Hz (14bit) / 1Hz (20bit)
	15 0	12		Input Range -10,,10V/-20,,20mA	 -10V10V. max freq. 25Hz (14bit) / 1Hz (20bit)
	16 I7 I	13		Input Range -1010V/-2020mA	 -10V.10V max freq. 25Hz (14bit) / 1Hz (20bit)
	18 🔍	14		Input Range -10.10V/-20.20mA	 -10V.10V max freq. 25Hz (14bit) / 1Hz (20bit)
	н 📗	15		Input Range -10. 10V/-20. 20mA	 -10V. 10V. max freq. 25Hz (14bit) / 1Hz (20bit)
PC-3.IOU.0	01	16		Input Range -10, 10V/-20, 20mA	 I JUNITER (2011) - 100
		17		Input Range -10.10V/-20.20mA	=
F		= 19		Input Range -10.10V/-20.20mA	= -10V 10V, max freq. 25Hz (14bit) / 1Hz (20bit)
VR U	JSB	10		Input Range 10.10V/ 20.20mA	= 10V.10V, max freq. 25Hz
,	19 🔍	19		Ouderture deceder	Aux AsiB fragmann 50kbb alawast ala ana andai 500ma
10	110	110			Max Aob frequency: Soke2, slowest pic app. cycle: Sooms
2	112	111		Quadrature decoder	Max Aob frequency: SokHz, slowest pic app. cycle: Soums
3	113	112		Quadrature decoder	Max Add frequency: Jokn2, slowest pic app. cycle: Journs
5	115	115		Ouderture deceder	- 10%.10%, max neq. 25h2
6	116 =	114			Max Aob frequency: 500Hz
_		115		Quadrature decoder	Max AQB frequency: SOUHZ
		110		Quadrature decoder	Max A&B frequency: 500Hz
		AO1		Analog output	-10V10V
		AO2		Analog output	* -10V10V

NOTE: This input detects a reference position for the Quadrature Decoder. When using reset input, if inputs A, B, and reset are all zero, the counter is also reset to zero. Reset can be triggered with hardware signal or from PLC application with QuadDec_Reset.

57 Configuration of the PLC is done using Smarteh IDE software tool. Please refer to PROGRAMMING GUIDE for details.



6 PROGRAMMING GUIDE

6.1 Basic programming

There are several logical units attached with this module. They can be accessed from the Smarteh IDE application. Some units are enabled by default, others can be enabled through Smarteh IDE. Unit is enabled when any of its variables is used.

PLC has 32 kB of non-volatile memory, which is available to any variable used inside application simply by setting the variable *Option* to *Retain*.

PLC also provides 4 kB of ROM (flash) memory area to the user who would like to use some initialization data or some fixed parameters. This area can be accessed from application only for reading. Setting the values of variables in Flash can be issued with Flash uploader page. In Flash memory area there are some preloaded data stored:

MAC: is unique for every unit produced. This value can be also found on the label attached on the housing of the unit.

IP: default value is 192.168.19.225

MASK: default value is 255.255.255.0

Gateway, Primary DNS, Secondary DNS: default 0.0.0.0

Flash memory unit

This unit enables only reading from its variables. Setting the variables is issued with one of *Smarteh IDE* plugins, *Flash uploader page*.

Flash unit provides reading of a portion of a flash memory inside MC8 module. Flash memory is non-volatile, therefore keeps data forever.

Usually this area is used for setting some data to the default value even before installation of the unit to its position. After, when PLC is commissioned, the data are already present and there is no need for further setting. This keeps its data in area and some startup parameters can be written.

RTC and NVRAM unit

For RTC back-up and for Retain variables stored in NVRAM, there is Super Capacitor instead of battery integrated inside PLC. This way replacement of the discharged battery is avoided. The Retention time is minimum 30 days from the power down.

RTC time provides date and time information. Along, alarming function is also supported.

Modbus slave unit

Modbus TCP/IP slave has 512 addresses in each memory section.

Coils:	00000 to 00511
Discrete Inputs:	10000 to 10511
Input Register:	30000 to 30511
Holding Registers:	40000 to 40511

Supports up to 3 connections to the slave unit. Scan rate is 500 ms or greater.



CANopen unit

CANopen unit consists of Master (CAN1) and Slave (CAN2) communication ports. They are independent, thus can be connected to two different CAN network at the same time.

The ports can operate at baud rates 50 kbps, 125 kbps or 250 kbps.

It follows the internationally standardized (EN 50325-4) CAN-based higher-layer protocol for embedded control systems. Advised rules and concepts by this standard must be followed to fulfill the conditions and so achieving normal operation and results.

The structure of the network as cable type and lengths, baud rates, number of the nodes and termination must be taken into account within the recommendations and requirements, when designing the network.

The bus network can consist of at least one Master and at least one Slave node by the standard, but it is advised that with increased number of nodes, the Master node fastest interval is reduced. Below are two examples:

Example 1: network with 1 master and 9 slaves, every slave have defined 32 (4x8) byte of data and baud rate 125 Kbps. Fastest Cycle time for this configuration is 50 ms.

Example 2: network with 1 master and 4 slaves, every slave have defined 4 byte of data and baud rate 250 Kbps. Fastest Cycle time for this configuration is 5 ms.

5 millisecond is the fastest recommended cycle time.

It is recommended to power-up all the nodes on the same network at the same time, if some or all nodes had been reprogrammed (to reinitialize the communication properly).

Additional operational information

After the installation of the PLC it must be at least 20 minutes on external power supply, before the internal super capacitor is charged and the retain memory is ready to save variables without loosing them switching power supply off.

RUN / STOP Switch

Run: Status (RUN) LED on indicate that the PLC program is up and user program is running.

<u>Stop</u>: When the switch is turn to STOP state, the status (RUN) LED is Off. The application switch to the boot loader, this fact allow users to program LPC-3.IOU.001.

When the user is done programming, the PLC via USB, the switch must be turned ON and the LPC-3.IOU.001 starts the application.

PLC task cycle time

Main PLC task interval (under Project tab \rightarrow Resource \rightarrow Tasks \rightarrow Interval) time is not recommended to be set lower than 5 ms.



6.2 Digital input 11..18 programming

su	ription:			Cla	ss Filter: All		•	🖕 💻	T	1
ŧ	Name	Class	Туре	Location	Initial Value	Option	Documentation			
	I1	Local	DINT	%ID1.1.5.1.7						
2	VTreshold	Local	REAL							
}	EPS	Local	REAL							
ł	DI_1	Local	BOOL							
5	HYSTERESIS	Local	HYSTERESIS							
I	1]]	DINT_1 IN	FO_REAL OUT	HYSTERESIS HYSTERESIS XIN1 (0 5 2	DI_1				

Figure 26: Digital Input I1..18 LD language example⁵⁸

6.3 Digital input I9..I16 programming

scri	ption:			Class	s Filter: All		•
#	Name	Class	Туре	Location	Initial Value	Option	Documentation
1	I_1	Local	BOOL	%IX1.1.5.0			
2	I_2	Local	BOOL	%IX1.1.5.1			
3	IN1	Local	BOOL				
4	TN/2	Local	BOOL				

Figure 27: Digital Input I9..116 LD language example⁵⁹

58 Configuration of the PLC is done using Smarteh IDE software tool. Please refer to PROGRAMMING GUIDE for details.



6.4 Digital output Q1..Q16 programming

#	Name	Class	Type	Location	Initial Value	Option	Documentatio
 1	0 1	Local	BOOL	%OX1.1.5.16		option	
2	OUT1	Local	BOOL				
3	Q_2	Local	BOOL	%QX1.1.5.17			
4	OUT2	Local	BOOL				

Figure 28: Digital output Q1..Q16 LD language example⁵⁹

6.5 Analog input unipolar -10 .. 10 V programming

Figure 29: Analog input unipolar -10 .. 10 V LD language example⁶⁰

2	PAI ×									Ŧ
Desc	ription:			Cla	ss Filter: All		•	-	Ŷ	↓
#	Name	Class	Туре	Location	Initial Value	Option	Documentation			
1	I1	Local	DINT	%ID1.1.5.1.7						
2	AI_neg10to1	(Local	DINT							
	11				AI_neg10to1	0V				
										Ŧ





6.6 Analog input differential -10 .. 10 V programming

Figure 30: Analog input differential -10 .. 10 V LD language example⁶⁰

escr	iption:			Cla	ss Filter: All		•	- -	1	J
#	Name	Class	Туре	Location	Initial Value	Option	Documentation			
1	I1	Local	DINT	%ID1.1.5.1.7						
2	12	Local	DINT	%ID1.1.5.1.8						
3	AI_neg10to1(Local	DINT							
[11		SUB IN1 OUT		AI_neg10to10	UV .				

6.7 Analog input unipolar -20 .. 20 mA programming

Figure 31: Analog input unipolar -20 .. 20 mA LD language example⁶¹

1	AI ×									Ŧ
Desci	iption:			Cla	ss Filter: All		•	-	T	↓
#	Name	Class	Туре	Location	Initial Value	Option	Documentation			
1	I1	Local	DINT	%ID1.1.5.1.7						
2	AI_neg20to2	Local	DINT							
	11				AI_neg20to2	20mA				

^{60 14} bits ADC settings should be used for better common mode interference (CMI) filtering. Configuration of the PLC is done using Smarteh IDE software tool. Please refer to PROGRAMMING GUIDE for details.

⁶¹ Configuration of the PLC is done using Smarteh IDE software tool. Please refer to PROGRAMMING GUIDE for details.



6.8 Analog input differential -20 .. 20 mA programming

Figure 32: Analog input differential -20 .. 20 mA LD language example⁶²



6.9 Analog input unipolar 0 .. 1 V programming

Figure 33: Analog input unipolar 0 .. 1 V LD language example⁶³

	al ×								Ŧ
Desc	ription:			Class Fi	Iter: All	•		 Ŷ	↓
#	Name	Class	Туре	Location	Initial Value	Option	Documentation		
1	11	Local	DINT	%ID1.1.5.1.7					
2	AI_0to1V	Local	DINT						
	11				AI_0to1V				*
									Ŧ

⁶³ Measurement accuracy using filters will heavily increase => + 25 μV. Configuration of the PLC is done using Smarteh IDE software tool. Please refer to PROGRAMMING GUIDE for details.



^{62 14} bits ADC settings should be used for better common mode interference (CMI) filtering. Configuration of the PLC is done using Smarteh IDE software tool. Please refer to PROGRAMMING GUIDE for details.



6.10 Analog input 0 .. 10 mA programming

Figure 34: Analog input 0 .. 10 mA LD language example⁶⁴

esci	iption:			Class Fil	ter: All	•	4	 -	T	J
#	Name	Class	Туре	Location	Initial Value	Option	Documentation			
L	11	Local	DINT	%ID1.1.5.1.7						
2	AI_0to10mA	Local	DINT							
	11			[/	AI_0to10mA					

6.11 Analog output 0 .. 10 mA programming

Figure 35: Analog output 0 .. 10 mA LD language example⁶⁵

esci	ription:			Cla	ass Filter: All		•	- 🔶 I	- 4	r	1
#	Name	Class	Туре	Location	Initial Value	Option	Documentation				
1	A01	Local	DINT	%QD1.1.5.2.1							
2	AO_0to10mA	Local	DINT								
[AO_0to10mA				A01						



6.12 Thermocouple programming

escrip	ption:			Class	s Filter: All		•
#	Name	Class	Туре	Location	Initial Value	Option	Documentation
1	I4	Local	DINT	%ID2.1.5.7			
2	тс_ко	Local	TC_K				
3	Temp1	Local	DINT	%ID2.1.5.0			
4	Temperature	Local	UINT				
5	Measured_error	Local	BOOL				

Figure 36: Thermocouple LD language example⁶⁵

6.13 Thermistor programming

1	Thermistor	×								
esc	ription:			Class Fil	ter: All	•		-	T	1
#	Name	Class	Туре	Location	Initial Value	Option	Documentation			
1	11	Local	DINT	%ID1.1.5.1.7						
2	AO1	Local	DINT	%QD1.1.5.2.17						
3	Offset	Local	DINT							
4	Temperature	Local	DINT							
5	I1_R100	Local	DINT	%ID1.1.5.5.1						
6	I1_R3k9	Local	DINT	%ID1.1.5.5.9						
7	AO1_FDB	Local	DINT	%ID1.1.5.1.5						
Ŭ		Local								
			PT	100						
		_	PT_Th	ermistor						
	I1		IN	олт —	Te	mperature				
	100	j	PT_Type	OUT_RefV		A01				
	Offset]	Offset							
	AO1_FDB]	RefV							
	I1_R100]	Ref_100Oł	nm						
	T1 R3k0	1	Ref 3k90h	m						



65 Configuration of the PLC is done using Smarteh IDE software tool. Please refer to PROGRAMMING GUIDE for details.



6.14 Fast counter programming

Figure	38:	Fast	counter	LD	language	example ⁶⁶
I ISUIC	50.	I USC	counter		unguuge	champic

esci	ription:			Class Filter:	All	•		-	T	٩
#	Name	Class	Туре	Location	Initial Value	Option	Documentation			
1	Cnt_I9_Direction	Local	BOOL	%QX1.1.5.3.2						
2	Cnt_I9_Set	Local	BOOL	%QX1.1.5.3.4						
3	Cnt_I9_Rst	Local	BOOL	%QX1.1.5.3.3						
4	Cnt_I9_Value	Local	DINT	%QD1.1.5.3.5						
5	Cnt_I9_Enable	Local	BOOL	%QX1.1.5.3.1						
6	19	Local	DINT	%ID1.1.5.1.15						
7	Count	Local	DINT							
8	Count_Enable	Local	BOOL							
9	UP_0_and_DOWN_1	Local	BOOL							
10	Set_manual	Local	BOOL							
11	Set_manualValue	Local	DINT							
12	Set_CountValue	Local	BOOL							
	I9 Count_Enable UP_0_and_DOWN Set_manual Set_manualValu	e			Cnt_19_Enab Cnt_19_Enab Cnt_19_Direct Cnt_19_Sel Cnt_19_Sel Cnt_19_Valu	ion t				
	Set_CountValue	9			Cnt_I9_Rst	t				

66 Configuration of the PLC is done using Smarteh IDE software tool. Please refer to PROGRAMMING GUIDE for details.



6.15 Quadrature encoder programming

Figure 39: Quadrature encoder LD language example⁶⁷

)esc	ription:			Class Filter:	All	•		🔶 💻	1
#	Name	Class	Туре	Location	Initial Value	Option	Documentation		
1	I10	Local	DINT	%ID1.1.5.1.16					
2	Count	Local	DINT						
3	QuadDec_I10_Index	Local	BOOL	%QX1.1.5.3.11					
4	Reset	Local	BOOL						
	I10				Count				
	Reset			Quad	dDec_I10_Index				



7 MODULE LABELING

Figure 40: Labels on housing

Label 1 (sample):

Label 2 (sample):

LPC-3.IOU.001 P/N:226IOU14001001 D/C: 05/15

S/N: IOU-S9-1500000190

Label 1 descriptions:

- 1. LPC-3.IOU.001 is the full product name.
- 2. P/N: 226IOU14001001 is the part number.
 - 226 general code for product family,
 - IOU short product name,
 - 14001 sequence code,
 - 14 year of code opening,
 - 001 derivation code,
 - 001 version code (reserved for future HW and/or SW firmware upgrades).
- 3. D/C: 05/15 is the date code.
 - 05 week and
 - 15 year of production.

Label 2 descriptions:

- 1. S/N:IOU-S9-1500000190 is the serial number.
 - IOU short product name,
 - **S9** user code (test procedure, e.g. Smarteh person xxx),
 - 1500000190 year and current stack code,
 - 15 year (last two digits),
 - 00000190 current stack number; previous module would have the stack number 00000189 and the next one 00000191.



8 CHANGES

Date	۷.	Description
01.03.15	1	The initial version, issued as LPC-3.10U.001 UserManual.
01.09.15	2	Technical update.
01.02.16	3	Update figures 19, 21. Added thermocouples note. Page 2 description update.

The following table describes all the changes to the document.

9 NOTES



