Product datasheet
Characteristics

ATV320U40N4B

variable speed drive ATV320 - 4kW - 380...500V - 3 phase - book



Main

Range of product	Altivar Machine ATV320
Product or component type	Variable speed drive
Product specific application	Complex machines
Device short name	ATV320
Format of the drive	Book
Product destination	Asynchronous motors Synchronous motors
EMC filter	Class C2 EMC filter integrated
IP degree of protection	IP20 conforming to EN/IEC 61800-5-1
Type of cooling	Fan
Network number of phases	3 phases
[Us] rated supply voltage	380...500 V (- 15...10 %)
Supply frequency	50...60 Hz (- 5...5 %)
Motor power kW	4 kW for heavy duty
Motor power hp	5 hp for heavy duty
Line current	13.7 A at 380 V for heavy duty 10.5 A at 500 V for heavy duty
Prospective line Isc	<= 5 kA
Apparent power	9.1 kVA at 500 V for heavy duty
Continuous output current	9.5 A at 4 kHz for heavy duty
Maximum transient current	14.3 A during 60 s for heavy duty
Asynchronous motor control profile	Voltage/frequency ratio, 2 points Voltage/frequency ratio, 5 points Flux vector control without sensor, standard Voltage/frequency ratio - Energy Saving, quadratic U/f Flux vector control without sensor - Energy Saving
Synchronous motor control profile	Vector control without sensor
Speed drive output frequency	0.1...599 Hz
Nominal switching frequency	4 kHz
Switching frequency	2...16 kHz adjustable 4...16 kHz with current derating
Safety function	STO (safe torque off) SIL 3 SS1 (safe stop 1) SMS (safe maximum speed) SLS (safe limited speed) GDL (guard door locking)
Communication port protocol	CANopen Modbus
Option card	Communication module: CANopen daisy chain RJ45 Communication module: CANopen SUB-D 9 Communication module: CANopen open style terminal block Communication module: EtherCAT RJ45 Communication module: DeviceNet Communication module: Ethernet/IP Communication module: Profibus DP V1 Communication module: Profinet Communication module: Ethernet Powerlink

Complementary

Output voltage	<= power supply voltage
Permissible temporary current boost	1.5 x In during 60 s for heavy duty

The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein.
This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications.
It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof.
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Speed range	1...100 with asynchronous motor in open-loop mode
Speed accuracy	+/- 10 % of nominal slip 0.2 Tn to Tn
Torque accuracy	+/- 15 %
Transient overtorque	170...200 % of nominal motor torque
Braking torque	<= 170 % with braking resistor during 60 s
Regulation loop	Adjustable PID regulator
Motor slip compensation	Automatic whatever the load Not available in voltage/frequency ratio (2 or 5 points) Adjustable 0...300 %
Acceleration and deceleration ramps	S U CUS Deceleration ramp automatic stop DC injection Deceleration ramp adaptation Linear Ramp switching
Braking to standstill	By DC injection
Protection type	Drive: thermal protection Drive: overcurrent between output phases and earth Drive: input phase breaks Drive: overheating protection Drive: short-circuit between motor phases
Frequency resolution	Display unit: 0.1 Hz Analog input: 0.012/50 Hz
Electrical connection	Control, screw terminal: 0.5...1.5 mm² AWG 20...AWG 16 Motor/braking resistor, screw terminal: 1.5...2.5 mm² AWG 14...AWG 12 Power supply, screw terminal: 2.5...4 mm² AWG 12...AWG 10
Connector type	1 RJ45 for Modbus/CANopen on front face
Physical interface	2-wire RS 485 for Modbus
Transmission frame	RTU for Modbus
Transmission rate	4.8, 9.6, 19.2, 38.4 kbit/s for Modbus 50 kbps, 125 kbps, 250 kbps, 500 kbps, 1 Mbps for CANopen
Data format	8 bits, configurable odd, even or no parity for Modbus
Type of polarization	No impedance for Modbus
Number of addresses	1...247 for Modbus 1...127 for CANopen
Method of access	Slave for CANopen
Supply	Internal supply for reference potentiometer (1 to 10 kOhm): 10.5 V DC (+/- 5 %) current <= 10 mA (overload and short-circuit protection)
Local signalling	1 LED red for drive voltage 1 LED green for CANopen run 1 LED red for CANopen error 1 LED red for drive fault
Width	60 mm
Height	325 mm
Depth	245 mm
Product weight	3 kg
Analogue input number	3
Analogue input type	Voltage (AI1): 0...10 V DC, impedance 30000 Ohm, resolution 10 bits Bipolar differential voltage (AI2): +/- 10 V DC, impedance 30000 Ohm, resolution 10 bits Current (AI3): 0...20 mA (or 4-20 mA, x-20 mA, 20-x mA or other patterns by configuration), impedance 250 Ohm, resolution 10 bits
Discrete input number	7
Discrete input type	Programmable (sink/source) (DI1...DI4): 24...30 V DC: level 1 PLC Programmable as pulse input 20 kpps (DI5): 24...30 V DC: level 1 PLC Switch-configurable PTC probe (DI6): 24...30 V DC Safe torque off (STO): 24...30 V DC, impedance 1500 Ohm
Discrete input logic	Negative logic (sink): : DI1...DI6, > 19 V (state 0) < 13 V (state 1) Positive logic (source): : DI1...DI6, < 5 V (state 0) > 11 V (state 1)
Analogue output number	1
Analogue output type	Software-configurable current (AQ1): 0...20 mA, impedance 800 Ohm, resolution 10 bits Software-configurable voltage (AQ1): 0...10 V, impedance 470 Ohm, resolution 10 bits

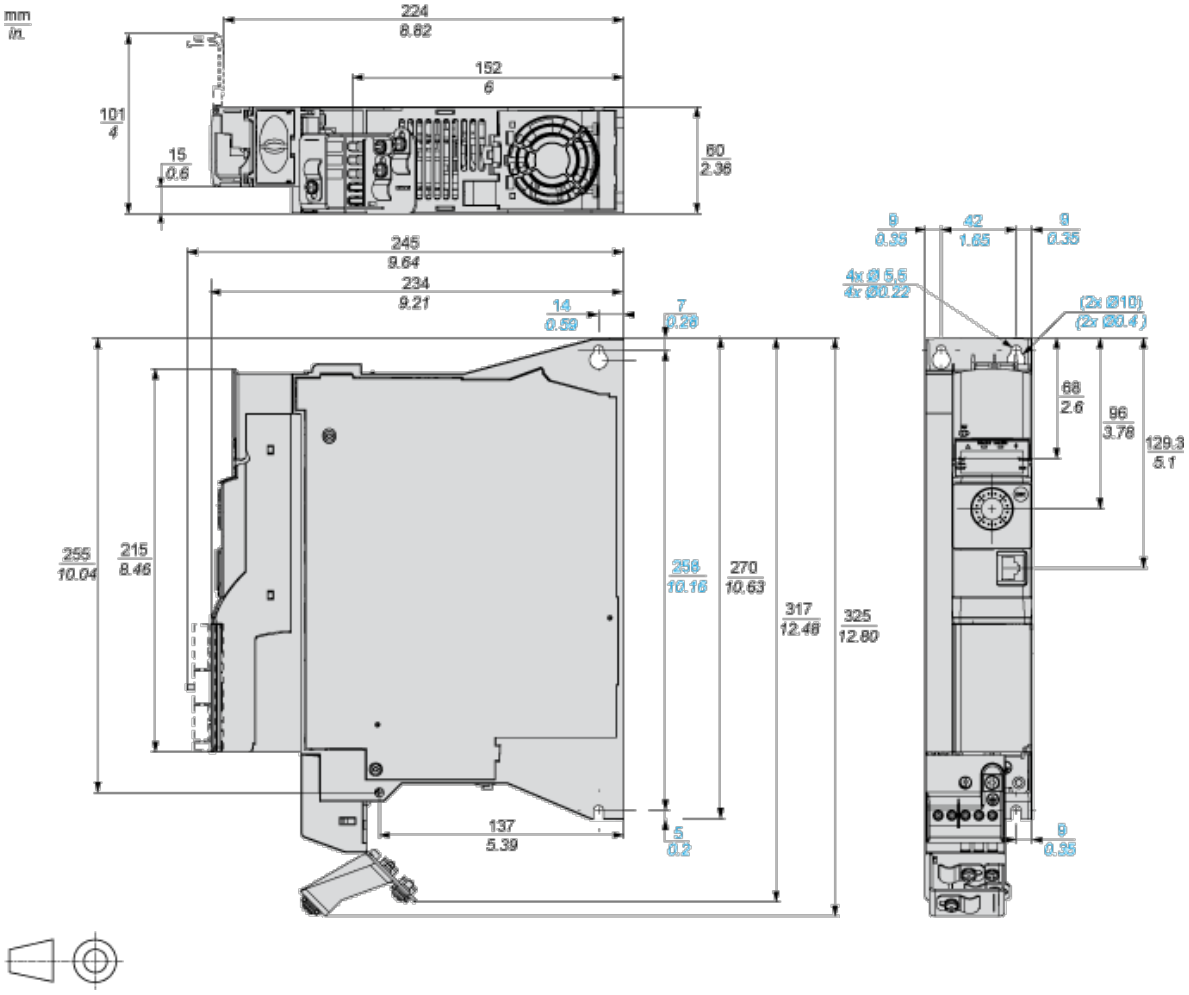
Sampling duration	Analog input (AI1, AI2, AI3): 2 ms Analog output (AQ1): 2 ms
Accuracy	Analog input AI1, AI2, AI3: +/- 0.2 % for a temperature of -10...60 °C Analog input AI1, AI2, AI3: +/- 0.5 % for a temperature of 25 °C Analog output AQ1: +/- 1 % for a temperature of 25 °C Analog output AQ1: +/- 2 % for a temperature of -10...60 °C
Linearity error	Analog input (AI1, AI2, AI3): +/- 0.2...0.5 % of maximum value Analog output (AQ1): +/- 0.3 %
Discrete output number	3
Discrete output type	Configurable relay logic NO/NC (R1A, R1B, R1C): electrical durability 100000 cycles Configurable relay logic NO (R2A, R2B): electrical durability 100000 cycles Logic (LO)
Refresh time	Logic input (DI1...DI6): 8 ms (+/- 0.7 ms) Relay output (R1A, R1B, R1C): 2 ms Relay output (R2A, R2C): 2 ms
Minimum switching current	Relay output (R1, R2): 5 mA at 24 V DC
Maximum switching current	Relay output (R1) on resistive load (cos phi = 1: 3 A at 250 V AC Relay output (R1) on resistive load (cos phi = 1: 4 A at 30 V DC Relay output (R1, R2) on inductive load (cos phi = 0.4: 2 A at 250 V AC Relay output (R1, R2) on inductive load (cos phi = 0.4: 2 A at 30 V DC Relay output (R2) on resistive load (cos phi = 1: 5 A at 250 V AC Relay output (R2) on resistive load (cos phi = 1: 5 A at 30 V DC
Specific application	Machinery
Discrete and process manufacturing	Hoisting self erecting Material handling carousel Material handling conveyor Material handling lifting platfrom Material handling palletizers - medium performance Material handling transfer table Material handling turn table Material working (wood, ceramic, stone, pvc, metal) cutting - medium accuracy Material working (wood, ceramic, stone, pvc, metal) drilling Material working (wood, ceramic, stone, pvc, metal) saw Packaging bagging Packaging feed conveyor low performance Packaging filling bottles - intermittent operation Packaging linear labeling Packaging other application Packaging stretching wrapping Packaging tray take Textile knitting Textile printing machines Textile spinning Washing machines car Washing machines other application Hoisting standard crane - travelling or trolley
Power range	4...6 kW 380...440 V 3 phases 4...6 kW 480...500 V 3 phases
Motor starter type	Variable speed drive

Environment

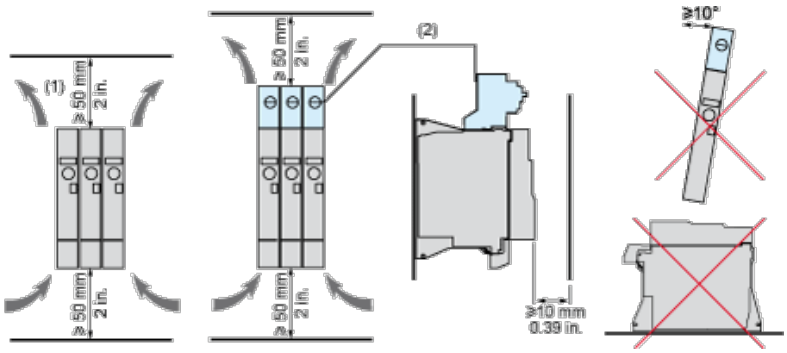
isolation	Between power and control terminals
insulation resistance	> 1 mOhm at 500 V DC for 1 minute to earth
noise level	45 dB conforming to 86/188/EEC
power dissipation in W	125 W (fan) at 380 V, 4 kHz
operating position	Vertical +/- 10 degree
electromagnetic compatibility	Conducted radio-frequency immunity test conforming to IEC 61000-4-6 level 3 Electrical fast transient/burst immunity test conforming to IEC 61000-4-4 level 4 Electrostatic discharge immunity test conforming to IEC 61000-4-2 level 3 Radiated radio-frequency electromagnetic field immunity test conforming to IEC 61000-4-3 level 3 Voltage dips and interruptions immunity test conforming to IEC 61000-4-11 1.2/50 µs - 8/20 µs surge immunity test conforming to IEC 61000-4-5 level 3
pollution degree	2 conforming to EN/IEC 61800-5-1
vibration resistance	1.5 mm peak to peak (f = 3...13 Hz) conforming to EN/IEC 60068-2-6 1 gn (f = 13...200 Hz) conforming to EN/IEC 60068-2-6
shock resistance	15 gn during 11 ms conforming to EN/IEC 60068-2-27
relative humidity	5...95 % without condensation conforming to IEC 60068-2-3 5...95 % without dripping water conforming to IEC 60068-2-3

ambient air temperature for operation	-10...50 °C without derating 50...60 °C with derating factor
ambient air temperature for storage	-25...70 °C
operating altitude	<= 1000 m without derating 1000...2000 m with current derating 1 % per 100 m
standards	EN/IEC 61800-3 EN/IEC 61800-5-1 EN 55011 class A group 1 EN 61800-3 environment 1 category C2 EN 61800-3 environment 2 category C2
product certifications	CSA NOM 117 UL RCM EAC
marking	CE

Dimensions



Mounting and Clearance

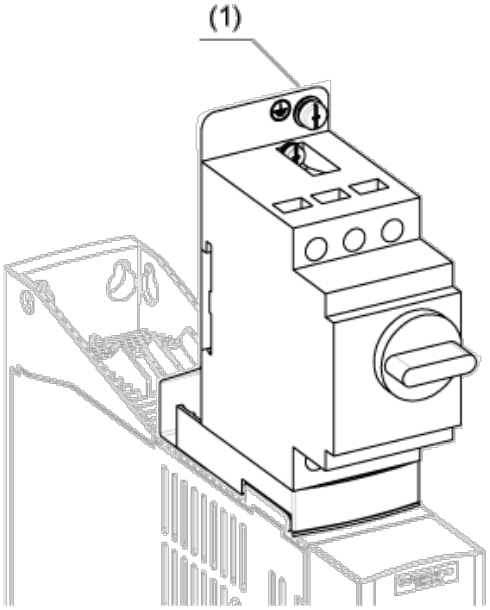


(1) Minimum value corresponding to thermal constraints.

(2) Optional GV2 circuit-breaker

Option: Protection Device, GV2 circuit-breaker

NOTE: The product overall height dimension, including GV2 adapter and EMC plate mounted, becomes 424 mm (16.7 in.) instead of 325 mm (12.80 in.)

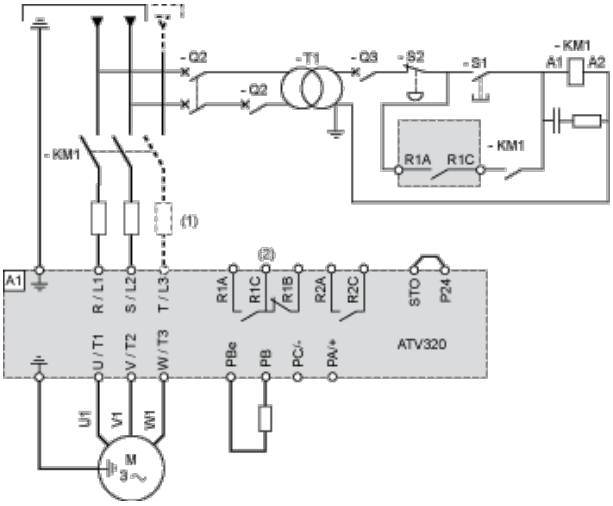


(1) Ground screw (HS type 2 - 5x12)

Connection Diagrams

Diagram with Line Contactor

Connection diagrams conforming to standards EN 954-1 category 1 and IEC/EN 61508 capacity SIL1, stopping category 0 in accordance with standard IEC/EN 60204-1.

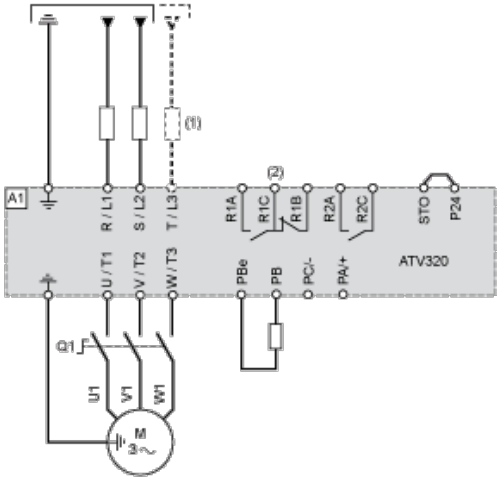


(1) Line choke (if used)

(2) Fault relay contacts, for remote signaling of drive status

Diagram with Switch Disconnect

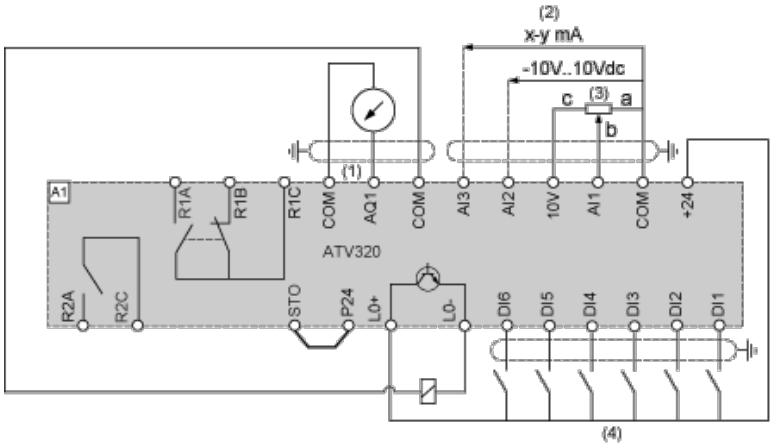
Connection diagrams conforming to standards EN 954-1 category 1 and IEC/EN 61508 capacity SIL1, stopping category 0 in accordance with standard IEC/EN 60204-1.



(1) Line choke (if used)

(2) Fault relay contacts, for remote signaling of drive status

Control Connection Diagram in Source Mode



(1) Analog output

(2) Analog inputs

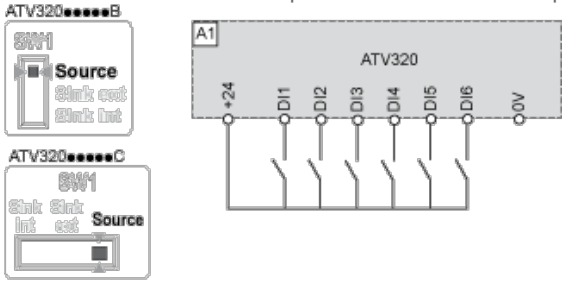
(3) Reference potentiometer (10 kOhm maxi)

(4) Digital inputs

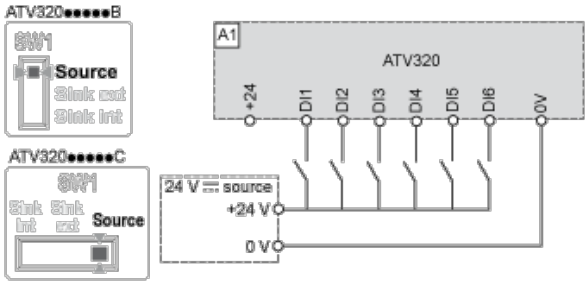
Digital Inputs Wiring

The logic input switch (SW1) is used to adapt the operation of the logic inputs to the technology of the programmable controller outputs.

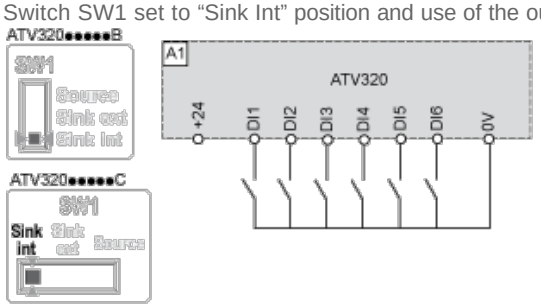
Switch SW1 set to “Source” position and use of the output power supply for the DIs.



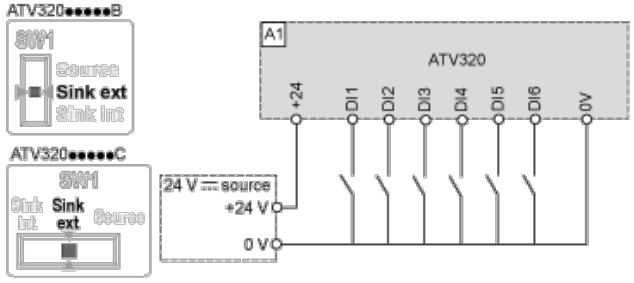
Switch SW1 set to “Source” position and use of an external power supply for the DIs.



Switch SW1 set to “Sink Int” position and use of the output power supply for the DIs.

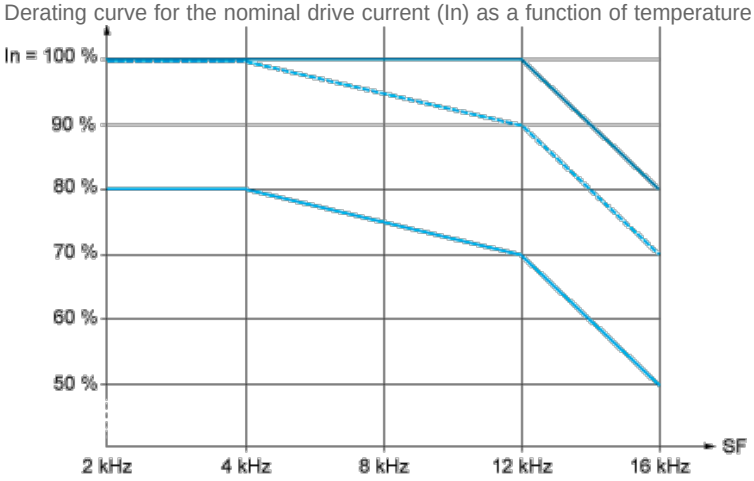


Switch SW1 set to “Sink Ext” position and use of an external power supply for the DIs.



Derating Curves

Derating curve for the nominal drive current (In) as a function of temperature and switching frequency (SF).



40 °C (104 °F) - Mounting type A, B and C

50 °C (122 °F) - Mounting type A, B and C

60 °C (140 °F) - Mounting type B and C

In : Nominal Drive Current

SF : Switching Frequency

Our Proposal: Circuit Breaker + Contactor + Drive for Motor Power 4 kW and 380 VAC

Motor Power (kW)	Icu (kA)	Breaker	Contactor (*)	Motor Starter
4	50			

		GV2L16	LC1D09P7	ATV320U40N4B

Non contractual pictures.

(*) You can select the contactor proposed or variants. Please consider examples hereafter or follow the link to the complete offer.

Motor Power kW	Coil voltage VAC - 50/60 Hz	24	48	110	115	220	230	400	Other
4	LC1D09 ..	B7	E7	F7	FE7	M7	P7	V7	Complete Offer

Motor Power kW	Coil voltage VDC - U 0.75...1.25 Uc	24	48	Other
4	LC1D09 ..	BD	ED	Complete Offer

Motor Power kW	Coil voltage Low Consumption VDC - U 0.8...1.25 Uc	24	110	Other
4	LC1D09 ..	BL	FL	Complete Offer