Concrete Testing

50 Compression testing machines, Machine parts, Flexural frames and accessories, Advanced Testing Systems

Concrete structures are a great deal more than sand, gravel, cement and water stirred up and left to harden into usefully shaped lumps. Considerable care and knowledge are required to produce quality concrete. We propose a complete range of testing equipment to satisfy all the EN and other National Standards. This section includes the widest range available today of Advanced Automatic, Semi-automatic compression testers and Automatic Testing Systems which satisfy all requirements.


CONTROLS
300kN
CONTROLS
CVI TECH
CONTROLS
AUTOMAX

Testing systems for determining the mechanical properties of concrete

This vast and complete range includes:
COMPRESSION and FLEXURAL TESTING MACHINES (from page 216 to 249)

ADVANCED SYSTEMS, (from page 250 to 267)
Relating to power and control consoles connectable to up to four frames, performing more sophisticated determinations such as the modulus of elasticity and deformability/ductility tests under load, displacement and strain control.

The pages which follow should guide you in the identification of your ideal machine or system, and at the same time, present a summary of our products which, we believe, are the most complete, modern and advanced available in the world market today.

ICONS Legend

Machine capacity

Machine capacity

Numbers of frames (including the basic frame) that can be controlled by the PCS

Other voltages option

Additional information available

(PCS) Power Control System

WIZARD2 — 2 — Semi-automatic, 2 channels digital readout display

DIGIMAX3 — 2 — Semi-automatic, 3 channels, data acquisition and processing

PILOT — 3 — Automatic, with closed loop control

AUTOMAX — 3 — Super-automatic, with closed loop control

COMPRESSION TESTING MACHINES

SELECTION CRITERIA

Basic components: Frame and Power Control System (PCS)

The compression testers are primarily characterized by the current testing Standards (e.g. ASTM/AASHTO or EN) which prescribe the shape and dimensions of specimens (e.g. cylinders, cubes or blocks). This requirement determines the type of frame (capacity, spherical seat, compression platen dimensions).

The other important component is the Power and Control System (PCS for short) which also refers to the Standards in terms, mainly, of load application, strength measurement and accuracy.
We propose four versions, WIZARD 2 Semi-automatic, DIGIMAX3 Semi-automatic, Pilot and Automax Automatic testing systems. The following table summarize the most common configurations.

	Description	kN Capacity	Power Control System (PCS)	Standards	Page
Standards					
EN	Compression testers For **Cubes and Cylinders**	kN 2000 · kN 3000 · kN 4000 · kN 5000	**DIGIMAX 3 | PILOT | AUTOMAX**	EN 12390-4	216
EN	Compression testers For **Cubes, Cylinders, Blocks**	kN 2000 · kN 3000	**DIGIMAX 3 | PILOT | AUTOMAX**	EN 12390-4 EN 772-1	218
EN	Heavy Duty Compression frames for **Cubes, Cylinders, Blocks**	kN 4000 · kN 5000		EN 12390-4 EN 772-1	220
ASTM	Compression testers For **Cylinders**	kN 1500 · kN 2000 · kN 3000 · K lbf 335 · K lbf 450 · K lbf 660	**WIZARD 2 | PILOT**	ASTM C39 AASHTO T22	222
ASTM	Compression testers For **Blocks and Cylinders**	kN 3000 · K lbf 660	**PILOT**	ASTM C39 AASHTO T22 ASTM C140 ASTM C1314	224
General Utility*	Compression testers For **Cubes and Cylinders**	kN 1500 · kN 2000 · kN 3000	**WIZARD 2 | PILOT**	--	226
General Utility*	Compression testers For **Blocks, Cubes, Cylinders**	kN 2000 · kN 3000	**WIZARD 2 | PILOT**	--	228

COMPACTline

The integrated COMPACT-Line design

Combining a single testing frame with a PCS results in the integrated COMPACT-Line version of compression machine where the PCS is attached to the side of the frame.

SMARTline

DIGIMAX3, PILOT and AUTOMAX PCS are also available housed in a stand-alone console (SMART-Line version), for connection and control of up to 3 different frames (up to 2 frames for DIGIMAX3 PCS), including flexural and cement compression frames. See page 237

Modular system: user selection of testing frame and control system

The comprehensive range of testing frames and PCS, and the modularity of the system, permit to achieve, with the help of our specialists, the configuration you need even if it is outside of the standard models we propose in this catalogue.

Machine class

All models are supplied in Class 1 to EN 12390-4 (corresponding to ASTM E74 Class A) starting from the 10% of the full range as standard, but with a special calibration procedure identified by the code 50-C0050/CAL, we can grant Class 1 starting from 1% of the full range.

EN Compression testers 2000 | 3000 | 4000 | 5000 kN

Standards EN 12390-4 - **Accuracy Cl.1**

COMPACTline

Cubes
up to 300* mm

Cylinders
up to dia.
160 x 320 mm,
250 x 500* mm

**With the 4000 and 5000 kN versions only*

Pilot 50-C46C02

Automax 50-C56D02

This serie is proposed with different power and control systems (PCS):

AUTOMAX
Super-automatic system with closed loop control

PILOT
Automatic system with closed loop control

DIGIMAX3
Semi-automatic power and control system

Note *Also available, as alternative, the configuration with WIZARD 2, Semi-automatic power and control system.* *See page 232*

Common specifications

Frame
Four column rigid welded steel construction. EN heavy duty spherical seat allows free alignment at the initial contact with the specimen. Ram travel 50 mm.

Compression Platens
See physical specifications table.

Safety Features
Max. pressure valve to avoid machine overloading, piston travel limit switch, emergency stop button, front door and rear fragment guard.

Machine Accessories
- Distance pieces to reduce the vertical daylight.
- Frame pedestal.

Software
All our PCS are supplied complete with the 82-SW/TRM software allowing real time and deferred test data download to PC. Full data management and reporting is provided with optional software DATAMANAGER 82-SW/DM (not suitable for WIZARD 2 PCS). See page 238

Test Accessories
These machines can be equipped with accessories to perform:
- Splitting tensile test
- Compression on cement samples
- Flexural test on concrete beams

Upgrading Options

Additional testing frame connection
For WIZARD 2 and DIGIMAX 3 PCS.
See page 232, 233
For PILOT and AUTOMAX PCS.
See page 236

Printer installation
For WIZARD 2 and DIGIMAX 3 PCS.
See page 232, 233
For PILOT and AUTOMAX PCS.
See page 236

Fragment guard lock switch
Prevents test execution with the safety guard open

50-C50/P
For 4000kN and 5000kN testers with AUTOMAX PCS and for testers with PILOT PCS.

50-C50/P1
For 2000kN and 3000kN testers with AUTOMAX PCS.

50-C50/P2
For testers with DIGIMAX and WIZARD PCS.

Special calibration procedure
See page 240

Certified platen hardness
See page 240

Explosion proof test kit
Upgrading kit comprehending: safety cables securing the upper platen to the frame, metallic perforated fragment guard and bottom platen anti-fall safety system.

50-C59/EK
Explosion proof test kit for C56xxx series

50-C69/EK
Explosion proof test kit for C68xxx

50-C79/EK
Explosion proof test kit for C78xxx

Note: *for testing high strength / explosive failure specimens we strongly recommend the use of distance pieces complete with threaded centering pin.* *See page 242*

Frame physical specifications

model 50-	C46xxx	C56xxx	C68xxx	C78xxx
Cap. kN	2000	3000	4000	5000
Max. vertical daylight mm	350	350	525	525
Horizontal daylight mm	350	370	425	390
Platen dimensions, mm	dia. 300		305 x 305	
Surface hardness	53 HRC (550HV)			
Flatness tolerance	0.03 mm			

AUTOMAX 50-C68D02

main features

- High-stiffness 4-column welded frame with EN heavy duty spherical seat in oil bath, supplied with traceable test certificate for load transfer verification (stability test) to EN 12390-4
- Class 1 accuracy to EN 12390-4 starting from 10% of full scale. Special calibration procedure to obtain Class 1 from 1% available as option. Traceable calibration certificate supplied with the machine
- Optional explosion proof test kit specifically designed to cope with the explosive energy release resulting from high strength concrete specimen failure

PILOT and AUTOMAX

- Automatic test execution with closed-loop digital feedback
- 3 channels (for load sensors) with 132˙000 div. resolution (better than 0.01% of full scale)
- sampling rate 50/sec
- ES Energy Saving technology reducing the power consumption and ensuring silent operations
- Control of additional testing frames
- Unlimited storing capacity on USB pen drive of test data downloadable to PC via LAN port
- Double-stage hydraulic pump with rapid approach (40 mm/min) and precise oil flow control. Soft platen-to-specimen contact and smooth load rate control from the very beginning of the ramp
- Dual user-interface via console display and PC

AUTOMAX

kN 2000 | kN 3000 | kN 4000 | kN 5000 | 3

50-C46D02
AUTOMAX Compact-Line, 2000 kN cap. super-automatic EN compression tester for cylinders up to dia. 160 x 320 mm and cubes up to 200 mm. Complete with steel base. 230 V, 50-60 Hz, 1 ph.

50-C56D02
AUTOMAX Compact-Line, 3000 kN cap. super-automatic EN compression tester for cylinders up to dia. 160 x 320 mm and cubes up to 200 mm. Complete with steel base. 230 V, 50-60 Hz, 1 ph.

50-C68D02
AUTOMAX Compact-Line, 4000 kN cap. super-automatic EN compression tester for cylinders up to dia. 250 x 500 mm and cubes up to 300 mm. 230 V, 50-60 Hz, 1 ph.

50-C78D02
AUTOMAX Compact-Line 5000 kN cap. super-automatic EN compression tester for cylinders up to dia. 160 x 320 mm and cubes up to 300 mm.
230V, 50-60Hz, 1 ph

PILOT

kN 2000 | kN 3000 | kN 4000 | kN 5000 | 3

50-C46C02
PILOT Compact-Line, 2000 kN cap. automatic EN compression tester for cylinders up to dia. 160 x 320 mm and cubes up to 200 mm. 230 V, 50-60 Hz, 1 ph.

50-C56C02
PILOT Compact-Line, 3000 kN cap. automatic EN compression tester for cylinders up to dia. 160 x 320 mm and cubes up to 200 mm. 230 V, 50-60 Hz, 1 ph.

50-C68C02
PILOT Compact-Line, 4000 kN cap. automatic EN compression tester for cylinders up to dia. 250 x 500 mm and cubes up to 300 mm. 230 V, 50-60 Hz, 1 ph.

50-C78C02
PILOT Compact-Line 5000 kN cap. automatic EN compression tester for cylinders up to dia. 160 x 320 mm and cubes up to 300 mm.
230V, 50-60Hz, 1 ph

DIGIMAX 3

kN 2000 | kN 3000

50-C46B02
DIGIMAX 3, 2000 kN cap. semi-automatic compression tester for cylinders up to dia. 160 x 320 mm and cubes up to 200 mm. 230 V, 50 Hz, 1 ph.

50-C56B02
DIGIMAX 3, 3000 kN cap. semi-automatic compression tester for cylinders up to dia. 160 x 320 mm and cubes up to 200 mm. 230 V, 50 Hz, 1 ph.

Frames only

All frames are supplied complete with pressure transducer, connection kit for separate control console and steel base (except 50-C68Z00 and 50-C78Z00 models)

kN 2000 | kN 3000 | kN 4000 | kN 5000

50-C46Z00
EN compression testing frame, 2000 kN cap.

50-C56Z00
EN compression testing frame, 3000 kN cap.

50-C68Z00
EN compression testing frame, 4000 kN cap.

50-C78Z00
EN compression testing frame, 5000 kN cap.

info

For 110V, 60 Hz versions change last code number from 2 to 4.
Example: 50-C46B04, C56C04, C68D04

For 220V, 60Hz versions change last code number from 2 to 3 (only for WIZARD 2 and DIGIMAX 3)

EN Compression testers 2000 | 3000 kN

Standards EN 12390-4 | EN 772-1 - **Accuracy Cl.1**

COMPACTline

Cubes up to 200 mm

Cylinders up to dia. 160x320 mm

Blocks

Automax 50-C57D02

This serie is proposed with different power and control systems (PCS):

AUTOMAX
Super-automatic system with closed loop control

PILOT
Automatic system with closed loop control

DIGIMAX3
Semi-automatic power and control system

Note *Also available, as alternative, the configuration with WIZARD 2, Semi-automatic power and control system.* *See page 232*

Common specifications

Frame
Four column rigid welded steel construction. EN heavy duty spherical seat allows free alignment at the initial contact with the specimen. Ram travel 50 mm.

Compression Platens
See physical specifications table.

Safety Features
Max. pressure valve to avoid machine overloading, piston travel limit switch, emergency stop button, front door and rear fragment guard.

Machine Accessories
- Distance pieces to reduce the vertical daylight.
- Frame pedestal.
- Lifting device for bottom platen

Software
All our PCS are supplied complete with the 82-SW/TRM software allowing real time and deferred test data download to PC. Full data management and reporting is provided with optional software DATAMANAGER 82-SW/DM (not suitable for WIZARD 2 PCS). See page 238

Test Accessories
These machines can be equipped with accessories to perform:
- Splitting tensile test
- Compression on cement samples
- Flexural test on concrete beams

Upgrading Options

Additional testing frame connection
For WIZARD 2 and DIGIMAX 3 PCS.
See page 232, 233
For PILOT and AUTOMAX PCS. See page 236

Printer installation
For WIZARD 2 and DIGIMAX 3 PCS.
See page 232, 233
For PILOT and AUTOMAX PCS.
See page 236

Fragment guard lock switch
Prevents test execution with the safety guard open.

50-C50/P
For testers with AUTOMAX and PILOT PCS.

50-C50/P2
For testers with DIGIMAX PCS and WIZARD PCS.

Special calibration procedure
See page 240

Certified platen hardness
See page 240

Note: *for testing high strength / explosive failure specimens we strongly recommend the use of distance pieces complete with threaded centering pin.* *See page 242*

Frame physical specifications

model 50-	C47xxx	C57xxx
Cap. kN	2000	3000
Max. vertical daylight mm	350	350
Horizontal daylight mm	350	370
Platen dimensions, mm	310 x 510 x 50*	
Surface hardness	55.5 HRC (600 HV)	
Flatness tolerance	0.05 mm	

**Models fitted with platens 310x510x90mm also available on request*

Pilot 50-C57C02
with steel base 50-C59/B

main features

- Models matching all requirements of both EN 12390-4 and EN 772-1 Standards
- High-stiffness 4-column welded frame with EN heavy duty spherical seat in oil bath, supplied with traceable test certificate for load transfer verification (stability test) to EN 12390-4
- Class 1 accuracy to EN 12390-4 starting from 10% of full scale. Special calibration procedure to obtain Class 1 from 1% available as option. Traceable calibration certificate supplied with the machine

PILOT and AUTOMAX

- Automatic test execution with closed-loop digital feedback
- 3 channels (for load sensors) with 132˙000 div. resolution (better than 0.01% of full scale)
- Sampling rate 50/sec
- ES Energy Saving technology reducing the power consumption and ensuring silent operations
- Control of additional testing frames
- Unlimited storing capacity on USB pen drive of test data downloadable to PC via LAN port
- Double-stage hydraulic pump with rapid approach (40 mm/min) and precise oil flow control. Soft platen-to-specimen contact and smooth load rate control from the very beginning of the ramp
- Dual user-interface via console display and PC

AUTOMAX

kN 2000 | kN 3000 | kN 4000 | 3

50-C47D02

AUTOMAX Compact-Line, 2000 kN cap., super-automatic EN compression tester for blocks, cylinders and cubes. Complete with steel base. 230 V, 50-60 Hz, 1 ph.

50-C57D02

AUTOMAX Compact-Line, 3000 kN cap., super-automatic EN compression tester for blocks, cylinders and cubes. Complete with steel base. 230 V, 50-60 Hz, 1 ph.

PILOT

kN 2000 | kN 3000 | kN 4000 | 3

50-C47C02

PILOT Compact-Line, 2000 kN cap.,automatic EN compression tester for blocks, cylinders and cubes. 230 V, 50-60 Hz, 1 ph

50-C57C02

PILOT Compact-Line, 3000 kN cap.,automatic EN compression tester for blocks, cylinders and cubes. 230 V, 50-60 Hz, 1 ph

50-C57B02
with steel base 50-C59/B

DIGIMAX 3

kN 2000 | kN 3000 | 2

50-C47B02

DIGIMAX 3, Compact-Line 2000 kN cap, semi-automatic EN compression tester for blocks, cylinders and cubes.
230 V, 50 Hz, 1 ph.

50-C57B02

DIGIMAX 3, Compact-Line 3000 kN cap, semi-automatic EN compression tester for blocks, cylinders and cubes.
230 V, 50 Hz, 1 ph.

Frames only

All frames are supplied complete with pressure transducer, connection kit for separate control console and steel base

kN 2000 | kN 3000

50-C47Z00

EN compression frame 2000 kN cap.

50-C57Z00

EN compression frame 3000 kN cap.

info

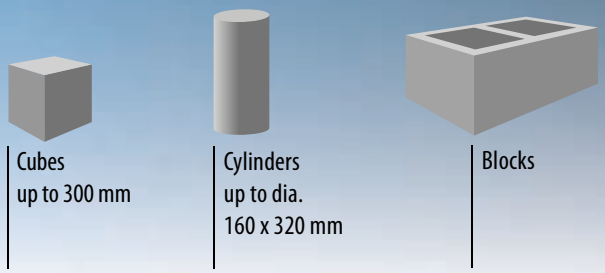
For 110V, 60 Hz versions change last code number from 2 to 4.
Example: 50-C47B04, C57C04

For 220V, 60Hz versions change last code number from 2 to 3 (only for WIZARD 2 and DIGIMAX 3)

EN Heavy duty compression frames 4000 | 5000 kN

Standards

EN 772-1 | EN 12390-4



Cubes
up to 300 mm

Cylinders
up to dia.
160 x 320 mm

Blocks

This model featuring four column rigid welded steel construction, is fitted with block platens 310x510x90 mm thickness and Heavy duty premium spherical seat. Satisfy either the EN 772-1 concerning block testing, or the EN 12390-4 concerning standard cubes and cylinders. The frame is provided with all safety features relating to the explosive energy release resulting from high strength concrete specimen failure.

It can be fitted with a special block platen lifting assembly which is essential to make easy the placement of distance pieces, to adjust the vertical daylight, between the piston and the lower platen. See accessories.

50-C79Z00 with 50-C10D02 Automax Smart-Line. The frame is fitted with front and rear fragment guard protections. Upper compression platen is secured to the frame by steel cords. Bottom compression platen is secured to the distance pieces. See safety features

Common specifications

Frame
Four column rigid welded steel construction. EN Premium heavy duty spherical seat allows free alignment at the initial contact with the specimen. Ram travel 50 mm.

Compression Platens
See physical specifications table.

Safety Features
These models are fitted with a specifically designed explosion proof test kit comprehending: safety cables securing the upper platen to the frame, metallic perforated fragment guard and bottom platen anti-fall safety system.

Note: *for testing high strength / explosive failure specimens we strongly recommend the use of distance pieces complete with threaded centering pin. See page 242*

Detail of the compression frame fitted with lifting device 50-C9060/B.

Machine Accessories
- Distance pieces to reduce the vertical daylight.
- Heavy duty lifting device for bottom platen

main features

> A unique compression frame conforming to EN 772-1 and EN 12390-4, certified for stability (verification of force transfer). Traceable test certificate provided with the machine

> Specifically designed to cope with the explosive energy release resulting from high strength concrete specimen failure. Fitted with a specifically designed explosion proof test kit

EN Frame only
All compression frames are complete with pressure transducer and connection kit for separate control console.

kN 4000 kN 5000

50-C69Z00
EN Compression testing frame, 4000 kN cap

50-C79Z00
EN Compression testing frame, 5000 kN cap.

Frame physical specifications

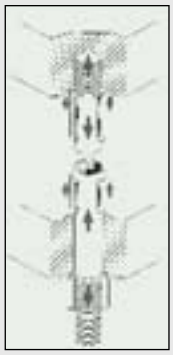
Model 50-	C69Z00	C79Z00
Cap., kN	4000	5000
Max. vertical daylight, mm	310	310
Horizontal daylight, mm	425	425
Platen dimensions, mm	310 x 510 x 90	
Surface hardness	55.5 HRC (600 HV)	
Flatness tolerance	0.05 mm	

EN High stiffness pre-stressed frames 3000 kN

Standards

EN 12390-4

These high stiffness frames are particularly suitable for research purposes. The four column structure is pre-tensioned as shown below. The two proposed versions are identical except for the load cell incorporated in the piston of the 50-C86Z10 version providing very high accuracy starting from the very beginning of load scale. 50-C86Z00 version is fitted with pressure transducer. Both versions include pedestal and connection kit for control console.



Balanced pre-tensioning system
The columns consist of two elements, one contained within the other. The internal part is the column and works in tension, whilst the external part is a tube and works in compression. This configuration guarantees tensional uniformity at all load levels. The other specifications concerning compression platens, spherical seat and safety features are identical to those of the EN Four column welded structures

Schematic balanced pre-tensioning system

Common specifications

Frame
Four pre-tensioned steel columns construction. EN heavy duty spherical seat allows free alignment at the initial contact with the specimen. Ram travel 50 mm.

50-C86Z10 Detail of load cell housed in the ram

Compression Platens
See physical specifications table.

Safety Features
Piston travel limit switch, front rigid door and rear fragment guard.anti-fall safety system.

Machine Accessories
- Distance pieces to reduce the vertical daylight

Test Accessories
These frames can be equipped with accessories to perform:
- Splitting tensile test
- Compression on cement samples
- Flexural test on concrete beams

EN Frame only
All high stiffness compression frames are complete with pressure transducer or load cell, connection kit for separate control console and pedestal.

kN
3000

50-C86Z00
EN compression frame 3000 kN cap. Load measurement system with pressure transducer

50-C86Z10
EN compression frame 3000 kN cap. Load measurement system with load cell

info

Smart-Line Console DIGIMAX 3.... p. 237
Smart-Line Console PILOT..... p. 237
Smart-Line Console AUTOMAX.... p. 237
Dimensions and weight.....p. 230
Certificate of platen surface hardness..... p. 240
Machine accessories.....p. 241
Test accessories..... p. 263
DATAMANAGER Software ..... p. 238
Special calibration..... p. 240

Frame physical specifications

Model 50-	C86Z00	C86Z10
Cap., kN	3000	3000
Load measurement system	Pressure transducer	Load cell
Max. vertical daylight, mm	345	345
Horizontal daylight, mm	330	330
Platen dimensions, mm	dia. 300	
Surface hardness	53 HRC (550 HV)	

ASTM Compression testers 1500 | 2000 | 3000 kN and 335 | 460 | 660 klbf

Standards ASTM C39 | AASHTO T22
Accuracy Cl.1/ Cl. A

COMPACTline

Cylinders up to dia. 160x320 mm (6"x12")

50-A12A02 with pedestal 50-C99/B and front door 50-C19/FG

50-A22C02 with pedestal 50-C29/B and front door 50-C29/FG

WIZARD 2

Semi-automatic power and control system

Note *Also available, as alternative, the configuration with DIGIMAX 3, Semi-automatic power and control system. See page 233 and ask for our technical support.*

PILOT

Automatic system with closed loop control

Note *Also available, as alternative, the configuration with AUTOMAX, super automatic power and control system. See page 234 and ask us for technical support.*

Common specifications

Frame
Rigid welded steel construction. ASTM spherical seat allows free alignment at the initial contact with the specimen. Ram travel 50 mm.

Compression Platens
See physical specifications table.

Safety Features
Max. pressure valve to avoid machine overloading, piston travel limit switch, emergency stop button, front and rear flexible fragment guards.

Machine Accessories
- Distance pieces to reduce the vertical daylight
- Frame pedestal
- Rigid front door

Software
All our PCS are supplied complete with the 82-SW/TRM software allowing real time and deferred test data download to PC. Full data management and reporting is provided with optional software DATAMANAGER 82-SW/DM (not suitable for WIZARD 2 PCS).
See page 238

Test Accessories
These machines can be equipped with accessories to perform:
- Capping pads and retainers
- Sulphur capping equipment
- Splitting tensile test
- Compression on cement samples
- Flexural test on concrete beams

Upgrading Options

Additional testing frame connection
For WIZARD 2 and DIGIMAX 3 PCS.
See page 232, 233
For PILOT and AUTOMAX PCS.
See page 236

Printer installation
For WIZARD 2 and DIGIMAX 3 PCS.
See page 232, 233
For PILOT and AUTOMAX PCS.
See page 236

Fragment guard lock switch
Prevents test execution with the front door (optional) open.

50-C50/P1
For testers with PILOT PCS.

50-C50/P3
For testers with DIGIMAX 3 PCS and WIZARD 2 PCS.

Special calibration procedure
See page 240

Calibration in lbf units
These machines can be calibrated in lbf unit. For the codes change second last code number from 0 to 1

Certified platen hardness
See page 240

Frame physical specifications

model 50-	A12xxx	A22xxx	A32xxx
Cap., kN (lbf)	1500 (335,000)	2000 (450,000)	3000 (660,000)
Max. vertical daylight, mm (inches)	370 (14.6")	380 (15")	380 (15")
Horizontal daylight, mm (inches)	265 (10.4")	340 (13.4")	370 (14.6")
Platen dimensions, mm (inches)	dia. 165 (6.5")		
Surface hardness	55 HRC		
Flatness tolerance	0.02 mm		

50-A12C02 with pedestal 50-C99/B and front door 50-C19/FG

main features

- Rigid welded steel construction
- Spherical seat assembly fully compliant to ASTM C39 for testing 4"x8" and 6"x12" cylinders
- Class A accuracy to ASTM E74 starting from 10% of full scale. Special calibration procedure to obtain Class A from 1% available as option. Traceable calibration certificate for load measurement accuracy supplied with the machine

PILOT

- Automatic test execution with closed-loop digital feedback
- 3 channels (for load sensors) with 132˙000 div. resolution (better than 0.01% of full scale)
- Sampling rate 50/sec
- ES Energy Saving technology reducing the power consumption and ensuring silent operations
- Control of additional testing frames
- Unlimited storing capacity on USB pen drive of test data downloadable to PC via LAN port
- Double-stage hydraulic pump with rapid approach (40 mm/min) and precise oil flow control. Soft platen-to-specimen contact and smooth load rate control from the very beginning of the ramp
- Dual user-interface via console display and PC

WIZARD 2

kN 1500 | kN 2000 | kN 3000 | 2
K lbf 335 | K lbf 450 | K lbf 660

50-A12A02
WIZARD 2 Compact-line 1500 kN cap. semi-automatic ASTM compression tester for cylinders up to dia. 6"x12"(160 x 320 mm). 230V, 50Hz, 1 ph
50-A12A12
as above but calibrated in lbf (cap. 335,000 lbf)

50-A22A02
WIZARD 2 Compact-line 2000 kN cap. semi-automatic ASTM compression tester for cylinders up to dia. 6"x12"(160 x 320 mm). 230V, 50Hz, 1 ph
50-A22A12
as above but calibrated in lbf (cap. 450,000 lbf)

50-A32A02
WIZARD 2 Compact-line 3000 kN cap. semi-automatic ASTM compression tester for cylinders up to dia. 6"x12"(160 x 320 mm). 230V, 50Hz, 1 ph
50-A32A12
as above but calibrated in lbf (cap. 660,000 lbf)

PILOT

kN 1500 | kN 2000 | kN 3000 | 3
K lbf 335 | K lbf 450 | K lbf 660

50-A12C02
PILOT Compact-line 1500 kN cap. automatic ASTM compression tester for cylinders up to dia. 6"x12"(160 x 320 mm). 230V, 50-60Hz, 1 ph
50-A12C12
as above but calibrated in lbf (cap. 335,000 lbf)

50-A22C02
PILOT Compact-line 2000 kN cap. automatic ASTM compression tester for cylinders up to dia. 6"x12"(160 x 320 mm). 230V, 50-60Hz, 1 ph
50-A22C12
above but calibrated in lbf (cap. 450,000 lbf)

50-A32C02
PILOT Compact-line 3000 kN cap. automatic ASTM compression tester for cylinders up to dia. 6"x12"(160 x 320 mm). 230V, 50-60Hz, 1 ph
50-A32C12
as above but calibrated in lbf (cap. 660,000 lbf)

Frames only

All frames are supplied complete with pressure transducer and connection kit for separate control console

kN 1500 | kN 2000 | kN 3000
K lbf 335 | K lbf 450 | K lbf 660

50-A12Z00
ASTM compression frame 1500 kN cap.
50-A12Z10
as above but calibrated in lbf (cap. 335,000 lbf), when connected to any PCS.

50-A22Z00
ASTM compression frame 2000 kN cap.
50-A22Z10
as above but calibrated in lbf (cap. 450,000 lbf), when connected to any PCS.

50-A32Z00
ASTM compression frame 3000 kN cap.
50-A32Z10
as above but calibrated in lbf (cap. 660,000 lbf), when connected to any PCS.

info

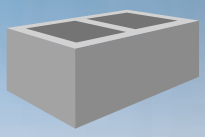
For 110V, 60 Hz versions change last code number from 2 to 4. Ex. 50-A12A04

For 220V, 60Hz versions change last code number from 2 to 3 (only for WIZARD 2 and DIGIMAX 3)

ASTM Compression testers 3000 kN | 660 klbf

Standards ASTM C39 | ASTM C140 | ASTM C1314 | ASTM E4 | AASHTO T22
Accuracy CI.1/CI.A

COMPACTline



Blocks

Cylinders*
up to dia. 6"x12"
(150/160 x 300/320 mm)

**Using the upgrading option 50-A39/CYL.*

PILOT 50-A39C02 with printer 50-C10B/PR and pedestal 50-C39/B1

PILOT

Automatic system with closed loop control

Note *Also available, as alternative, the configuration with semi automatic power and control system WIZARD 2, DIGIMAX 3. See page 232, 233 Ask us for technical support.*

Common specifications

Frame
Four column rigid welded steel construction. ASTM spherical seat allows free alignment at the initial contact with the specimen. Ram travel 50 mm.

Compression Platens
See physical specifications table.

Safety Features
Max. pressure valve to avoid machine overloading, piston travel limit switch, emergency stop button, front door and rear fragment guard.

Machine Accessories
- Slotted distance pieces to reduce the vertical daylight
- Frame pedestal
- Rigid front door

Software
All our PCS are supplied complete with the 82-SW/TRM software allowing real time and deferred test data download to PC. Full data management and reporting is provided with optional software DATA-MANAGER 82-SW/DM (not suitable for WIZARD 2 PCS). See page 238

Test Accessories
These machines can be equipped with accessories to perform:
- Capping pads and retainers
- Sulphur capping equipment
- Splitting tensile test
- Compression on cement samples
- Flexural test on concrete beams

Upgrading Options

Additional testing frame connection
For WIZARD 2 and DIGIMAX 3 PCS. See page 232, 233
For PILOT and AUTOMAX PCS. See page 236

Printer installation
For WIZARD 2 and DIGIMAX 3 PCS. See page 232, 233
For PILOT and AUTOMAX PCS. See page 236

Fragment guard lock switch
Prevents test execution with the front door open

50-C50/P
For testers with PILOT PCS.

50-C50/P2
For testers with DIGIMAX 3 and WIZARD 2 PCS.

Special calibration procedure
See page 240

Calibration in lbf units
These machines can be calibrated in lbf unit. For the codes change second last code number from 0 to 1

Certified platen hardness
See page 240

Conversion system to test cylinder
This innovative upgrade is achieved by fitting the conversion apparatus, which consists of a rail sliding system and a 165 mm (6.5") diameter compression platen with a spherical seat, to the rear part of the frame. Once installed, the testing configuration can be changed with minimum effort: all that's required is to loosen the central screw using the upper hand wheel, slide off the upper block platen with spherical seat and fit the cylinder spherical seat assembly.

50-A39/CYL
Conversion set to test cylinders up to 6" x 12" to ASTM C39, comprehending:
- spherical seat and upper compression platen dia. 165 mm (6.5")
- system for easy removal and repositioning of the upper block spherical assembly

Frame physical specifications

Model 50-	A39xxx	A39xxx + A39/CYL
Cap., kN (lbf)	3000 (660,000)	
Max. vertical daylight, mm (inches)	260 (10.2")	370 (14.6")
Horizontal daylight, mm (inches)	370 (14.6")	
Platen dimensions, mm (inches)	310 x 410 x 90 (12.2"x16.1"x3.5")	dia. 165 (6.5")
Surface hardness	55 HRC	
Flatness tolerance	0.02 mm	

main features

- Rigid welded steel construction
- Premium Heavy Duty spherical seat and rectangular platens 310x410x90 mm (12.2"x16.1"x3.5") for testing blocks according to ASTM C140 and ASTM C1314
- Innovative upgrading kit for easily switch of the spherical seat assembly for testing cylinders to ASTM C39
- Compression machine completely reversible. This model is fitted with Premium Heavy Duty spherical seat and rectangular platens 310x410x90 mm (12.2"x16.1"x3.5") for testing blocks according to ASTM C140, C1314. Upper platen and spherical seat are mounted on a axial screw assembly allowing easy adjustment of vertical clearance using slotted distance pieces. Using the innovative upgrading kit the spherical seat-upper platen assembly for blocks can be easily switched with the other one for testing cylinders conforming to ASTM C39, resulting a multi-testing unit!
- Class A accuracy to ASTM E74 starting from 10% of full scale. Special calibration procedure to obtain Class A from 1% available as option. Traceable calibration certificate for load measurement accuracy supplied with the machine

Detail of axial screw assembly allowing easy adjustment of vertical clearance

Detail of upper platen and spherical seat strictly conforming to ASTM C39 and AASHTO T22

Detail of the sliding off operation of the upper block platen and spherical seat, to be replaced by the platen assembly for testing cylinders.

Detail of the upper block platen and spherical seat sliden off on the solid rail system, to fit the platen assembly for testing cylinders

PILOT

kN 3000 | K lbf 660 | 3

50-A39C02

PILOT Compact-line 3000 kN cap. automatic ASTM compression tester for blocks.
230V, 50-60Hz, 1 ph

50-A39C12
as above but calibrated in lbf (cap. 660,000 lbf), when connected to any PCS.

Frame only

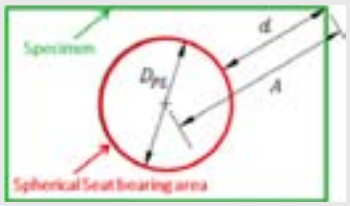
kN 3000 | K lbf 660

All frames are supplied complete with pressure transducer and connection kit for separate control console

50-A39Z00

ASTM compression frame 3000 kN cap.

50-A39Z10
as above but calibrated in lbf (cap. 660,000 lbf), when connected to any PCS.



This model fully complies with the ASTM C140 Standard which specifies the minimum platens thickness related to the spherical seat bearing area and the specimen dimensions as shown in the sketch.

Min. platens thickness = $d = A - D_{PL}/2$
- A: distance from spherical seat centre to specimen corner
- D_{PL}: diameter of spherical seat bearing surface (see Annex A8)

Slotted distance pieces

Specifically designed for reducing the vertical clearance, to suite the size of specimens. Made of steel.

Slotted distance pieces

Code 65-	Dimensions dia. x h	Weight approx.
L1000/100B	7.7"x 4" (195 x 100 mm)	44.1 lbs (20 kg)
L1000/68B	7.7"x 2.7" (195 x 68 mm)	29.8 lbs (13.5 kg)
L1000/50B	7.7"x 2" (195 x 50 mm)	21.6 lbs (9.8 kg)
L1000/40B	7.7"x 1.6" (195 x 40 mm)	17.2 lbs (7.8 kg)

info

For 110V, 60 Hz versions change last code number from 2 to 4.
Example: 50-A39C04

For 220V, 60Hz versions change last code number from 2 to 3 (only for WIZARD 2 and DIGIMAX 3)

General Utility Compression testers 1500 | 2000 | 3000 kN

Standards These series generally relate to previous European national standards
Accuracy Cl.1

COMPACTline

Cubes
up to 150
and 200* mm

Cylinders
up to dia.
160 x 320

**With the 3000 kN models only*

50-C13A02 with pedestal 50-C99/B and front door 50-C19/FG

50-C23C02 with pedestal 50-C29/B and front door 50-C29/FG

WIZARD 2
Semi-automatic power and control system

Note *Also available, as alternative, the configuration with DIGIMAX 3, Semi-automatic power and control system. See page 233 and ask for our technical support.*

PILOT
Automatic system with closed loop control and control system

Common specifications

Frame
Rigid welded steel construction. Spherical seat allows free alignment at the initial contact with the specimen. Ram travel 50 mm.

Compression Platens
See physical specifications table.

Safety Features
Max. pressure valve to avoid machine overloading, piston travel limit switch, emergency stop button, front and rear flexible fragment guards.

Machine Accessories
- Distance pieces to reduce the vertical daylight
- Frame pedestal
- Rigid front door

Software
All our PCS are supplied complete with the 82-SW/TRM software allowing real time and deferred test data download to PC. Full data management and reporting is provided with optional software DATAMANAGER 82-SW/DM (not suitable for WIZARD 2 PCS). See page 238

Test Accessories
These machines can be equipped with accessories to perform:
- Splitting tensile test
- Compression on cement samples

50-C50/CYL
Lower compression platen dia.165 x 30 mm for testing capped cylinders dia. 150 x 300 mm (6"x12"). Resulting compression machine vertical clearance is increased by 20 mm.

Upgrading Options

Additional testing frame connection
For WIZARD 2 and DIGIMAX 3 PCS.
See page 232, 233
For PILOT and AUTOMAX PCS.
See page 236

Printer installation
For WIZARD 2 and DIGIMAX 3 PCS.
See page 232, 233
For PILOT and AUTOMAX PCS.
See page 236

Fragment guard lock switch
Prevents test execution with the front door (optional) open

50-C50/P1
For testers with PILOT PCS.

50-C50/P3
For testers with DIGIMAX PCS and WIZARD PCS.

Special calibration procedure
See page 240

Certified platen hardness
See page 240

Frame physical specifications

model 50-	C13xxx	C23xxx	C34xxx
Cap. kN	1500	2000	3000
Max. vertical daylight mm	340*	350*	350*
Horizontal daylight mm	265	340	370
Platen dimensions, mm	dia. 216		dia. 300
Surface hardness	55 HRC		
Flatness tolerance	0.03 mm		

Note: *with accessory 50-C50/CYL vertical clearance is increased by 20 mm. See Test Accessories.*

main features

- Rigid welded steel construction
- Spherical seat assembly suitable to test both cubes and cylinders
- Class 1 accuracy to EN 12390-4 (Class A to ASTM E74) starting from 10% of full scale. Special calibration procedure to obtain Class 1 / A from 1% available as option. Traceable calibration certificate for load measurement accuracy supplied with the machine

WIZARD 2

- 2 channels (for load sensors) with 65˙000 div. resolution (better than 0.01% of full scale)
- Sampling rate 50/sec
- Second frame option available
- Unlimited storing capacity on USB pen drive of test data downloadable to PC via LAN port
- Digital readout unit with wide high-contrast display 4x20 characters and 6 keys membrane keyboard
- Real time display of load / stress and applied load rate by symbols for easy adjustment
- Dual stage pump: low pressure/high delivery for fast piston approach (40 mm/min) and high pressure/low volume for loading
- Special hand operated pressure-compensated proportional valve for the manual preset of load rate requiring just occasional operator's intervention

50-C13C02 with pedestal
50-C99/B and front door 50-C19/FG

WIZARD 2

kN 1500 | kN 2000 | kN 3000 | 2

50-C13A02
WIZARD 2, 1500 kN cap. semi-automatic compact-line compression tester for cylinders up to dia. 160 x 320 mm and cubes up to 150 mm. 230V, 50 Hz, 1 ph

50-C23A02
WIZARD 2, 2000 kN cap. semi-automatic compact-line compression tester for cylinders up to dia. 160 x 320 mm and cubes up to 150 mm. 230V, 50 Hz, 1 ph

50-C34A02
WIZARD 2, 3000 kN cap. Compact-Line semi-automatic compact-line compression tester for cylinders up to dia. 160 x 320 mm and cubes up to 200 mm. 230V, 50 Hz, 1 ph

PILOT

kN 1500 | kN 2000 | kN 3000 | 3

50-C13C02
PILOT Compact-Line , 1500 kN cap. automatic compression tester for cylinders up to dia. 160 x 320 mm and cubes up to 150 mm. 230V, 50-60 Hz, 1 ph

50-C23C02
PILOT Compact-Line , 2000 kN cap. automatic compression tester for cylinders up to dia. 160 x 320 mm and cubes up to 150 mm. 230V, 50-60 Hz, 1 ph

50-C34C02
PILOT Compact-Line , 3000 kN cap. automatic compression tester for cylinders up to dia. 160 x 320 mm and cubes up to 200 mm. 230V, 50-60 Hz, 1 ph

Frames only

All frames are supplied complete with pressure transducer and connection kit for separate control console

kN 1500 | kN 2000 | kN 3000

50-C13Z00
General utility compression frame 1500 kN cap.

50-C23Z00
General utility compression frame 2000 kN cap.

50-C34Z00
General utility compression frame 3000 kN cap.

info

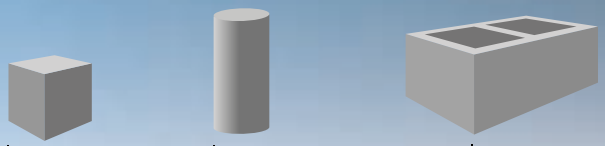
For 110V, 60 Hz versions change last code number from 2 to 4. Example: 50-C13C04.

For 220V, 60Hz versions change last code number from 2 to 3 (only for WIZARD 2 and DIGIMAX 3)

General Utility Compression testers 2000 | 3000 kN

Standards These series generally relate to previous European national standards
Accuracy Cl.1

COMPACTline



Cubes
up to 200 mm

Cylinders
up to dia.
160 x 320 mm

Blocks

50-C25A02 with pedestal 50-C29/B and front door 50-C29/FG

WIZARD 2

Semi-automatic power and control system

Note *Also available, as alternative, the configuration with DIGIMAX 3, Semi-automatic power and control system. See page 233 and ask for our technical support.*

PILOT

Automatic system with closed loop control and control system

Note *Also available, as alternative, the configuration with AUTOMAX, Super Automatic system with closed loop control. See page 234 and ask us for technical support.*

Common specifications

Frame
Rigid welded steel construction. Spherical seat allows free alignment at the initial contact with the specimen. Ram travel 50 mm.

Compression Platens
See physical specifications table.

Safety Features
Max. pressure valve to avoid machine overloading, piston travel limit switch, emergency stop button, front and rear flexible fragment guards.

Machine Accessories
- Distance pieces to reduce the vertical daylight
- Frame pedestal
- Rigid front door

Software
All our PCS are supplied complete with the 82-SW/TRM software allowing real time and deferred test data download to PC. Full data management and reporting is provided with optional software DATAMANAGER 82-SW/DM (not suitable for WIZARD 2 PCS). See page 238

Test Accessories
These machines can be equipped with accessories to perform:
- Splitting tensile test
- Compression on cement samples
- Flexural test on concrete beams

Upgrading Options

Additional testing frame connection
For WIZARD 2 and DIGIMAX 3 PCS.
See page 232, 233
For PILOT and AUTOMAX PCS.
See page 236

Printer installation
For WIZARD 2 and DIGIMAX 3 PCS.
See page 232, 233
For PILOT and AUTOMAX PCS.
See page 236

Fragment guard lock switch
Prevents test execution with the front door (Optional) open

50-C50/P1
For testers with PILOT PCS.

50-C50/P3
For testers with DIGIMAX 3 PCS and WIZARD 2 PCS.

Special calibration procedure
See page 240

Certified platen hardness
See page 240

Note: *for testing high strength / explosive failure specimens we strongly recommend the use of distance pieces complete with threaded centering pin. See page 242*

Frame physical specifications

Model 50-	C25xxx	C35xxx
Cap., kN	2000	3000
Max. vertical daylight, mm	350	350
Horizontal daylight, mm	340	370
Platen dimensions, mm	310 x 510 x 50	
Surface hardness	55.5 HRC (600 HV)	
Flatness tolerance	0.05 mm	

main features

- Rigid welded steel construction
- Spherical seat assembly suitable to test both cubes, cylinders and blocks
- Class 1 accuracy to EN 12390-4 (Class A to ASTM E74) starting from 10% of full scale. Special calibration procedure to obtain Class 1 / A from 1% available as option. Traceable calibration certificate for load measurement accuracy supplied with the machine

WIZARD 2

- 2 channels (for load sensors) with 65˙000 div. resolution (better than 0.01% of full scale)
- Sampling rate 50/sec
- Second frame option available
- Unlimited storing capacity on USB pen drive of test data downloadable to PC via LAN port
- Digital readout unit with wide high-contrast display 4x20 characters and 6 keys membrane keyboard
- Real time display of load / stress and applied load rate by symbols for easy adjustment
- Dual stage pump: low pressure/high delivery for fast piston approach (40 mm/min) and high pressure/low volume for loading
- Special hand operated pressure-compensated proportional valve for the manual preset of load rate requiring just occasional operator's intervention

50-C25C02 with pedestal 50-C29/B and front door 50-C29/FG

WIZARD 2

kN 2000 | kN 3000 | 2

50-C25A02

WIZARD 2, 2000 kN cap. semi-automatic compact-line compression tester for testing blocks, cylinders and cubes.
230V, 50 Hz, 1 ph

50-C35A02

WIZARD 2, 3000 kN cap. semi-automatic compact-line compression tester for testing blocks, cylinders and cubes.
230V, 50 Hz, 1 ph

PILOT

kN 2000 | kN 3000 | 3

50-C25C02

PILOT Compact-Line , 2000 kN cap. automatic compression tester for testing blocks, cylinders and cubes.
230V, 50-60 Hz, 1 ph

50-C35C02

PILOT Compact-Line , 3000 kN cap. automatic compression tester for testing blocks, cylinders and cubes.
230V, 50-60 Hz, 1 ph

Frames only

All frames are supplied complete with pressure transducer and connection kit for separate control console

kN 2000 | kN 3000

50-C25Z00

General utility compression frame 2000 kN cap.

50-C35Z00

General utility compression frame 3000 kN cap.

Upgrading of the power pump by a two way valve to connect a second frame

info

For 110V, 60 Hz versions change last code number from 2 to 4.
Example: 50-C35C04

For 220V, 60Hz versions change last code number from 2 to 3 (only for WIZARD 2 and DIGIMAX 3)

Dimensions and weights of compression testing machines

	CODE	DIMENSIONS LxDxH (mm)	WEIGHT (Kg)
EN 12390-4	50-C46B02	955 x 450 x 1115	670
	50-C46C02	895 x 450 x 1115	680
	50-C46D02	930 x 420 x 1530	740
	50-C56B02	1035 x 505 x 1190	1040
	50-C56C02	985 x 505 x 1190	1045
	50-C56D02	1020 x 475 x 1550	1105
	50-C68C02	1090 x 570 x 1555	2000
	50-C68D02	1125 x 570 x 1555	2010
EN 12390-4 / EN 772-1	50-C47B02	955 x 605 x 1115	730
	50-C47C02	895 x 605 x 1115	740
	50-C47D02	930 x 605 x 1530	790
	50-C57B02	1035 x 640 x 1190	1095
	50-C57C02	985 x 640 x 1190	1105
	50-C57D02	1020 x 640 x 1550	1160
ASTM C39 AASHTO T22	50-A12A02 50-A12A12	810 x 425 x 1085	285
	50-A12C02 50-A12C12	760 x 370 x 1085	290
	50-A22A02 50-A22A12	835 x 440 x 1090	500
	50-A32A02 50-A32A12	805 x 450 x 1160	710
	50-A32C02 50-A32C12	765 x 450 x 1160	710
ASTM C140 ASTM C1314 ASTM C39	50-A39C02 50-A39C12	925 x 510 x 1670	980
	50-A39C02 50-A39C12 + 50-A39/CYL	925 x 830 x 1670	1031 (+51)
GENERAL UTILITY	50-C13A02	810 x 425 x 1085	305
	50-C13C02	760 x 370 x 1085	315
	50-C23A02	835 x 440 x 1090	525
	50-C23C02	785 x 420 x 1090	530
	50-C34A02	805 x 450 x 1160	755
	50-C34C02	755 x 450 x 1160	760
	50-C25A02	835 x 555 x 1090	610
	50-C25C02	785 x 555 x 1090	620
	50-C35A02	805 x 600 x 1160	815
	50-C35C02	765 x 600 x 1160	820
	50-C46Z00	650 x 450 x 1530	665
	50-C56Z00	740 x 505 x 1550	1035
	50-C68Z00 50-C78Z00	845 x 570 x 155	1960

Dimensions and weights of compression frames

	CODE	DIMENSIONS LxDxH (mm)	WEIGHTS (Kg)
EN-12390-4	50-C46Z00	650 x 450 x 1530	665
	50-C56Z00	740 x 505 x 1550	1035
	50-C68Z00 50-C78Z00	845 x 570 x 155	1960
EN 12390-4 Pre-stressed columns	50-C86Z00	700 x 450 x 1470	1050
	50-C86Z10	700 x 450 x 1580	1110
EN 12390-4 EN 772-1	50-C47Z00	650 x 610 x 1530	725
	50-C57Z00	740 x 640 x 1550	1100
	50-C69Z00 50-C79Z00	845 x 570 x 155	1960
ASTM C140 ASTM C1314	50-A12Z00 50-A12Z10	450 x 365 x 1090	250
	50-A22Z00 50-A22Z10	540 x 440 x 1090	465
	50-A32Z00 50-A32Z10	440 x 450 x 1160	665
ASTM C140 ASTM C1314 ASTM C39	50-A39Z00 50-A39Z10	610 x 510 x 1670	935
	50-A39Z00 50-A39Z10 + 50-A39/CYL	610 x 830 x 1670	986 (+51)
General Utility	50-C13Z00	445 x 365 x 1090	270
	50-C23Z00	540 x 400 x 1090	490
	50-C34Z00	440 x 450 x 1160	715
	50-C25Z00	540 x 555 x 1090	575
	50-C35Z00	440 x 600 x 1160	775

Dimensions and weights of multipurpose machines and frames

	CODE	DIMENSIONS LxDxH (mm)	WEIGHTS (Kg)
Multipurpose machines	50-C92A02 50-C92A12	810 x 425 x 1085	285
	50-C92C02 50-C92C12	760 x 370 x 1085	290
	50-C92Z00 50-C92Z10	450 x 365 x 1090	250
	50-C92A22	1060 x 410 x 1090	325
	50-C92C22	1010 x 390 x 1090	330
	50-C92Z20	695 x 390 x 1090	280

Semi-Automatic Power and Control Systems

These systems include a power pump with a proportional valve and a load measuring and display system which is produced in two versions:

WIZARD 2
Readout/Digital Interface

DIGIMAX 3
Data Acquisition and Processing Unit

Power pump and proportional valve

The power system consists of a dual-stage pump: low pressure/high delivery (max. 7 bar) for fast piston approach (up to 40mm/min) and high pressure/low volume (up to 650 bar, 0.50 litres/min) for loading. It is optimised to prevent any overheating effects even under intensive use and severe working conditions.
The pump is fitted with a special manually-controlled proportional valve (pacemeter system) to maintain the preset load rate during the test, requiring only occasional adjustments by the operator.
The power pump with proportional valve can be used to fit existing frames, including other brands. It is identified with the following code and description:

Ordering information

50-Q30B12

Hydraulic power systemfor compression testing machines.
230V, 50Hz, 1ph.
50-Q30B13
As above but 220V, 60Hz, 1ph.
50-Q30B14
As above but 110V, 60Hz, 1ph.

Technical specifications

- Complete with self-compensated proportional valve for the manual preset of load rate
- Maximum pressure: 650 bar, oil delivery 0.5 litres/min
- Maximum usable oil volume: 3.5 litres
- Power: 750W
- Weight: 55kg (approx.)

Semi-automatic power system (50-Q30B12)

Upgrading options

50-C10B/2F

Two-way valve for WIZARD 2 and DIGIMAX 3 PCS for the connection of a second testing frame.

Detail of proportional valve and dial knob

50-Q60A02 with printer 50-C10A/PR

WIZARD 2
Digital readout unit

HARDWARE
- 2 analogue channels
- 4 x 20 characters alphanumeric display
- 65˙000 points high resolution/stability analogue channels
- Sampling rate 50/sec
- Large storage capacity for test data on USB memory stick
- Ethernet port to download data to PC using the SW/TRM software
- Optional integrated printer (see Accessories)

FIRMWARE
- Simultaneous display of load, specific load and actual load rate
- LAN connection to PC for data transmission in real time
- Easy firmware update through Ethernet port
- Memory management with options to display tests stored on USB memory stick, download data to internal printer or PC, delete single tests or reset the entire memory
- Multi-coefficient calibration procedure with automatic storage of data without manual editing (using a suitable load cell and readout unit)
- Language and units selection (kN, ton, lbf)

The WIZARD 2 unit can also be ordered separately to upgrade existing frames (including other makes). A suitable pressure transducer (see Accessories) and connection cable would also be required. For more information get in touch with our Service department.

Ordering information

50-Q60A02

WIZARD 2, two-channel readout/digital interface for compression and flexural machines. Support bracket not included. 110-240V, 50-60Hz, 1ph.

Accessories

50-Q60A02/ARM

Arm for lateral-wall mounting of WIZARD 2 digital readout unit.

Serial printer
(must be factory installed)

50-C10A/PR

Upgrade of the WIZARD 2 unit to incorporate a serial printer in the front panel, allowing results to be printed at the end of a test.

Specifications:
- Very quiet printing
- High speed: 50 mm/sec
- High resolution: 203 dpi= 8 dots/mm
- Supports text printing
- Easy maintenance with self-diagnostics
- Paper width: 57.5 mm

Pressure transducer

82-P0700

Pressure transducer, 0-700 bar.

82-P0349/ELT

Pressure transducer connecting cable

50-Q60B02 with printer 50-C10B/PR

main features

DIGIMAX 3

- Three channels (for load sensors) with 132˙000 divs resolution (better than 0.01% of full scale)
- Large advanced touchscreen with 240x128 pixel graphic display, icon-driven with figures and diagrams
- Compatible with the DataManager software 82-SW/DM. See pages...
- Can be connected to any make of hydraulically operated testing frame
- Recording facility of up to 10 test profiles for each channel allowing quick and easy test start

DIGIMAX 3
Data Acquisition and Processing Unit

HARDWARE
- 3 analogue channels
- Touch screen graphic display 240 x 128 pixel .Icons driven showing figures and diagrams
- 132˙000 point high resolution/stability analogue channels
- Sampling rate 50/sec
- Large storage capacity for test data on USB memory stick
- Ethernet port to download data to PC using the SW/TRM or the DATAMANAGER software
- Optional integrated printer (see Accessories)

FIRMWARE
- Simultaneous display of load, specific load, actual load rate and load/time graph
- LAN connection to PC for transmissionof load and time data in real time during loading
- Easy firmware update through Ethernet port
- Memory management with options to display tests stored on USB memory stick, download data to internal printer or PC, delete single tests or reset the entire memory
- Multi-coefficient calibration procedure with automatic storage of data without manual editing (using a suitable load cell and readout unit)
- Recording facility for up to 10 test profiles for each channel including: type of test (e.g. compression, flexural, indirect tensile), specimen size and shape, load rate, test standard and other general information. Each one of the recorded test profiles can be recalled automatically to save time.
- Compatible with the newly-released Data Manager Software (82-SW/DM, see page 238), tailored to the requirements of construction material testing laboratories, for real-time data acquisition, display and management
- 9 language
- Unit selection (kN, ton, lbf)

The DIGIMAX 3 unit can also be ordered separately to upgrade existing frames (including other makes). A suitable pressure transducer (see accessories) and connection cable would also be required. For more information get in touch with our Service department.

Ordering information

50-Q60B02

DIGIMAX 3, three-channel digital readout unit for compression and flexural machines. Support bracket included.
110-240V, 50-60Hz, 1ph.

Accessories

Graphic printer
(must be factory installed)

50-C10B/PR

Upgrade of the DIGIMAX 3 unit to incorporate a serial graphic printer in the front panel, allowing results (including a load/time plot) to be printed at the end of a test.

Specifications:
- Very quiet printing
- High speed: 50 mm/sec
- High resolution: 203 dpi=8 dots/mm
- Supports text and graphic printing
- Easy maintenance with self-diagnostics
- Paper width: 57.5 mm

Pressure transducer

82-P0700

Pressure transducer 0-700 bar for use with compression and flexural testers.

82-P0349/ELT

Pressure transducer connecting cable

DIGIMAX 3 SEMI-AUTOMATIC POWER AND CONTROL SYSTEMS
The systems include a power pump with a proportional valve, code 50-Q30B12 and a load measuring and display system, code 50-Q60B02.

Automatic Power and Control Systems

PILOT and AUTOMAX have the same technical features in common except for the enhanced hydraulic control and firmware of the AUTOMAX Super Automatic System, which are described in the additional features below.

Technical specifications
(PILOT and AUTOMAX systems)

HYDRAULICS
- Dual-stage pump: centrifugal low pressure for fast approach automatically switches to radial multi-piston high pressure for loading
- DC motor, 720W, 50-60Hz
- Maximum working pressure 700 bar
- Second and third frame optional facility using valve selector (PILOT PCS)
- Second (included) and third (optional) frame facility with active frame selection using display or PC software (AUTOMAX PCS).
- ES Energy Saving technology to reduce the power consumption and enable silent operation

HARDWARE
- 132,000 points high-resolution/stability analogue channels
- 240 x 128 pixel, icon-driven touchscreen graphic display, showing data and plots
- Large storage capacity for test data on a USB memory stick
- Ethernet port for communication with PC
- Optional integrated graphic printer

FIRMWARE
- Simultaneous display of load, specific load, actual load rate and load/time graph
- Memory management with options to display tests stored on USB memory stick, download data to internal printer (optional) or PC, delete single tests or reset the entire memory
- Multi-coefficient calibration curve
- Automatic force verification procedure
- Recording facility for up to 10 test profiles for each channel including: type of test (e.g. compression, flexural, indirect tensile), specimen size and shape, load rate, test standard and other general information. Each one of the recorded test profiles can be recalled automatically to save time
- Compatible with the newly-released DataManager software, tailored to the requirements of construction material testing laboratories, for real-time data acquisition, display and management
- 9 languages and unit selection (kN, ton, lbf)
- Real-time clock/date
- Execution of compression, flexure or indirect tensile tests in automatic mode. The load rate is controlled by a closed-loop P.I.D. system
- Link to PC via LAN port
- Display of load rate (e.g. N/s) or stress rate (e.g. MPa/s), data and plot

main features

Common to PILOT and AUTOMAX systems
- > Automatic test execution with closed-loop digital feedback
- > Adopts the latest ES Energy Saving technology for reduction of power consumption
- > Silent operation
- > Double-stage hydraulic pump with rapid approach and precise oil flow control allowing high throughput of accurate tests (up to 40 per hour)
- > Soft platen-to-specimen contact and smooth load rate control from the very beginning of the ramp
- > Control of a second frame (optional for PILOT) and third testing frame (optional for PILOT and AUTOMAX PCS)
- > Optional internal graphic printer including load/time plot
- > Connects to laboratory network via LAN port/DataManager
- > Connectable to PC via DataManager software (see page 238)
- > Dual user-interface via console display and PC

Additional features of the AUTOMAX systems
- > Automatic performance of the complete test cycle with closed-loop digital feedback by pressing the start button. Automatic loading and unloading by electronic on/off valve
- > Fully computerized system. Connectable to PC via DataManager software (see page 238). The software includes a remote control function for full computerization of the system
- > Double frame control as standard with optional control of an additional third frame: active frame selection via console display or software

PILOT Automatic Power and Control system, connected directly to a compression frame. The display unit is upgraded with the serial graphic printer 50-C10B/PR

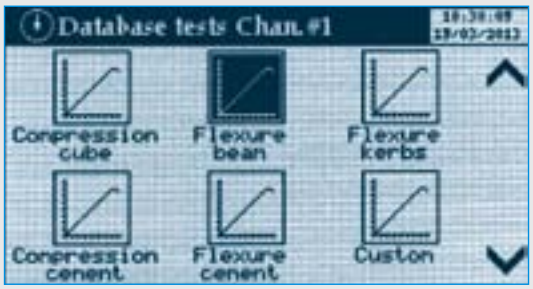
AUTOMAX, Super-automatic Power and Control System, connected directly to a compression frame

PILOT | AUTOMAX

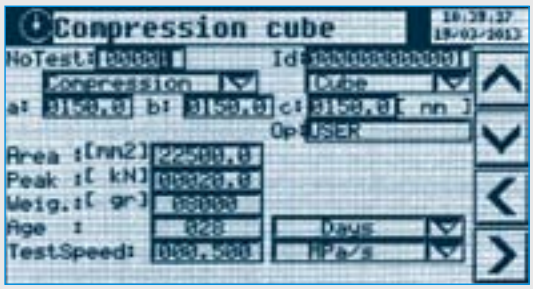
Automatic test procedure

Once the specimen has been positioned and centered, the test procedure is:

1. The user sets the test parameters, including load rate, on the touchscreen (or PC with DataManager software). This operation can be avoided by using a pre-saved test profile for repetitive tests.
2. The user presses the start button on the touchscreen (or PC). For PILOT System the loading/unloading valve has to be switched to the loading position.
3. The machine automatically starts the rapid platen approach, softly contacts the specimen, switches to the test speed and applies load to the specimen with a smooth load-rate control and, finally, releases the pressure upon specimen failure. For PILOT System the loading/unloading valve has to be switched to the unloading position.
4. The machine automatically saves the test including data results and load/time graph. Conformance of the test execution to standards can be easily proven.

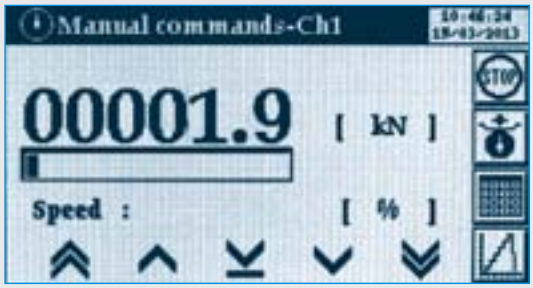


Selection of the test profile (specimen type, load rate, ref. standards, etc.)



Test profile data

Test results



Manual commands for calibration purpose

Date and time

Language selection menu

Automatic Power and Control Systems

Upgrading options

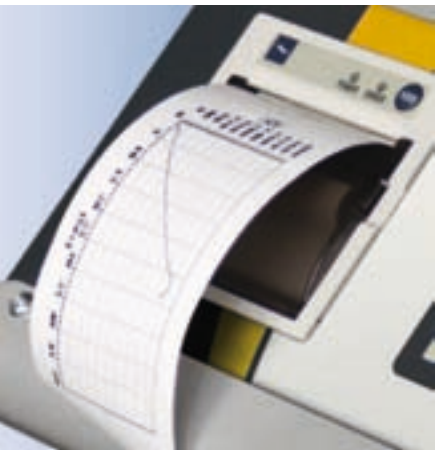
Graphic printer
(must be factory installed)

50-C10B/PR

Upgrade of a PILOT or AUTOMAX system to incorporate a serial graphic printer in the front panel, allowing results (including a load/time plot) to be printed at the end of a test.

Specifications:

- Very quiet printing
- High speed: 50mm/sec
- High resolution: 203 dpi= 8 dots/mm
- Supports text and graphic printing
- Easy maintenance with self-diagnostics
- Paper width: 57.5mm



Detail of display unit with 50-C10/PR graphic printer

Second frame connection
Second and third frame connection
(PILOT System)

The PILOT System can be upgraded with a two or three way valve for controlling (not simultaneously) a second or a third frame.

50-C10C/2F

Two-way valve for PILOT System to control a second frame. This item must be factory installed.

Detail of the two way valve selector (left) and loading/unloading valve (right).

50-C10C/3F

Three-way valve for PILOT System to control a second and a third frame. This item must be factory installed.

Automatic compression tester with PILOT Power and Control unit, controlling a second Flexural frame with the two-valve selector 50-C10C/2F

Third frame connection
(AUTOMAX System)

The AUTOMAX System, which can control two frames as standard, can be upgraded with a hydraulic valve for controlling (not simultaneously) a third frame.

50-C10D/3F

Hydraulic valve for AUTOMAX System to control a third frame. This item must be factory installed.

Super-automatic compression tester with AUTOMAX Power and Control unit, controlling Flexural on concrete and Compression cement frames, with the hydraulic valve 50-C10D/3F

DIGIMAX3 | PILOT | AUTOMAX Smart-Line stand-alone consoles

DIGIMAX 3, PILOT and AUTOMAX PCS are also available in a stand-alone configuration that can be connected to all our compression and flexural frames. In this configuration, they can be profitably used to update any make of existing machine. Technical specifications are identical to those listed on pages 233 for DIGIMAX 3 PCS and on page 234 for PILOT and AUTOMAX PCS.

- Overall dimensions: 1292 x 350 x 450 mm
- Weight: 80 kg (approx.)

Accessories

50-C20Z00
PC cabinet
Dimensions:
500 x 650 x 1350 mm (l x p x h)
Weight approx.: 46 kg
PC and printer not included

DIGIMAX SMART-Line

50-C10B02
DIGIMAX 3 SMART-Line, semi-automatic stand-alone Power and Control Console, for the control of one testing frame. Second frame facility available on request.
230V, 50Hz, 1ph

50-C10B03
As above but 220V, 60Hz, 1ph.

50-C10B04
As above but 110V, 60Hz, 1ph.

DIGIMAX 3 SMART-Line,stand-alone control console 50-C10B02 with 50-C56Z00 frame and distribution block 50-C10B/2F for the control of 50-C0910/FR flexure frame

PILOT SMART-Line

50-C10C02
PILOT SMART-Line, automatic stand-alone Power and Control Console, for the control of one testing frame. Second and third frame facility available on request.
230V, 50-60Hz, 1ph)

50-C10C04
As above but 110V, 60Hz, 1ph.

PILOT SMART-Line, stand-alone console, 50-C10C02, controlling three frames: Compression and Flexure on cement and compression on concrete, with the two way valve 50-C10C/3F

AUTOMAX SMART-Line

50-C10D02
AUTOMAX SMART-Line, super-automatic stand-alone Power and Control Console, for the control of two testing frames. Third frame facility available on request.
230V, 50-60Hz, 1ph.

50-C10D04
As above but 110V, 60Hz, 1ph.

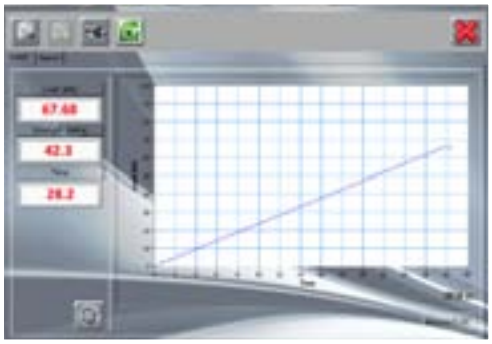
AUTOMAX SMART-Line, stand-alone console, 50-C10D02, controlling three frames: Compression concrete, Flexure concrete and Compression cement, with the hydraulic valve 50-C10D/3F

intuitive
smart software

Universal Testing Software

DataManager 82-SW/DM

The DataManager software, running within the RTM (Real Time Management) environment, is compatible with DIGIMAX 3, PILOT and AUTOMAX Power and Control Systems and also with the more sophisticated AUTOMAX E-Modulus consoles. It is specially designed for data acquisition and reporting of compression, flexure and indirect tensile tests performed on different types of specimens and materials.



The Control System of the testing machine is connected to the PC via the RTM software using a high-speed Ethernet link, passing data and commands to the software in real-time and allowing live readings of load, strength and elapsed time, and a load/time graph to be displayed on the screen.

When connected to the AUTOMAX Control System, tests can be fully performed remotely, using the software.

Test data is stored using a database system, allowing previous tests to be quickly and easily recalled for reviewing or creating reports. MS Excel® test reports can be generated singly, or as batch files containing all the required test results for a single client or project or other criteria.

Test types and descriptive sample and test information are fully customisable, meaning that test reports can be tailored to the client's specific requirements, and ensuring that results can be reported in accordance with the relevant testing standards.

Automatic force verification procedure

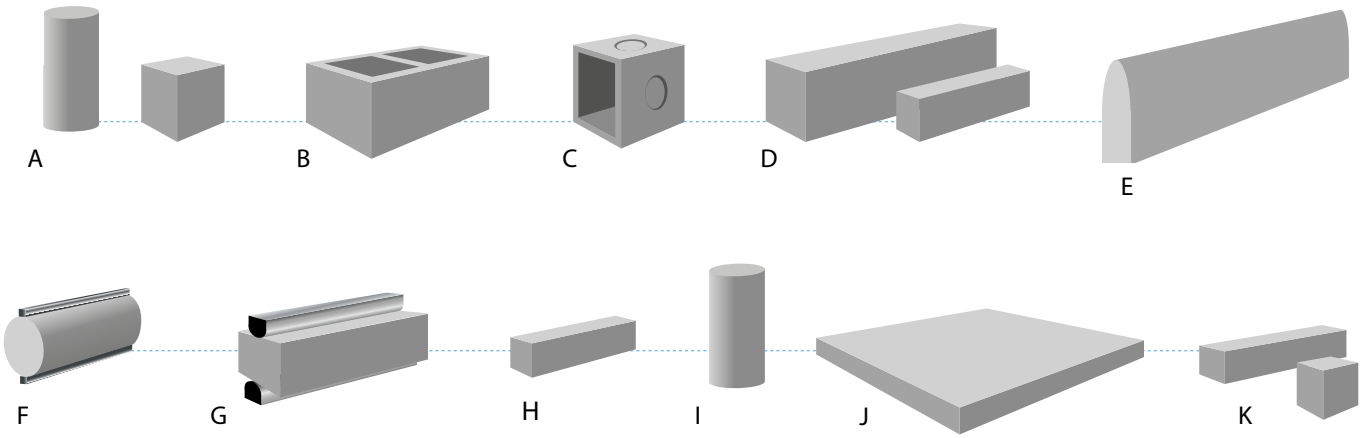
In addition, by connecting the PC to our digital readout unit (82-P0801/E or 82-P0804/E) and suitable load cells, it is possible to perform an automatic load measurement verification procedure, including data acquisition and printing of traceable calibration certificates, using the software.
see page 268

Control console directly connected via software to our digital readout unit and load cell to perform automatic force verification procedure.

DataManager 82-SW/DM

For Compression, Flexural, Indirect tensile Testing on Concrete, Cement and similar

Standard	Test	Specimen
EN 12390-3	Compressive strength of Concrete test specimens	A
EN 772-1 ASTM C140, C1314	Compressive strength of masonry units	B
EN 1917	Concrete unreinforced, manholes and inspection chambers, compressive strength	C
EN 12390-5	Flexural strength of concrete test specimens	D
EN 1340	Flexural test on Concrete kerb units	E
EN 12390-6	Tensile splitting test on concrete test specimens	F
EN 1338	Indirect tensile test on concrete paving blocks	G
EN 196-1	Compression and flexural strength of cement specimens	H
ASTM C39 AASHTO T22	Compressive strength of cylindrical concrete specimens	I
ASTM C78	Flexural strength of concrete using third-point loading	D
ASTM C293	Flexural strength of concrete using center-point loading	D
ASTM C496	Splitting tensile strength of cylindrical concrete specimens	F
EN 1339	Flexural test on concrete flagstones	J
ASTM C109 C348	Compression and flexural strength of cement specimens	K



Upgrading options

Platen surface hardness certificates

Standards

EN 12390-4 | ASTM C39 | ASTM C109 | ASTM C140 | EN 196-1 | ASTM D2664 | ASTM D2938

The standards prescribe a minimum surface hardness depending on the type of test to be performed. When required, the hardness verification is performed with certified instruments. This option is identified by the Certificate code shown on the following table.

Platen surface

Machine/frame/ accessory Series	Platen dimensions (mm)	Certificate code	Certified minimum hardness HRC
50-A12xxx 50-A22xxx 50-A32xxx 50-A39xxx + accessory 50-A39/CYL 50-C92xxx	165 (circular)	**50-C0050/HRD2**	55
50-G13xxx 50-G23xxx	216 (circular)	**50-C0050/HRD3**	55
50-C34xxx 50-C46xxx 50-C56xxx 50-C86xxx	300 (circular)	**50-C0050/HRD4**	53
50-C25xxx 50-C35xxx 50-C47xxx 50-C57xxx 50-C67xxx 50-C77xxx	310 x 510 x 50 (rectangular)	**50-C0050/HRD7**	55.5
50-C69xxx 50-C79xxx	310 x 510 x 90 (rectangular)	**50-C0050/HRD10**	55.5
50-C68xxx 50-C78xxx	305 x 305 (square)	**50-C0050/HRD6**	53
65-L17xxx 65-L27xxx 50-C9030 50-C9030/H	40 x 40 (square)	**50-C00050/HRD5**	60
65-L18xxx 65-L28xxx 65-L38xxx 65-L58xxx 50-C92x2x	165 (circular)	**65-L0050/HRD**	55.5
50-Q0050/HRD*	300 (circular)	**50-C0050/HRD9**	58

** For rock testing to ASTM D2938, D3148*

Special calibration procedures

Standards

EN 12390-4 | ASTM E74

These procedures can be applied to Concrete, Cement and Flexural testing machines fitted with WIZARD 2, DIGIMAX 3, PILOT and AUTOMAX systems and testing systems AUTOMAX E, MCC and ADVANTEST.

The calibrations are obtained by selecting suitable load sensors and using the calibration facilities of the Control Systems' software.

To be specified at the time of ordering

Machine/Frame Series	Calibration in Class 1 (A)	Identification code
All compression testing frames from 1500 to 5000kN capacity	From 1% to 100% of full scale	**50-C0050/CAL**
All cement compression testing frames, 300 and 600kN testing chambers only	From 1% to 100% of full scale	**50-C0050/CAL**
Cement compression Testing frame 500 kN capacity (model fitted with load cell)	From 0,1 % to 100 % of full scale	**50-C0050/1 CAL**
All cement double-chamber testing frames, for the 15kN chamber	From 5% to 100% of full scale	**50-C0050/CAL5**
Flexure testing frames fitted with load cells: 50-C1201/BFR 50-C1401/BFR 50-C1601/BFR	From 1% to 100% of full scale	**50-C0050/CAL**
Flexure testing frames fitted with pressure transducers: 50-C0910/FR 50-C1200/BFR 50-C1400/BFR	From 5% to 100% of full scale	**50-C0050/CAL5**

Machine accessories

Frame pedestals

All the pedestals in the range are made of steel and are designed to make use of the compression machine straightforward, providing easy specimen loading and machine control.

Technical specifications and ordering information

Code 50-	Pedestal dimensions (wxdxh) mm	For machines/ frame	Approx. weight (kg)
C29/B	620 x 420 x 400	50-C23xxx 50-C25xxx 50-A22xxx	29
C39/B	670 x 400 x 400	50-C34xxx 50-C35xxx 50-A32xxx	40
C49/B	650 x 310 x 425	50-C42xxx 50-C46xxx 50-C47xxx	35
C59/B	740 x 370 x 375	50-C52xxx 50-C56xxx 50-C57xxx	36
C99/B	660 x 370 x 400	50-C92xxx 50-A12xxx 50-C13xxx	26
C39/B1	670 x 630 x 200	50-A39xxx	35

50-C49/B, 50-C59/B

50-C99/B, 50-C29/B, 50-C39/B

Rigid front door

All our EN compression frames/machines series are already fitted with front rigid door and rear flexible fragment guard. General utility and ASTM frames/machines series are standard mounted with front and rear flexible fragment guard. As accessory it is possible to upgrade them with a front rigid door.

Ordering information

Code 50-	For machine/frame
C19/FG	50-C13xxx / 50-A12xxx
C29/FG	50-C23xxx / 50-A22xxx
C25/FG	50-C25xxx
C39/FG	50-C34xxx / 50-A32xxx
C35/FG	50-C35xxx

Lifting assembly for block testing platens

This accessory is used for easier placement of distance pieces which can be used, when necessary, to reduce the vertical clearance of the machines/frames.

Two models are available:

50-C9060/A

Lifting device for bottom block platen for easier placement pieces compatible platen size 310 x 510 x 50 mm thickness. Weight: 19 kg (approx.)

50-C9060/B

Lifting device for bottom block platen for easier placement of distance pieces compatible platen size 310 x 510 x 90 mm thickness. Weight: 18 kg (approx.)

50-C9060/A

50-C9060/B

Centering device for cylinders and cubes

This is a useful accessory for accurately centering cylindrical and cubical specimens on the compression platens, made of corrosion-resistant steel.

50-C0050/CTR2

Centering device for specimen with 100, 150, 160 and 200 mm diameter/side. Suitable for machines fitted with 300 mm dia. platens.

50-C0050/CTR3
Same as above, but suitable for machines fitted with 216 mm square platens.

50-C0050/CTR4
Same as above, but suitable for machines fitted with 305 x 305 mm square platens.

50-C0050/CTR 2

50-C0050/CTR2

Machine accessories

Distance pieces

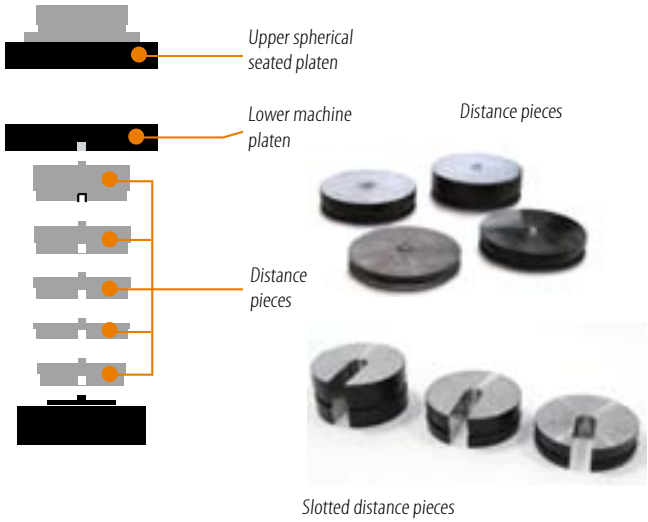
For adjusting the vertical clearance

Made of steel, these pieces are used to reduce the vertical clearance of the compression machine to a height that is appropriate for the size of the specimen and considering that, in general, the maximum piston travel is 50mm. The following information is provided to help you select the correct combination of distance pieces.

How to select distance pieces

When selecting distance pieces, all possible combinations of tests and specimen sizes should be considered.
The total vertical space that needs to be filled by distance pieces can be calculated using:
(v - h) - 10 mm
Where:
v = Maximum vertical clearance of the machine (mm)
h = Specimen height (mm)
10 mm = typical free vertical space to be left after specimen positioning

For example:
v= 350 mm
h = 150 mm
Vertical space to be filled = (v-h) - 10 mm =(350 -150)-10 = 190 mm (approx.)



Slotted distance pieces

Technical specifications and ordering information

Code	Dimensions (diameter xheight, mm)	Approx. weight (kg)
50-C9080*	200 x 30	7.3
50-C9082*	200 x 50	12.3
50-C9083*	200 x 68	16.7
50-C9084	96 x 158	9
50-C9086*	200 x 100	25
50-C9087	96 x 130	7
65-L1000/20	165 x 20	3.5
65-L1000/30	165 x 30	5.5
65-L1000/40	165 x 40	7
65-L1000/68	165 x 68	10.5
Slotted type (for 50-A39xxx only)		
50-L1000/40B	195 x 40	7.8
50-L1000/50B	195 x 50	9.8
50-L1000/68B	195 x 68	13.5
50-L1000/100B	195 x 100	20

**These codes by adding the suffix / P identify the distance pieces complete with threaded centering pin suitable for testing high strength / explosive failure specimens. Dimensions are the same as standard models.*

Test accessories

Splitting tensile test devices

Standards EN 1338 | EN 12390-6 | ASTM C496

This device is a two-column steel frame with a self-centering specimen holder at the base and an upper load beam suspended with springs for easy adjustment of the specimen. It can be easily placed on the lower platen of the compression tester, with suitable distance pieces used to adjust the vertical clearance.

The devices have to be completed with packing strips which are inserted between the specimen and the load beam.

Model 50-C9000/B is used for splitting tensile tests on cylindrical specimens up to 160 x 320 mm (diameter x height)
Model 50-C9000/A is used for cylinders up to 250 x 500 mm (diameter x height).
Model 50-C9070/B is used for splitting tensile tests on concrete block pavers and concrete cubes.

Technical specifications

Model	50-C9000/B	50-C9070/B	50-C9000/A
Maximum height*, mm	370	370	388
Max vertical daylight, mm	210 (total height: 370)		
Min vertical daylight, mm	90 (total height: 250)		
Max horizontal daylight, mm	160		
Max travel, mm	45		
Bearers length, mm	345		
Overall dimensions, width/ length, mm	255/345	255/345	346/525
Usable with	All compression testers	All compression testers	With 4000/5000kN compression testers only
Approx. weight, kg	28	28	50

**When testing 150 mm and 160 mm diameter specimens, the vertical height required is 325 mm.*
When testing 100 mm diameter specimens, the vertical height required is 275 mm.
Suitable distance pieces must be selected to adjust the remaining vertical clearance.
For models 50-C9000/B and C9070/B max total height is 370 mm. The 370 mm vertical daylight can easily obtained removing the lower platen of the compression tester.

50-C9070/B

50-C9000/B

Ordering information

50-C9000/B

Splitting tensile test device for cylinders up to 160 mm diameter x 320 mm height. Conformsto EN 12390-6 and ASTM C496.

50-C9000/A

Splitting tensile test device for cylinders 250mm diameter x 500 mm height. Conforms to EN 12390-6.

50-C9070/B

Splitting tensile test device for concrete block pavers and concrete cubes. Conforms to EN 1338 and EN 12390-6.

Accessories

50-C9002

Hardboard packing strips 4 x 15 x 345 mm, to EN 1338 and 12390-6.
Pack of 50.

50-C9001/A

Hardboard packing strips 4 x15 x 550 mm, for 50-C9000/A device. Pack of 50.

50-C9002/A

Plywood packing strips 3 x 25 x 345 mm, to ASTM C496. Pack of 50.

50-C9000/B fitted in the compression machine

Flexural test device for concrete beams

Standards

EN 12390-5 | ASTM C78 | ASTM C293 | AASHTO T97

This device has a double upper bearer for two-point and centre-point tests. The total height of the device is 370 mm when adjusted for 150 mm beams and 320 mm for 100 mm beams. When the device is adjusted to 370mm height, the required vertical clearance in the chamber of the compression tester can easily be obtained by removing the lower platen.

50-C9010/B

Flexural device for concrete beams 100 x 100 x 400/500 mm and 150 x 150 x 600/700 mm.

- Maximum vertical clearance: 160 mm (total height: 370 mm)
- Minimum vertical clearance: 110 mm (total height: 320 mm)
- Maximum travel: 45 mm
- Distance between upper rollers: 100 mm or 150 mm
- Distance between lower rollers: 300 mm or 450 mm
- Total width: 260 mm
- Weight: 33 kg (approx.)

50-C9010/B fitted in the compression machine

Compression devices for cement and mortars

Standards

ASTM C109 | EN 196

This apparatus can be placed and centered directly on the lower machine platen and consists of a robust frame fitted with an upper platen with a spring-mounted spherical seat. The 50-C9030/H model conforms to EN 196-1 and is designed to test portions of 40 x 40 x 160 mm prisms broken in flexure, while the 50-C9032/ H model, conforming to ASTM C109, is fitted with 75 mm diameter compression platens, has a vertical clearance of 53 mm, and is used to test 50 mm/2" cubes and other small samples such as microcores.

The total height of both models is 222 mm.

Vertical clearance of the compression machine has to be adjusted accordingly using suitable distance pieces. See accessories.

50-C9030/H can be supplied, on request, with a platen hardness certificate. See page 240

Weight: 8 kg (approx.)

50-C9030/H

50-C9032/H

Ordering information

50-C9030/H

Compression device to test portions of 40 x 40 x 160mm prisms broken in flexure to EN 196-1. High stiffness model.

50-C9032/H

Compression device to test 50mm (2") cubes to ASTM C109. High stiffness model.

Distance pieces (dimensions and weight on page 242) required for specimen size:

Machine and frames Series 50-	Vertical daylight approx. mm	*Cylinders 4"x 8" and Ø 100 x 200 mm		*Cylinders 6"x12", Ø 150 x 300 and 160 x 320 mm		Cube 100 mm		Cube 150 mm		Cube 200 mm		Cube 300 mm		Blocks up to 300 x 500 x 200 mm (W x D x H)	
		Q.ty	code	Q.ty	code	Q.ty	code	Q.ty	code	Q.ty	code	Q.ty	code	Q.ty	code
A12xxx	370	1x	C9084	1x 1x	L1000/40 L1000/20	1x 2x 1x	C9084 L1000/40 L1000/20	-		-		-		-	
C13xxx	340	2x	C9083	1x	C9080	2x 2x	C9082 C9083	1x 2x	C9082 C9083	-		-		-	
A22xxx	380	1x 1x	C9084 L1000/20	1x 1x	L1000/40 L1000/30	1x 2x 1x	C9084 L1000/40 L1000/30	-		-		-		-	
C23xxx	350	2x	C9083	1x	C9080	2x 2x	C9082 C9083	1x 2x	C9082 C9083	-		-		-	
C25xxx (block platens)	350	2x	C9083	1x	C9080	2x 2x	C9082 C9083	1x 2x	C9082 C9083	2x	9083	1x	C9080	2x	C9083
A32xxx	380	1x 1x	C9084 L1000/20	1x 1x	L1000/40 L1000/30	1x 2x 1x	C9084 L1000/40 L1000/30	-		-		-		-	
C34xxx	350	2x	C9083	1x	C9080	2x 2x	C9082 C9083	1x 2x	C9082 C9083	1x 1x	C9082 C9083	-		-	
C35xxx (block platens)	350	2x	C9083	1x	C9080	2x 2x	C9082 C9083	1x 2x	C9082 C9083	2x	C9083	1x	C9080	2x	C9083
C46xxx	350	2x	C9083	1x	C9080	2x 2x	C9082 C9083	1x 2x	C9082 C9083	2x	C9083	-		-	
C47xxx (block platens)	350	2x	C9083	1x	C9080	2x 2x	C9082 C9083	1x 2x	C9082 C9083	2x	C9083	1x	C9080	2x	C9083
C56xxx	350	2x	C9083	1x	C9080	2x 2x	C9082 C9083	1x 2x	C9082 C9083	2x	C9083	-		-	
C57xxx (block platens)	350	2x	C9083	1x	C9080	2x 2x	C9082 C9083	1x 2x	C9082 C9083	2x	C9083	1x	C9080	2x	C9083
C69xxx (block platens)	330	1x 1x	C9082 C9083	-		1x 1x 1x	C9082 C9083 C9086	1x 1x	C9083 C9086	1x 1x	C9082 C9083	-		1x 1x	C9082 C9083
C68xxx	525	1x 2x 1x	C9083 C9086 C9082	1x 1x 1x	C9083 C9086 C9082	1x 3x 1x	C9083 C9086 C9082	1x 3x	C9083 C9086	1x 2x 1x	C9083 C9086 C9082	1x 1x 1x	C9083 C9086 C9082	-	
C79xxx (block platens)	330	1x 1x	C9082 C9083	-		1x 1x 1x	C9082 C9083 C9086	1x 1x	C9083 C9086	1x 1x	C9082 C9083	-		1x 1x	C9082 C9083
C78xxx	525	1x 2x 1x	C9083 C9086 C9082	1x 1x 1x	C9083 C9086 C9082	1x 3x 1x	C9083 C9086 C9082	1x 3x	C9083 C9086	1x 2x 1x	C9083 C9086 C9082	1x 1x 1x	C9083 C9086 C9082	-	
C86xxx	345	2x	C9083	1x	C9080	2x 2x	C9082 C9083	1x 2x	C9082 C9083	2x	C9083	-		-	

*The distance pieces here above listed refer to cylinders tested without capping devices.

Concrete pipe tester

Concrete pipe testing machines 750 kN capacity

Designed to test concrete sewer and drain pipes used in drainage works, water supply systems, irrigation systems etc. The machine is available in two versions:

50-C9602 conforming to ASTM C497

50-C9612 conforming to EN 1916

This EN version is suitable for testing round shaped pipes, cylindrical barrel shape over the full length without sockets conforming to EN 1916 Annex C, fig. C.2a. Compression tests can also be performed on cylindrical pipes with sockets, provided that you specify, at time of request, the shape and dimensions of above sockets to verify the compatibility with the loading bearers.

The difference between the two models concerns, mainly, the lower supports and the upper bearing beam. The machines do not include the elastomeric bearing strips or similar which have to be provided on site.

Other machine versions are available on request.

50-C9612

FRAME

The frame is made of structural steel and is bolted together with high strength bolts so it can be easily assembled and disassembled either for delivery or for movement from one site to another. The two upper crossbeams are raised and lowered by a motor operated winch. The upper crossbeam is then locked in position by locking pins inserted through the columns.

HYDRAULIC RAM ASSEMBLY

Consists of an alloy steel cylinder, of a piston tempered and ground, and hydraulic hoses and spherical seat.

CONTROL CONSOLE

DIGIMAX 3 Smart Line control console see page 237

For technical specifications about hydraulic pump and digital processing unit see page 233

Specifications (both models)

- Max. load: 750 kN
- Max vertical daylight: 3900 mm
- Distance between columns: 3250 mm
- Max. pipe dimensions: dia. 3700x2900 mm long
- Frame dimensions: 6460 x 4150 x 3000 mm (hxlxd)
- Power rating: 1300 W
- Net weight approx.: 4300 kg
- Shipping weight approx.: 5200 kg
- Shipping cubage approx.. 11 m3

Important note:
The machine is delivered disassembled and have to be mounted on site following the instructions.

Large concrete pipe tested with the 50-C9602 machine

Ordering information

50-C9602

Concrete pipe tester, 750 kN capacity, conforming to ASTM C497. 230 V, 50 Hz, 1 ph.

50-C9603
As above but 220 V, 60 Hz, 1 ph

50-C9604
As above but 110 V, 60 Hz, 1 ph

50-C9612

Concrete pipe tester, 750 kN capacity, conforming to BS/EN 1916.. 230 V, 50 Hz, 1 ph.

50-C9613
As above but 220 V, 60 Hz, 1 ph

50-C9614
As above but 110 V, 60 Hz, 1 ph

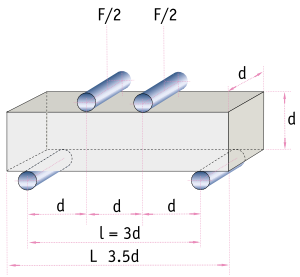
Flexural and transverse testing frames

These frames can be connected to our Power and Control Systems: WIZARD 2, DIGIMAX 3, PILOT, AUTOMAX, MCC and ADVANTEST, for testing standard concrete beams / flagstones / kerbs / tiles / fibre-reinforced and sprayed concrete etc. in conformance with the relevant EN, ASTM and AASHTO standards.

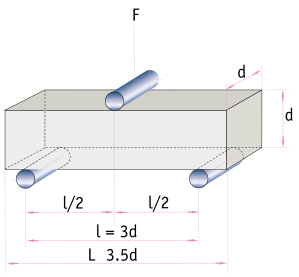
Testing standard concrete beams in flexure

EN and ASTM standards prescribe either the two-point or the centre-point methods which are illustrated in the sketch below. The two-point loading method (three-point for ASTM) however, has been taken as the reference method by the EN 12390-5.

All our frames are fitted or can be fitted with accessories to perform either the two-point or the centre-point loading.



Two-point loading



Centre-point loading

Models available

We produce various versions which mainly differ from one another in the size and shape of the testing space, the type of load sensor (pressure transducer or load cell), and the maximum capacity. Models fitted with a load cell give high accuracy when testing low strength specimens. The 300kN capacity 50-C1601/FR frame features a "C"-shaped open structure which facilitates the positioning of large and bulky specimens. This model is particularly suitable for tests under displacement control (e.g. FRC-FRP concrete and Shotcrete), using MCC and ADVANTEST control consoles. See page 256, 260

Ordering information

50-C0910/FR

Flexure frame, 100kN capacity, complete with loading rollers for testing standard concrete beams conforming to EN 12390-5, ASTM C78 and ASTM C293. Includes pressure transducer and connection kit for separate control console and pedestal.

50-C1201/BFR

Flexural frame, 100kN capacity, complete with load cell and connection kit for separate control console. Rollers not included.

50-C1200/BFR

Flexural frame, 150kN capacity, complete with pressure transducer and connection kit for separate control console. Rollers not included.

Note:
All our Flexural frames are fitted or can be fitted with accessories to perform either the two-point or the centre-point loading.

50-C1401/FR

Flexural frame, 150kN capacity, with adjustable vertical clearance, complete with load cell and connection kit for separate control console. Rollers not included.

50-C1400/FR

Flexural frame, 150kN capacity, with adjustable vertical clearance, complete with pressure transducer and connection kit for separate control console. Rollers not included.

50-C1501/FR

High stiffness flexural frame, 200kN capacity, complete with load cell and connection kit for separate control console. Rollers not included.

50-C1200/7

50-C0910/FR

50-C1400/FR with 50-C1400/8

50-C1201/BFR with 50-C1200/8

50-C1200/BFR with 50-C1200/3 (with loading pad)

Technical specifications

Model 50-*****	C0910/FR	C1200/BFR	C1201/BFR	C1400/FR	C1401/FR	C1501/FR
Maximum load capacity, kN	100	150	100	150	150	200
For testing	100 x 100 x 400/500 mm 150 x 150 x 600/700 mm concrete beams	Beams, flagstones, kerbs etc. (with the suitable accessory)	Beams, flagstones, kerbs etc. (with the suitable accessory)	Beams, flagstones, kerbs and large specimens in general (with the suitable accessory)	Beams, flagstones, kerbs and large specimens in general (with the suitable accessory)	Beams, flagstones, kerbs etc. (with the suitable accessory)
Load sensor	Pressure transducer	Pressure transducer	High-precision load cell	Pressure transducer	High precision load cell	High-precision load cell
Horizontal clearance, mm	180	720	720	660	660	650
Maximum vertical clearance with rollers or accessories, mm	160	-	-	-	-	-
50-C1x00/8	-	207	182	483	443	160
50-C1x00/3 (LP)*	-	273	248	405	365	226
50-C1x00/3 (LR)*	-	232	207	510	470	185
50-C1x00/3 + 50-C1200/4	-	181	156	458	418	134
50-C1x00/7	235	383	358	600	560	336
Distance between upper rollers, mm	150, 100 or single roller	100, 150, 200 or single roller	100, 150, 200 or single roller	100, 150, 200 or single roller	100, 150, 200 or single roller	100, 150, 200 or single roller
Distance between lower rollers, mm	450 or 300	100 to 900	100 to 900	100 to 1200	100 to 1200	100 to 900
Piston travel, mm	75	130	130	110	110	130
Piston travel limit switch	-	Included	Included	Included	Included	Included
Piston return by	Counterweight	Counterweight	Counterweight	Springs	Springs	Counterweight
Overall dimensions, mm (l x w x h)	350 x 530 x 1343 (including pedestal)	950 x 1000 x 981	950 x 1000 x 981	860 x 1400 x 1453	860 x 14090 x 1453	900 x 1000 x 950
Approx. weight, kg	165 (including pedestal)	130	130	216	224	150

** Note: The accessories 50-C1200/3 and 50-C1400/3 include lower rollers and either a top loading pad for testing kerbs, or an upper central loading roller for testing flagstones. The two different vertical clearances refer to the use of the loading pad (LP) or the use of the loading roller (LR). See accessories descriptions.*

Accessories

Standard	Description	Codes for testing frames 50-C1200/BFR 50-C1201/BFR 50-C1501/FR	Codes for testing frames 50-C1400/FR 50-C1401/FR
EN 12390-5 ASTM C78, ASTM C293 Flexural tests on standard concrete beams	Roller bearing assembly for centre and two-point loading. Bearer dimensions: 40 x 300mm (diameter x length) Weight: 37kg (approx.)	50-C1200/8	50-C1400/8
EN 1339, EN 1340 Flexural tests on flagstones and kerbs	Set of two loading supports and central loading roller 620mm long, 40mm diameter, and top loading swivel jointed pad, 40mm diameter. Weight: 45kg (approx.) *Note: The 50-C1200/3 and 50-C1400/3 sets can be easily expanded to also perform flexural tests on standard concrete beams in conformance with EN 12390-5, by adding the following accessory:* 50-C1200/4 Set of two upper rollers 40 x 300mm (diameter x length) with support plate and cylindrical seat. Weight: 23kg (approx.)	50-C1200/3	50-C1400/3
Compression test on small/low strength specimens	Set of lower and upper platens, spherically seated, 165mm diameter, for compression tests. Weight: 23kg (approx.)	50-C1200/7**	50-C1400/7

***Suitable also for flexure frame model 50-C0910/FR*

Flexural and transverse testing frames

50-C1601/FR

Universal, open structure flexural frame , 300 kN capacity

The 50-C1601/FR flexural frame has been designed to satisfy the stringent requirements prescribed by the Standards relating to determination of deformability and ductility index of sprayed concrete and fibre-reinforced concrete. The 'C-shaped' open structure of the frame allows easy and practical front-loading but, once the specimen is in position, the structure is closed with hydraulically-clamped rod assuring high rigidity.

Fitted with a high-precision strain gauge load cell for accurate and reliable test results, the frame must be connected to a suitable control console and used with appropriate testing accessories, depending on type of test.

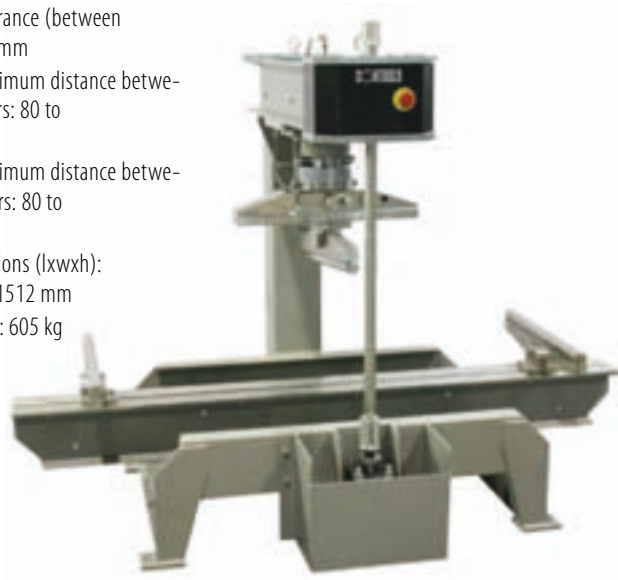
Main features

- Universal flexural frame, 300 kN capacity
- C-shaped open structure for easy specimen loading; closed for testing with hydraulically-clamped vertical rod
- Load measurement by high-precision load cell
- Large testing space houses a wide range of accessories for conventional tests and tests under displacement and strain control.

Technical specifications

- Maximum capacity: 300 kN
- Load sensor: load cell
- Maximum vertical clearance without accessories: 546 mm
- Horizontal clearance (between uprights): 900 mm
- Minimum/maximum distance between lower bearers: 80 to 1500 mm
- Minimum/maximum distance between upper bearers: 80 to 500 mm
- Overall dimensions (lxwxh): 1700 x 1266 x 1512 mm
- Weight approx.: 605 kg

50-C1601/FR with accessory. The vertical rod, hydraulically clamped in testing position, provides high rigidity and stability.



Flexural tests on standard concrete beams

Standards EN 12390-5, ASTM C78, ASTM C293

50-C1601/1B

Upper and lower assembly for centre and two-point loading tests on concrete beams.
-Bearers 30 mm diameter, 300 mm long
-Weight approx.: 52 kg

50-C1601/KIT

Set of four distance pieces and two base plates for adjusting the vertical clearance.

Note: *the remaining vertical clearance of the frame with the above accessory can be adjusted from 263 to 132 mm.*

Flexural strength of paving slabs

Standards EN 1339

50-C1601/2

Set of one upper and two lower roller assemblies for testing paving flags.
-Bearers 40 mm diameter, 620 mm long
-Weight approx.: 66 kg

50-C1601/KIT

Set of four distance pieces and two base plates for adjusting the vertical clearance.

Note: *the remaining vertical clearance of the frame with the above accessory can be adjusted from 263 to 132 mm.*

50-C1601/FR frame fitted with 50-C1601/1B assembly and 50-C1601/KIT

50-C1601/FR frame fitted with 50-C1601/2 assembly and 50-C1601/KIT

Compression tests on small/ low strength specimens

The 50-C1601/FR Universal frame, 300 kN capacity, can also be profitably used, when equipped with the accessories described below, for compression tests on small/low strength specimens by placing the specimen directly on the 165 mm dia. platens, for splitting tests on concrete in conjunction with the accessory 50-C9070 or for cement testing with the suitable compression device (see page 243).

50-C1601/4

Set of spherically seated upper platen and lower platen, 165 mm diameter, for compression tests.
-Weight approx.: 19 kg

50-C1601/KIT

Set of four distance pieces and two base plates for adjusting the vertical clearance.

Note: *the remaining vertical clearance of the frame with the above accessories can be adjusted from 352 mm to 100 mm.*

50-C1601/FR frame fitted with 50-C1601/4 assembly and 50-C1601/KIT

50-C9070/B

50-C9000/B

50-C9030/H

50-C9032/H

Flexural strength of kerbs

Standards EN 1340

50-C1601/3

Swivel-jointed loading pad for testing kerbs. To be used with the 50-C1601/2 assembly and 50-C1601/KIT described above, removing the upper bearer and replacing it with the loading pad.
-Weight approx.: 5 kg

Note: *the remaining vertical clearance of the frame with the above accessories can be adjusted from 221 to 90 mm.*

Frame opening for easy and practical front loading

50-C1601/FR frame fitted with 50-C1601/2 assembly and 50-C1601/KIT

Specimen positioning

Advanced testing systems

The wide range of Control Systems that we propose, may cause, sometimes, doubts in the selection of the appropriate model. For this reason, in order to steer our client into the best solution for the requested application, we summarize, hereunder, the main tests on building materials.

Compression and flexural tests

One of the most important test parameter is the loading rate which, is common knowledge, shall be smooth and precisely controlled conforming to Standard requirement, independently on oil pressure or non-linear response of the specimen.

This performance is assured, at different level of sophistication, by all our ADVANCED TESTING SYSTEMS: AUTOMAX E-Modulus, MCC Multitest, ADVANTEST



Determination of Modulus of Elasticity

An important test determination is the elastic deformability of concrete and mortar under loading before first cracking, known as ELASTIC MODULUS: longitudinal (Young's modulus) and transverse (Poisson's modulus).

International Standards prescribe the specimen to be submitted to a sequence of loading and unloading cycles under controlled load rate. The testing system shall control the oil flow with precise increments and decrements and measure longitudinal and transverse deformation.

This test can be performed, at different level of sophistication, by AUTOMAX E-Modulus, MCC Multitest and ADVANTEST.



Tests under displacement and strain control (e.g. FRC/Shotcrete applications)

The above tests are mainly performed to determine the ductility of special construction materials which are used for their superior capacity of deformation after first cracking. This applies, in particular, to the following materials:

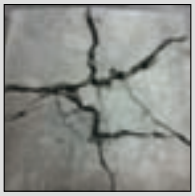
> FRC, Fiber Reinforced Concrete
> SHOTCRETE for tunneling
> Structural specimens reinforced with membranes or similar


The above tests are performed in two phases (or steps):

Hardening:
Load applied to the specimen is gradually increased in order to produce a constant rate of deformation (for example the deflection rate of a beam) up to the peak load value and first cracking.


Softening:
Load applied to the specimen is gradually decreased in order to maintain the same rate of deformation of the hardening phase. The test is completed when the load bearing capacity of the specimen becomes zero.
The typical test result is the area below the Stress-Strain diagram. The higher is the value of this area, the higher is the deformation capacity of the tested material.

The testing system must have very fast reaction time and extremely accurate oil flow regulation, if not, at the end of the hardening phase, facing the typical instability of the following stages, it is possible to loose the control of the test producing an early specimen failure and loosing the result (Stress-Strain diagram is partially lost and substended area is not measurable).

The above tests can be performed by MCC Multitest and ADVANTEST.
The capacity of the above systems to perfectly fulfill the stringent requirements requested for deformation/strain controlled tests has been obtained after years of research and cooperation with the academic world and are outlined by the vast international references.

Selection guide **Advanced** testing systems

AUTOMAX E-MODULUS represents the ideal solution to automatically perform with the required accuracy and superior productivity, both the standard failure tests and the determination of Modulus of Elasticity.

MCC Multitest represents the ideal solution to perform, with high accuracy, compression and flexural tests, determination of modulus of elasticity and deformation/strain controlled tests.

ADVANTEST covers all the application of MCC Multitest and also represents the ideal solution for central laboratories and research centers, to perform all tests and non standard determinations.

AUTOMAX E-MODULUS

The oil flow, and consequently the load rate, is controlled by a double stage hydraulic pump, specifically designed and optimized for construction material testing, powered by a variable speed DC motor with closed loop digital feedback and customized PID algorithm.
The oil flow control is furthermore integrated by a Flow-Sharing device to allow loading and unloading cycles.
Compatible with both small capacity frames (for cement and mortar specimens) and high capacity frames for concrete, high strength concrete, blocks and cores.

This technology, already in use in our machines by more than 10 years and continuously improved, combines high performances with the Energy Saving efficiency.

MCC MULTITEST

Oil flow control is obtained by a double stage hydraulic pump powered by an AC motor combined with a Servo-controlled Proportional valve with closed loop digital feedback and customized PID algorithm.

This sophisticated technology permits:

- Extremely accurate oil flow regulation controlling precisely even minor flow variation (positive and negative).
- Very fast reaction time , fundamental for those tests in which the behaviour of the specimen is fragile and requires immediate system feedback.
- Wide oil flow range making the system compatible with different tests, materials and testing frames

ADVANTEST

The advanced technology based on the Servo-controlled Proportional valve, featured by MCC Multitest, in this system is further extended: oil flow control and reaction time are nearly doubled and the total flexibility permits the system to perform ramp sequences, low frequency dynamic tests and user defined displacement/strain tests.

AUTOMAX E-Modulus

50-C20E82

☐ Compression and flexural tests

☐ Determination of modulus of elasticity

main features

- Test cycle with closed-loop digital feedback is automatically performed by pressing the start button
- Double-stage hydraulic pump with rapid approach and precise oil flow control allows high throughput of accurate tests (up to 40 per hour)
- Flow-Sharing technology for automatic execution of loading and unloading cycles
- Adopts the latest ES Energy Saving technology for reduction of power consumption and silent operation
- Soft platen-to-specimen contact and smooth load rate control from the very beginning of the ramp
- Double frame control expandable to up to four, with active frame selection via software
- Complete with PC and DATAMANAGER testing software for EN and ASTM Standards relating to compression, flexural, splitting tests, etc.
- Software for determination of Modulus of Elasticity and Poisson's ratio
- Ready to perform automatic tensile test on steel specimens once upgraded with tensile test kit including a suitable testing frame and accessories listed in section 70. Ask our technical department for more details.

The AUTOMAX E-Modulus is concerned essentially with the automatic compression, flexural and splitting tests on concrete and cement (when connected to suitable testing frames and determinations of Elastic Modulus and Poisson's ratio. Essentially the system consists of an ergonomic power and control console which houses the power unit and the PC.

50-C20E82 AUTOMAX E-Modulus controlling a EN Compression frame with three electronic Compressometer-Extensometers fitted to a cylindrical specimen.

Specifications

Hydraulics
- Dual-stage pump: centrifugal low pressure for fast approach and automatic switching to radial multi-piston high pressure for loading
- DC motor, 720 W, 50-60 Hz
- Maximum working pressure 700 bar
- Third and fourth frame option, active frame selection by software
- Flow-Sharing technology to perform loading and unloading cycles
- ES Energy Saving technology to reduce power consumption
- Silent operation

Hardware
- 132,000 points effective resolution
- Closed-loop P.I.D. control
- 4 channels for load sensors (pressure transducers/load cells)
- 6 channels for strain/displacement transducers (potentiometers, magnetostrictive, LVDTs)
- 4 channels for strain gauges
- Memorization of the calibration curves enables sensors to be connected and used immediately
- Digital linearization of the calibration curve (multi-coefficent)

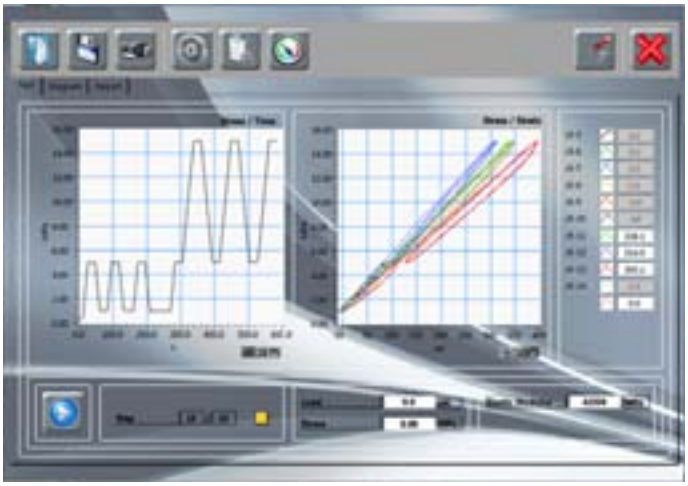
User-interface
- the System is fully controlled by the PC

Determination of modulus of elasticity

(Longitudinal: Young's Modulus-Transverse: Poisson's Modulus)

The specimen has to be submitted to a sequence of loading and unloading cycles under controlled load rate. The testing system shall control the oil flow with precise increments and decrements and measure longitudinal and transverse deformation.
For the AUTOMAX E-Modulus version, the oil flow control is integrated by a Flow-Sharing device to allow loading and unloading cycles. Compatible with both small capacity frames (for cement and mortar specimens) and high capacity frames for concrete, high strength concrete, blocks and cores.

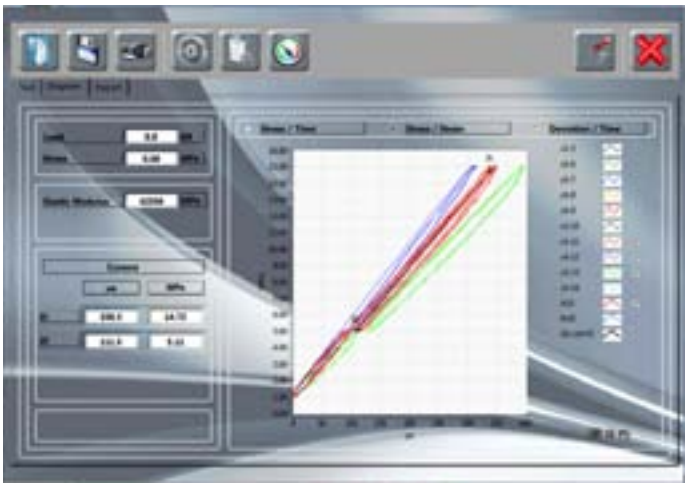
This technology, already in use in our machines by more than 10 years and continuously improved, combines high performances with the latest Energy Saving efficiency.



E-MODULE software: Elastic Modulus test performed according to EN 12390-13 (Procedure A)

PC and Software

- Remote control of the complete system (Console and Frame) for automatic test execution: rapid platen approach, zeroing, application of user-defined cycles of load/unload ramps, identification of the failure load, verification of conformity to the selected Standard, calculation of results, graphical and numerical management of results
- DATAMANAGER software for compression, flexural, splitting tests to EN and ASTM standards (see page 238)
- E-MODULE software for determination of young Modulus and Poisson's ratio allowing:
  - User-defined test cycles and step-programmable sequences
  - Real-time display of stress/time, stress/axial strain and stress/lateral strain diagrams
  - Automatic verification of sample centering and sensor functioning, as per standards requirements
  - Real- and/or deferred-time management of test results, either in graphical or table format
  - Remote selection of test frame
  - Memorization of single or batch test results
  - Printing and backing-up in MS Excel® format of user-defined test reports for single or batch tests
- Multi-language software, customizable with local languages
- Automatic load measurement verification procedure via software by connecting our digital tester (model 82-P0801/E or 82-P0804/E) with a strain gauged calibration cell to the PC allowing automatic data aquisition and print-out of traceable calibration certificates
- Remote technical assistance/diagnostics via internet
- UTSoftware for tensile test on steel specimens available on request



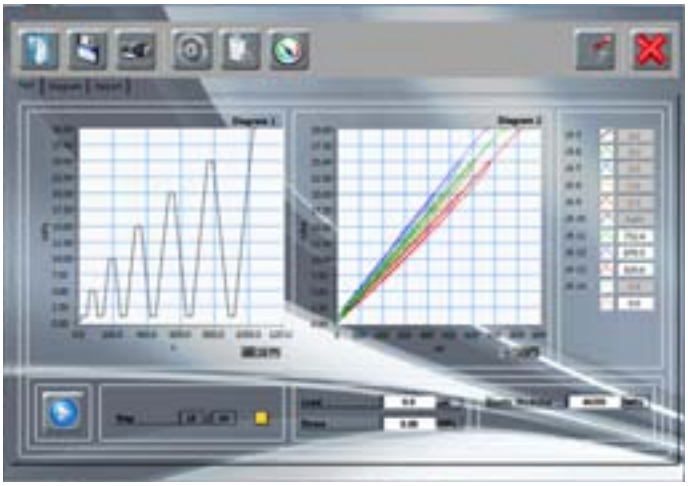
E-MODULE software: detail of stress/strain graph showing measurements of each transducer and average readings (dashed red line)

Ordering information

50-C20E82

AUTOMAX E-Modulus stand alone power and control console, for the (non simultaneous) control of up to two testing frames (expandable to four).
230 V, 50-60 Hz, 1 ph
Overall dimensions (w x d x h): 500 x 650 x 1354 mm.
Weight approx.: Kg. 102

50-C20E84
Same as above but 110 V, 60 Hz, 1 ph



E-MODULE software: Elastic Modulus test performed according to customized sequence of steps to fulfill any test procedure

AUTOMAX E-Modulus

Upgrading Options

Third and fourth frame connection

The AUTOMAX E-Modulus which can control two different frames can be upgraded for controlling, not simultaneously a third and a fourth frame, adding, respectively the following valve system:

50-C10D/3F

Hydraulic valve for AUTOMAX System for connection and control of a third frame.

50-C20E/4F

Hydraulic valve for AUTOMAX System for connection and control of a fourth frame

These options shall be installed in factory or by authorized engineers technicians.

Expandability of performance

The AUTOMAX Smart-Line control console (see page 237) is also available in an expandable version (code 50-C10D52) to fulfill multi-step investment programs. This version, designed for standard failure tests, when upgraded with upgrading kit 50-C10D52/EM becomes also suitable for Elastic Modulus and Poisson's ratio determination.

With this expandability option, all our clients can select a system that will cover their possible future testing requirements without the risk of having to purchase a c omplete new system.

For more information contact us or visit our website

50-C20E82 fitted with 50-C10D/3F and 50-C20E/4F hydraulic valves for connection and control of a third and fourth frame

Accessories for the determination of the Modulus of Elasticity and Poisson's Ratio

Standards

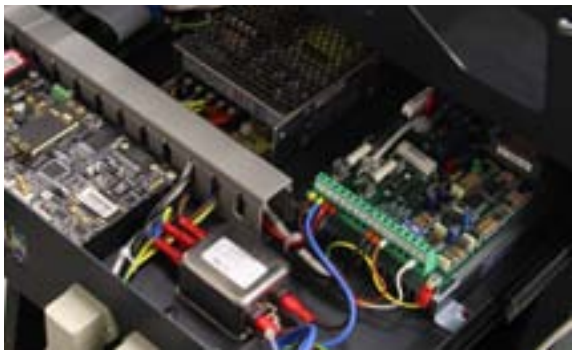
EN 12390-13, EN 13412, EN 13286-43, ASTM C469, ISO 6784, DIN 1048, BS 1888:121, UNI 6556

Elastic Modulus can be measured on different types of specimens and materials: concrete cores, cylinders and prisms, cement prisms, etc.

Accessories for Elastic Modulus determination are fully described on page 264, 265

Concrete cylinder fitted with three Compressometer-extensometers 50-C0222/F

Concrete specimen fitted with Strain Gauges



Detail of electronics positioned in the sliding drawer of Automax E-Modulus Console

Cement prism fitted with three compressometer-extensometers 50-C0222/F

info

AUTOMAX E-Modulus

50-C20E82 AUTOMAX E-Modulus controlling a 2000 kN EN compression frame 50-C46Z00

50-C20E82 AUTOMAX E-Modulus controlling a 2000 kN ASTM compression frame 50-C42Z00 and a 100 kN flexure frame 50-C1201/BFR with accessory.

50-C20E82 AUTOMAX E-Modulus controlling a 2000 kN EN compression frame 50-C46Z00, a 100 kN flexure frame 50-C1201/BFR with accessory and a 600/15 kN frame 50-C92Z20

MCC Multitest

50-C8422/MP with 82-D2999 PC cabinet. Printer not included

Compression and flexural tests

Determination of modulus of elasticity

Tests under displacement and strain control

main features

- Unique technology based on servo-controlled proportional valve optimized for construction materials for load, stress and displacement controlled tests, with superior performances: fast reaction time, excellent sensitivity to minor variations, extremely wide oil flow range
- All above features extended onto up to 4 different frames ranging from 15 kN to 5000 kN
- Completely automatic execution of:
  - Compression, flexure and indirect tensile tests.
  - Determination of Secant Elastic Modulus
  - Tests on Fibre-Reinforced Concrete (FRC-FRP) and Shotcrete (MCC Multitest only)
- Accuracy and reliability thanks to advanced electronics, efficient closed-loop control, high effective resolution, optimized P.I.D. algorithms

MCC Multites connected to the appropriate testing frame and fitted with the relevant accessories can perform:

- Compression, flexure and splitting tests on concrete, cement, mortar, etc.
- Cyclic tests for determination of Secant Elastic Modulus (Young) and Poisson's ratio
- Ductility and fracture energy test on Fibre-Reinforced Concrete (FRC) and concrete lined with polymers (FRP)
- Toughness test on sprayed concrete (Shotcrete) under concentrated load

Specifications

Hydraulics

- Max working pressure: 720 bar.
- Hydraulic motorized power pump with automatic double stage mode: low pressure/high flow rate (2l/min) for the fast approach (min. 40mm/min) and high pressure/low flow rate (0.7 l/min) for test execution.
- Wide flow rate range allowing the control of several frames with different capacities from 15kN up to 5000kN.
- Forced ventilation oil cooling system.
- High efficiency oil filtering system with anomalies warnings (e.g. low oil level and dirty oil filter).
- Oil flow regulated by servo controlled proportional valve with high frequency driving signal.
- 2 (extendable to 4, see upgrading options) electronic ON/OFF valves for remote automatic selection via PC of the active frame.

Hardware and Firmware

- 8 active channels (each one can be used by the machine as feedback variable to control test execution):
  - 4 for load sensors (load cells or pressure transducers)
  - 4 for displacement transducers (potentiometric, LVDT amplified, magnetostrictive) and deformation transducers (strain gauge)
- Effective resolution 132.000 divisions, Closed loop control with high frequency PID.
- Electrical characteristics of the channel conditioners:
  - Feed from 0.5 to 10V DC (digital selection)
  - Single-/dual-ended input with automatic detection
  - Input signal from -2.5 to +2.5V DC
  - Zero and gain digitally adjustable
- Data acquisition synchronized on all channels
- Calibration of the 8 channels in engineering units, via linearization function (up to 10 steps) which allows optimisation of readings accuracy over the whole test range.
- Storage of multiple calibration curves enables various sensors to be connected and used immediately
- Alphanumeric keyboard with 320x240 pixels display

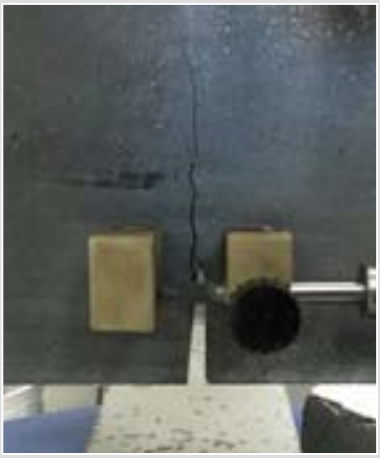
User-interface

The System is fully controlled by the PC

PC and Software

- Remote control of the complete system for automatic test execution including remote selection of test frame
- DATAMANAGER software for compression, flexural, splitting tests to EN and ASTM standards
- E-MODULE software for determination of Young Modulus allowing:
  - User-defined test cycles and step-programmable sequences
  - Real-time display of stress/ time and stress/axial strain diagrams
  - Automatic verification of sample centering, as per standards requirements
  - Real- and/or deferred-time management of test results, either in graphical or table format

Applications



The various main applications are summarized on pages 263 to 267

- MCC MULTITEST software for displacement/strain controlled tests for the determination of the:
- Toughness of fiber reinforced concrete (FRC): ASTM C1550
- Energy absorption of sprayed concrete: EN 14488-5, UNI 10834
- Flexural strength of Shotcrete: EN 14488-3
- Flexural strength of fiber reinforced concrete (FRC): EN 14641, ASTM C1609, C1018
  - Graphical and numerical management of data, including the overlaying of various curves on the same axis (e.g. three different deformation curves on a single time axis)
  - Possibility to display different curves in the same graph (for instance it's possible to display 3 different strain curves acquired by 3 different transducers in one graph with the same time axis)
  - Real time display and monitoring of all test data
  - During the test all the test parameter can be changed/modified including: active channel (used by the console as feedback to control the test execution), load/displacement rate, axes of diagrams, target value, etc.
  - Constant load/displacement/strain function with closed loop feedback assuring precise holding of the target value
- Printing and backing-up in MS Excel® format of user-defined test reports for single or batch tests
- Language selection: English, French, Spanish and Italian, plus another language which can be added by the user (Latin alphabet only)
- Printer not included

Ordering information

50-C8422/MP

MCC Multitest, stand-alone closed-loop Control Console for up to two test frames expandable to four.
Includes software for compression, flexure and indirect tensile tests, Elastic Modulus determination and displacement control testing facility.
PC included.
Power rating: 750 W
Dimensions (lxwxh): 470 x 410 x 1000 mm
Weight approx.: 120 kg, excluding PC
220 V, 50 Hz, 1 ph.

50-C8423/MP
Same as above but 220 V, 60 Hz, 1 ph

50-C8424/MP
Same as above but 110 V, 60 Hz, 1 ph

Tests under displacement and strain control

As explained on page 250, to perform the above tests with the relevant stringent requirements related to the two testing phases (Hardening and Softening), the testing system must have very fast reaction time and extremely accurate oil flow regulation, if not, at the end of the Hardening phase, facing the typical instability of the following stages, it is possible to loose the control of the test and correct results (Stress-Strain diagram is partially lost and substended area is not measurable).

The capacity of MCC Multitest and ADVANTEST to fulfill perfectly the stringent requirements requested for displacement/strain controlled tests has been obtained after years of research and cooperation with the academic world and are outlined by the vast international references.

Complete testing system controlled by the MCC Multitest, consisting of 4 frames: compression on concrete, compression and flexure on cement and flexure on concrete.
This configuration requires the upgrading of the system with two additional hydraulic ports 50-C7022/UP2. Printer and PC cabinet not included

MCC Multitest

Upgrading options

Third and fourth frame connection

50-C7022/UP1

Upgrading the MCC Classic and Multitest Control Consoles to control a third frame.

50-C7022/UP2

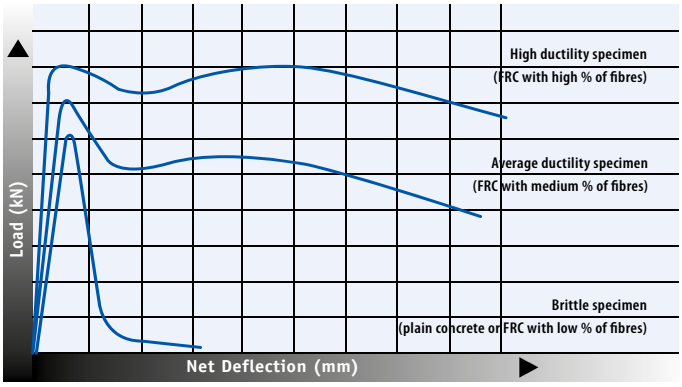
Upgrading the MCC Classic and Multitest Control Consoles to control a third and fourth frame.

Accessories

86-D2999

Cabinet for PC and printer with three extractable shelves to hold keyboard, printer and mouse. Complete with dust prevention system with two vented filters in the cabinet housing the PC.
230 V, 50 Hz, 1 ph
Overall dimensions (w x d x h):
500 x 550 x 915 mm
Weight approx.: 55 kg

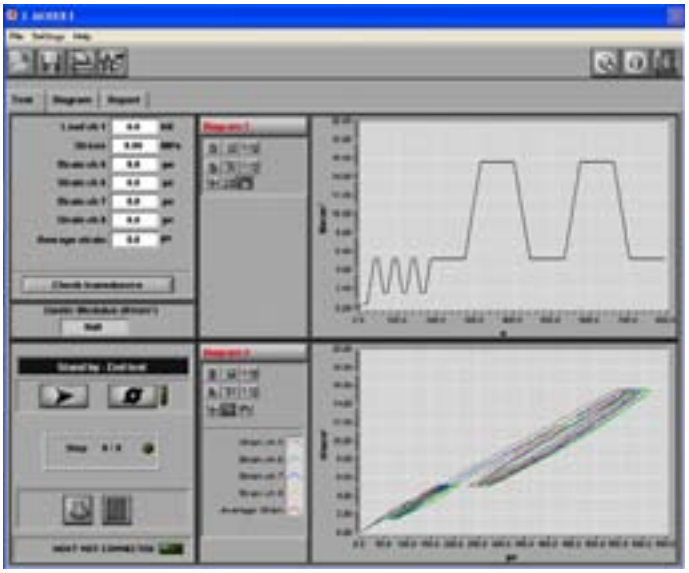
86-D2999/Z
Same as above but 110V, 60 Hz, 1Ph



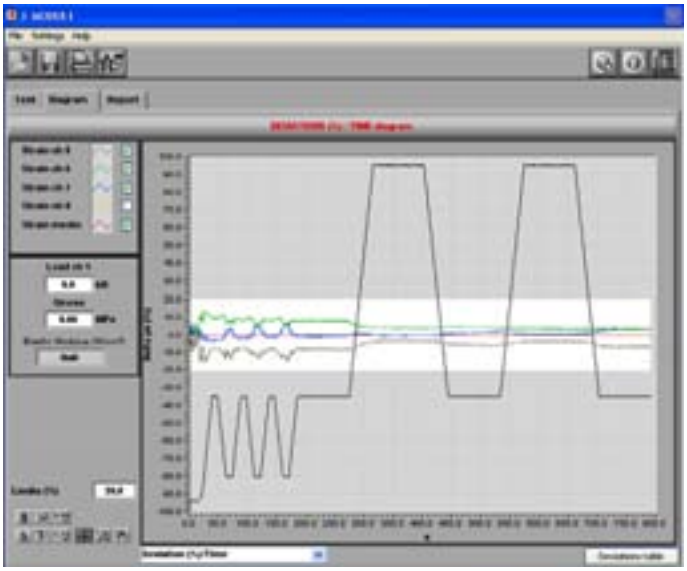
Detail of rear panel of MCC series

Calibration menu

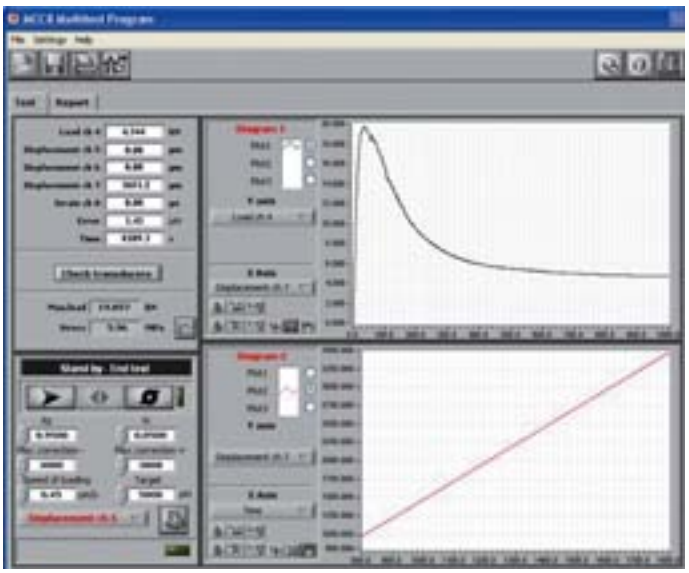
Detail of MCC display used basically for calibration purpose



Main screen of the software dedicated to Elastic Modulus determination



Deviation of the strain values measured by each transducer compared to the average reading (red line) useful to check specimen positioning



Results of flexure test on a fiber reinforced concrete beam performed under deflection rate control

MCC console upgraded with 50-C7022/UP2 distribution block for connection to up to 4 frames

86-D2999 PC cabinet,
PC and printer not included

Optimization and simplification

MCC and ADVANTEST are the outcome of more than 10 years of research, resulting in high performance and high-flexibility system suitable for many applications, together with optimization and simplification of major components

The power system can easily be lifted out of the console for ordinary maintenance and verification

Rear view of the
MCC Power and Control Consoles. The four hydraulic ports for connection of test frames are visible (the MCC has two ports, extendable to four)

info

ADVANTEST

main features

- Unique advanced technology controlling load, displacement and strain rate
- Performs user defined displacement/deformation tests for research purposes:
  - Unlimited combinations of load/stress, displacement/strain cycles, load/stress ramp sequences and test procedures
  - Low frequency dynamic tests with a maximum of 0.1 Hz (depending on the wave amplitude)
  - Real time variation of settings, including the control method (load, displacement or strain), active channel used as feedback variable, load/displacement/strain rate, target valve
- Completely automatic execution of:
  - Compression, flexural and indirect tensile tests
  - Determination of Secant Elastic Modulus
  - Tests on Fibre-Reinforced Concrete (FRC-FRP) and Shotcrete
- Ready to perform automatic Uniaxial and Triaxial tests on rock specimens, including stress-path procedure, once completed with the computerized lateral pressure controller SERCOMP ROCK, the Hoek cells and all the other relevant accessories listed in section 45.

50-C9842 with 82-D2999 PC cabinet

☐ Compression and flexural tests ☐ Determination of modulus of elasticity ☑ Tests under displacement and strain control

The advanced technology based on the double stage hydraulic pump powered by AC motor combined with the servo-controlled proportional valve with closed loop digital feedback, featured by MCC, in this system is further extended resulting in an increased test control capacity, above all in terms of reaction time which is particularly important to detect sudden variations of the specimen behaviour in case of brittle cracking, dropping of the bearing capacity, local failures. In addition the channels resolution is higher such to measure very small changes of the quantities under investigation and the total flexibility permits the system to perform fully customizable ramp sequences, low frequency test cycles and displacement/deformation tests.

For these reasons ADVANTEST is the ideal choice for research laboratories whose main activity is focused on non-standard tests on new construction materials, where the higher performance of the machine makes the difference.

Specifications

Hydraulics

- Max working pressure: 720 bar.
- Hydraulic motorized power pump with automatic double stage mode: low pressure/high flow rate (2l/min) for the fast approach (min. 40mm/min) and high pressure/low flow rate (0.7 l/min) for test execution.
- Wide flow rate range allowing the control of several frames with different capacities from 15kN up to 5000kN.
- Forced ventilation oil cooling system.
- High efficiency oil filtering system with anomalies warnings (e.g. low oil level and dirty oil filter).
- Oil flow regulated by servo controlled proportional valve with high frequency driving signal.
- 4 electronic ON/OFF valves for remote automatic selection via PC of the active frame.

Hardware e Firmware

- 8 active channels (each one can be used by the machine as feedback variable to control test execution):
  - 4 for load sensors (load cells or pressure transducers)
  - 4 for displacement transducers (potentiometric, LVDT amplified, magnetostrictive) and deformation transducers (strain gauge)
- Effective resolution 19-bit, 524.288 divisions allowing to measure negligible variations of the quantities under investigation. For each hydraulic channel the 524.288 divisions can be displayed in calibration menu/manual mode from zero up to the full scale remaining stable and without electric drift.
- 8 analogical outputs corresponding to each channel for possible use of external data acquisition system

- Electrical characteristics of the channel conditioners:
  - Feed from 0.5 to 10V DC (digital selection)
  - Single-/dual-ended input with automatic detection
  - Input signal from -2.5 to +2.5V DC
  - Zero and gain digitally adjustable
- Data acquisition synchronized on all channels
- Closed loop control with PID parameters adjustable in real time during test execution by the user
- Adjustable control frequency up to 120 HZ allowing to detect sudden variations of the specimen behaviour (for example brittle cracking, dropping of the bearing capacity, local failures, etc.)
- Calibration of the 8 channels in engineering units, via linearization function (up to 10 steps) which allows optimisation of readings accuracy over the whole test range.
- Storage of multiple calibration curves for immediate connection of various sensors.
- Alphanumeric keyboard with 320x240 pixels display

User-interface
The System is fully controlled by the PC

PC and Software
- Remote control of the complete system for automatic test execution, including selection of test frame
- The PC allows remote control of the whole system and the automatic execution of test including: fast approaching, zeroing, test stage, automatic test interruption after specimen failure, automatic unloading phase, numerical and graphical management of test results, etc.
- DATAMANAGER software for compression, flexural, splitting tests to EN and ASTM standards
- E-MODULE software for determination of Young Modulus allowing:
  - User-defined test cycles and step-programmable sequences
  - Real-time display of stress/ time and stress/axial strain diagrams
  - Automatic verification of sample centering, as per standards requirements
  - Real- and/or deferred-time management of test results, either in graphical or table format
- ADVANTEST software for displacement/strain controlled tests for the determination of the:
- Toughness of fiber reinforced concrete (FRC): ASTM C1550
- Energy absorption of sprayed concrete: EN 14488-5, UNI 10834
- Flexural strength of Shotcrete: EN 14488-3
- Flexural strength of fiber reinforced concrete (FRC): EN 14641, ASTM C1609, C1018
  - Free unlimited programmable load/stress/displacement/strain cycles to fulfill any kind of test procedure
  - Possibility to perform low frequency dynamic tests featuring square wave, triangular wave, trapezoidal wave, approximate sine wave for examining materials characteristics. The maximum work frequency is dependant on the size of the wave and on the deformability of the sample.
  - Graphical and numerical management of data, including the overlaying of various curves on the same axis (e.g. three different deformation curves on a single time axis)
  - Possibility to display different curves in the same graph (for instance it's possible to display 3 different strain curves acquired by 3 different transducers in one graph with the same time axis)
  - Real time display and monitoring of all test data
  - During the test all the test parameter can be changed/modified including: active channel (used by the console as feedback to control the test execution), load/displacement rate, axes of diagrams, target value, etc.
  - Constant load/displacement/strain function with closed loop feedback assuring precise holding of the target value
- Printing and backing-up in MS Excel® format of user-defined test reports for single or batch tests
- Language selection: English, French, Spanish and Italian, plus another language which can be added by the user (Latin alphabet only)

Ordering information

50-C9842

Advantest, stand alone closed loop automatic control console for up to 4 test frames for compression, flexure, indirect tensile tests under load/specific load control, for Elastic Modulus determination and for advanced tests under displacement/strain control. PC, printer and software included. 230V, 50Hz, 1ph.
Power rating: 750 W
Dimensions (l x w x h): 470 x 410 x 1000 mm
Weight approx.: 120 kg, excluding PC and printer

50-C9843
Same as above but 220 V, 60 Hz, 1 ph.

50-C9844
Same as above but 110 V, 60 Hz, 1 ph.

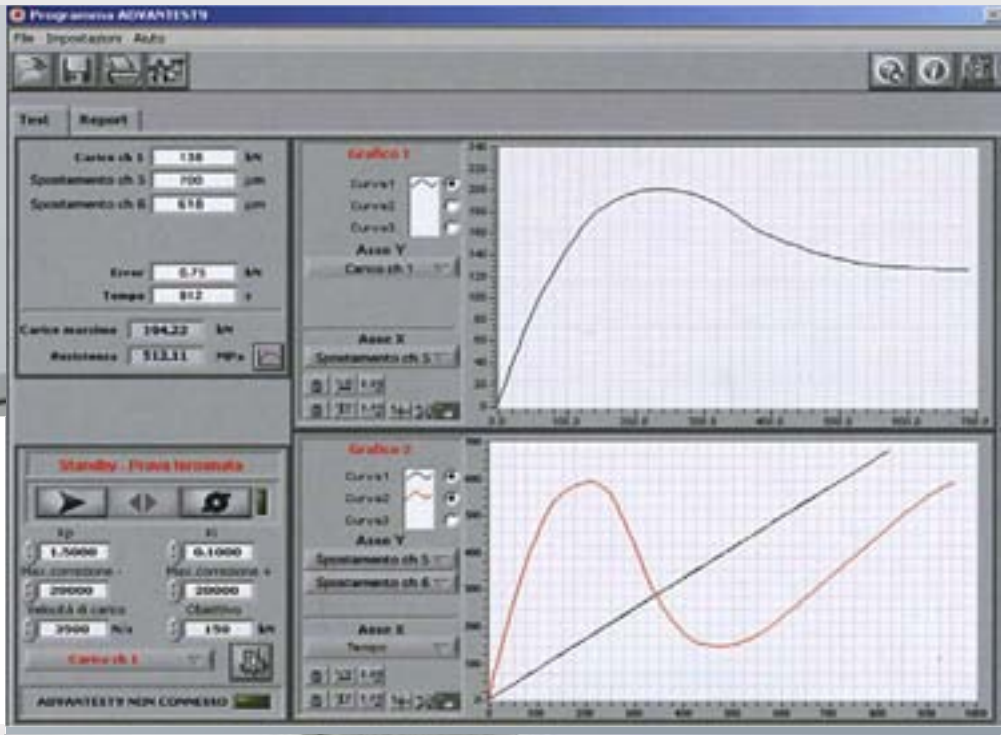
ADVANTEST, Configuration for Uniaxial and Triaxial tests on rock cores.

ADVANTEST
represents the ideal solution for central laboratories and research centers to perform all tests and non standard determinations.

Main applications and Test accessories

All above Systems, connected to the appropriate frame and accessory, can perform the following tests:

- Compression and flexural tests
- Determination of modulus of elasticity
- Tests under displacement and strain control



Main applications and Test accessories

AUTOMAX E-Modulus | MCC Multitest | ADVANTEST

Compression and Flexural tests

Standards EN 12390-4, EN 196, ASTM C39, ASTM C109, ASTM C348, AASHTO T22

Compression tests on concrete and cement

Our automatic testing systems can be connected to all our concrete and cement testing frames. See pages 234

Compression and flexure devices for cement testing. See page 46

50-C9030/H

65-L0019/B, 65-L0019/C

50-C9032/H

Standards

EN 1338, EN 12390-6, ASTM C496

Splitting tensile tests on concrete

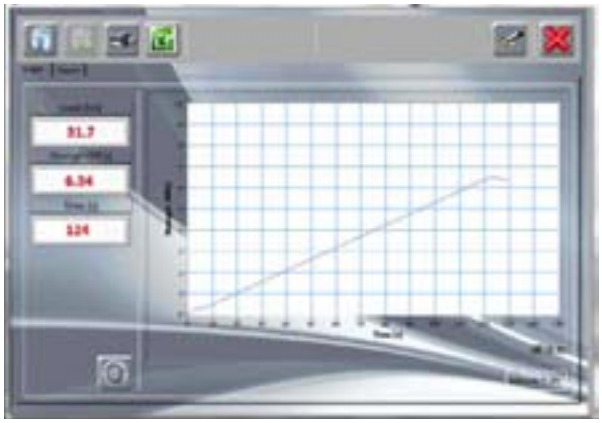
The accessory fits all our compression frames. Two versions are available: one for prism and paving blocks and one for cylinders. See page 242

Standards

EN 1339, EN 1340, EN 12390-5, ASTM C78, ASTM C293, AASHTO T97

Flexural tests on concrete beams, kerbs and flagstone.

See our flexural frames. See page 246, 249



Flexure test on a concrete beam

Main applications and Test accessories

Determinations of Modulus fo Elasticity

Standards EN 12390-13, EN 13412, EN 13286-43, ASTM C469, ISO 6784, DIN 1048, BS 1888:121, UNI 6556

Electronic universal compressometer/ extensometer

Aluminium and steel structure incorporating high-precision inductive transducer. Three units are generally recommended for precise axial deformation measurement.

Inductive transducer:

- Sensitivity: 0.02 micron
- Feed: up to 10 V
- Travel: ± 1.5 mm
- Gauge length: adjustable from 50 to 160 mm
- Minimum axial dimension: 150 mm
- Full-travel mechanical stop to prevent damage

Three compressometer-extensometers (55-C0222/F) fitted to a cylindrical specimen during compression stage.

Ordering information

55-C0222/F

Electronic universal compressometer-extensometer for cylinders and prisms. Supplied with adapter for small specimens, template for correct mounting and elastic bands holding the devices onto the specimen.

Three compressometer-extensometers (55-C0222/F) fitted to a cement prism 40 x 40 x 160 mm

Three compressometer-extensometers (55-C0222/F) fitted to a cylindrical specimen (150 mm diameter x 300 mm high) ready for elastic modulus test.

Three compressometer-extensometers 55-C0222/F fitted to a concrete beam

Concrete cylinder compressometer/ extensometer

Used for determining the axial deformation and diametrical extension of dia. 150 x 300 mm, dia. 160 x 320 mm or dia. 6"x12" concrete cylinder specimens during the compression test.

55-C0221/E

Ordering information

55-C0221/E

Concrete cylinder compressometer/ extensometer complete with two high precision LDT displacement transducers
10 mm travel.
Weight: 9 kg approx.

55-C0221/D

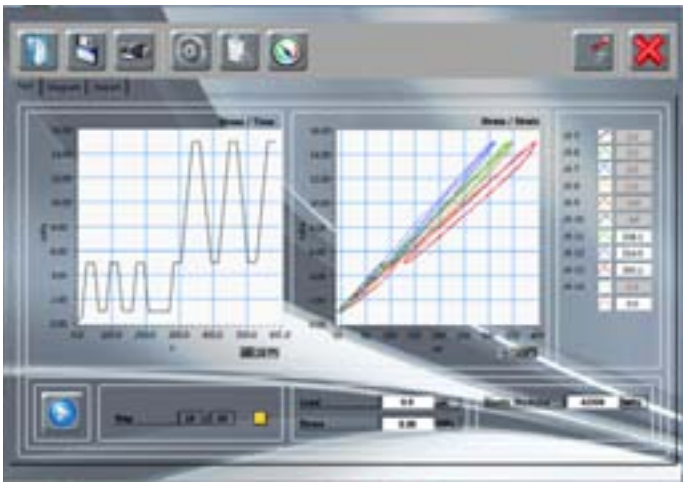
Axial-circumferential compression device complete with two digital gauges 12.5 x 0.001 mm with output for PC connection (special cable required)

55-C0221/D

82-D1261/LINK

Serial cable for PC connection

Note: *the dial gauge fitted on the 55-C0221/D device can be connected to the PC by using D1261/LINK cable in order to download displacement readings. By pushing a button on the cable, the current reading will be automatically stored in an excel cell or notepad row. Readings will be not acquired continuously, but just when pushing the button.*



E-MODULE software: Elastic Modulus test performed according to EN 12390-13 (Procedure A)

Determinations of Modulus fo Elasticity

Standards EN 12390-13, EN 13412, EN 13286-43, ASTM C469, ISO 6784, DIN 1048, BS 1888:121, UNI 6556

Strain gauges

Strain gauges provide a very accurate electrical signal, directly proportional to the strain of a loaded specimen.

They can be applied to the specimen surface using a special adhesive-catalyst agent and other accessories, which are included with 82-P0399/B Strain gauge application kit.

Up to four ¼ bridge strain gauges, can be directly connected to AUTOMAX E-Modulus, MCC Multitest and ADVANTEST Consoles using the interface 82-P0398.

82-P0399/B

82-P0398

Determination of Elastic Modulus using surface- mounted Strain gauges

Code 82-	P0390	P0391	P0392	P0393	P0396
Gauge width, mm	0.9	1.2	2.3	1	1
Gauge length, mm	10	20	30	60	120
Resistance, ohm	120	120	120	120	120
Bridge	¼	¼	¼	¼	¼
N° of gauges per package	10	10	10	10	10

Ordering information

82-P0390
Strain gauge, 10 mm gauge length (¼ bridge). Pack of 10

82-P0391
Strain gauge, 20 mm gauge length (¼ bridge). Pack of 10

82-P0392
Strain gauge, 30 mm gauge length (¼ bridge). Pack of 10

82-P0393
Strain gauge, 60 mm gauge length (¼ bridge). Pack of 10

82-P0396
Strain gauge, 120 mm gauge length (¼ bridge). Pack of 10

Accessories

82-P0399/1
Connecting terminals, 50-pair sheet

82-P0398
Compensation device for up to 4 Wheatstone bridges with ¼ or ½ bridge setup

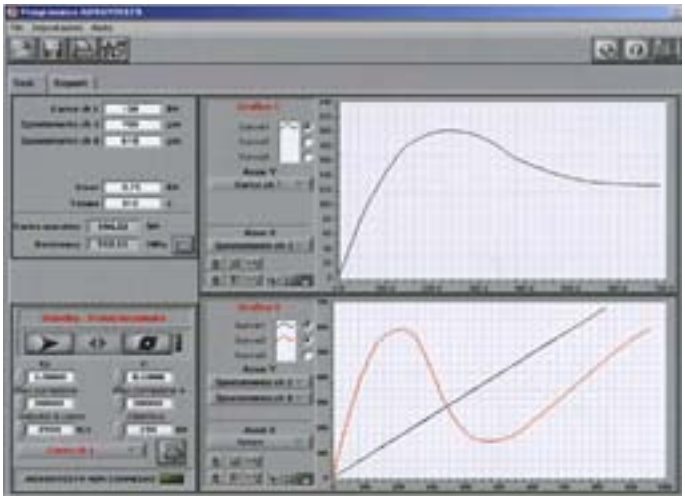
82-P0399/B
Strain gauge application kit including: conditioner, neutralizer, acetone, two tweezers, adhesive with catalyst agent, 100 m of bipolar cable, solder, soldering iron and carrying case.

Strain gauges mounted on a 40 x 40 x 160 mm mortar prism

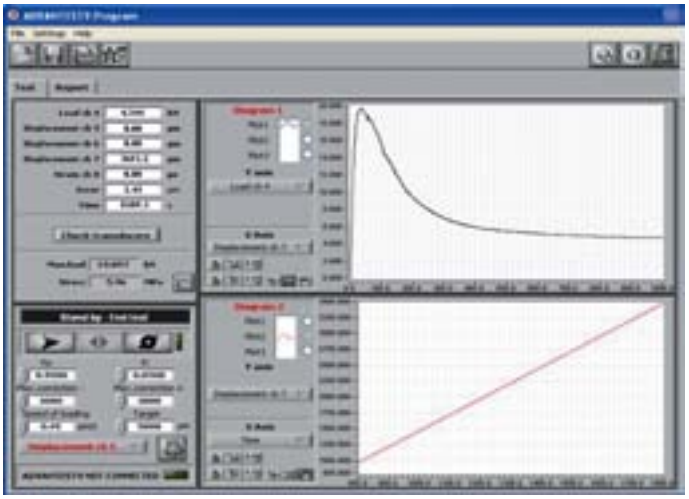
Main applications and Test accessories

Tests under displacement and strain control

As specified, these tests are performed particularly on Fibre-Reinforced Concrete (FRC-FRP) and Shotcrete. MCC Multitest or ADVANTEST Power and Control Consoles are required to perform this type of test, controlling a suitable flexural frame. To perform tests on FRC/Shotcrete specimens, we suggest the use of flexure frame model 50-C1601/FR, which features high-rigidity and superior performance. However, the same tests can be performed with our frame 50-C1201/BFR. For more info see pages 246 and 248



Main screen shot of software used for strain/displacement controlled tests.



Results of flexure test on a fiber reinforced concrete beam performed under deflection rate control

Virtual gauges indicating the actual reading of the sensor in percentage respect the full scale. It's an excellent tool for transducers positioning.

Flexural toughness of FRC concrete

Standards ASTM C1550

50-C1601/7

Lower support frame and upper loading element for slabs 800 mm diameter, 75 mm thick.
Weight approx.: 59 kg

50-C1601/9

Linear transducer, 100 mm travel, for measuring the piston displacement.

50-C1601/8

Displacement transducer, 50 mm travel, for measuring the deformation of the slab centre under concentrated load.

50-C1601/FR Flexural frame fitted with the accessories to perform the test.

Slab 800 mm dia.

Tests under displacement and strain control

Energy absorption of sprayed concrete

Standards EN 14488-5 and UNI 10834

Test accessories for the 50-C1601/FR frame:

50-C1601/6B

Supportive square base and upper loading element for testing 600 x 600 x 100 mm sprayed concrete slabs to EN Standard. Weight approx.: 78 kg

50-C1601/6

Same as above but componing to UNI standard

50-C1601/8

Displacement transducer, 50 mm travel, for measuring the deformation of the slab centre under concentrated load.

50-C1601/FR Flexural frame fitted with the accessories to perform the test.

50-C1601/9

Linear transducer, 100 mm travel, for measuring the piston displacement.

Test accessories for the 50-C1201/BFR frame:

50-C1200/6B

Supportive square base and upper loading element for testing 600 x 600 x 100 mm sprayed concrete slabs to EN Standard. Weight approx.: 78 kg

50-C1200/6

Same as above but componing to UNI standard

82-P0331/D1

High-precision displacement transducer, 50 mm travel

Typical failure under concentrated load

82-D1260

Magnetic transducer holder

Measurement of crack opening (CTOD-CMOD)

Standards EN 14651

Test accessories for the 50-C1601/FR frame:

50-C1601/1B

Upper and lower roller assembly for centre and two-point tests on concrete beams. Bearers 30 mm diameter x 300 mm long. Weight approx 52 Kg.

50-C1601/KIT

Set of four distance pieces and two base plates for adjusting the vertical clearance. Weight approx.: 10 Kg.

High precision transducer, 82-P0331/E

50-C1601/9

Linear transducer, 100 mm travel, for measuring the piston displacement.

Test accessory for the 50-C1201/BFR frame:

50-C1200/8B

Upper and lower roller assembly for centre- and two-point tests on concrete beams. Bearers 30 mm diameter x 300 mm long. Weight approx.45 Kg.

First Crack CMOD test

Common accessory:

82-P0331/E

High-precision displacement transducer for measuring Crack Tip Opening Displacement (CTOD) and Crack Mouth Opening Displacement (CMOD).
- Measuring capacity: 5 (3 to 8) mm
- Sensitivity: 1000 x 10^{-6} strain/mm

Beam deflection and toughness of FRC/Shotcrete

Standards EN 14488-3, ASTM C1609, ASTM C1018

Test accessories for the 50-C1601/FR frame:

50-C1601/1B

Set of two supports and two loading rollers, 30 mm diameter x 300 mm long.

50-C1601/KIT

Set of four distance pieces and two base plates to adjust the vertical clearance.

50-C1601/9

Linear transducer, 100 mm travel, for measuring the piston displacement.

Test accessories for the 50-C1201/BFR frame:

50-C1200/8B

Set of 2 supports and 2 loading rollers dia. 30 x 300 mm.

Common accessories:

50-C1200/5

Auxiliary testing frame for measuring the deflection of beams 100 x100 x 400/500 and 150 x 150 x 500/600 mm.

82-P0331/C1

High-accuracy displacement transducer, 10 mm travel (n.2 pieces req.)

82-P0331/2

Electric mean device for displacement transducer 82-P0331/C.

50-C1601/FR fitted with the accessories to perform the test

82-P0331/2

Detail of the auxiliary frame and specimen

Verification of force transfer

Standards EN 12390-4

The EN 12390-4 concerning specifications for compression testing machines, describes procedures for Verification of force transfer, including:

- Accuracy of force indication
- Self-alignment of upper machine plate
- Restraint of movement of the upper plate

These verifications can be performed using the 82-E0105/1 strain gauged cell connected to the 82-P0804/E tester. The data can be processed automatically on a PC with the testing software.

The verification of load measurement accuracy may be limited to the Accuracy of force indication using the appropriate load cell (82-E0100/L5 to 82-E0100/500) with a suitable tester such as our model 82-P0804/E. A detailed description of these items follows.

Can be performed with the following equipment:

Strain gauge load cell

The device consists of a 3000 kN capacity strain gauged column, 100mm diameter x 200 mm high, with hardness and tolerances conforming to Standard. The column is gauged with temperature-compensated electrical resistance strain gauges. Four complete bridges are applied, each centered at one of the ends of a pair of orthogonal diameters half-way up the cylinder.

Each bridge consists of two elements measuring axial strain and two measuring circumferential strain.

The column is supplied complete with auxiliary platen and spacers for easy and precise placing of the column either centrally or 6 mm displaced from the centre.

It must be used with a dedicated strain measuring apparatus such as, for example, our model 82-P0804/E.

The column can also be used as a standard load cell to test the accuracy of force indication.

Specifications

- Non linearity and hysteresis: ± 0.1% FS
- Repeatability: 0.03%
- Uncertainty: 0.05%
- Dimensions: 100 mm diameter x 200 mm height
- Weight approx.: 17.5 kg

Ordering information

82-E0105/1

Strain gauged column/load cell, 3000 kN capacity

82-P0804/E with 82-E0105/1 Strain gauged column and 82-P0172/M 24 column printer. The strain gauged column is supplied complete with auxiliary platen and spacers for an easy and precise placing of the column either centrally or 6 mm displaced from the centre. It can also be used as a 3000 kN load cell for force verification.

82-E0105/1. Strain gauged column. Carrying case included.

Digital tester for Force Transfer verification

This tester, when connected to the 82-E0105/1 column and to a PC and printer using the specific software 82-P0804/E1 and 82-P0804/E2, provides completely automatic data acquisition, processing and printing of the verification test certificates concerning either the accuracy of force indication or the force transfer verifications. Whilst operating, acquired data are displayed on the graphic screen and then downloaded via the serial port to the PC and printer. The system can also connected a 24-column serial printer (e.g. our model 82-P0172/M) or download the test results for further processing using programs developed by the user.

Supplied complete with carrying case that can also contain the 82-P0172/M printer.

Force Transfer verification certificate. The complete document includes another 3 certificates for upper plate self-alignment, alignment and restraint of movement.


CONTROLS
Masters of Technology
Centro di Taratura LAT N° 092
Calibration Centre
Laboratorio Accreditato di Taratura
ACCREDIA
CERTIFICATO DI TARATURA N° :
Certificate of calibration No :
VERIFICA DELLA STABILITA' IN FASE DI CARICO
STABILITY TEST VERIFICATION
Verificata secondo - Conform to :
PT 01 rev. 03
RISULTATI DI STABILITA' - STABILITY RESULT

Specifications

- Four channels
- Effective resolution:
- 1/128,000 used with 82-E0105/1 strain gauged column or 1/256,000 used with load cells
- Large permanent memory to store data and test results
- Graphic display 240 x 128 pixel
- Bridge impedance: 350 ohm
- Dimensions: 250 x 220 x 150 mm
- Weight approx.: 2 kg

Ordering information

82-P0804/E

Force transfer digital tester. 230 V, 50-60 Hz, 1 ph.

82-P0804/EZ

Same as above but 110 V, 60 Hz, 1 ph.

Accessories

82-P0804/E1

Testing software for the automatic data acquisition and processing of the plate self-alignment and restraint of movement verification (stability) of compression testers.

82-P0804/E2

Testing software for the automatic data acquisition and processing of force measurements for calibration of compression testers.

82-P0804/E3

Force transfer verification MS Excel spreadsheet

82-P0804/E4

Force calibration verification MS Excel spreadsheet

82-P0172/M

24-column serial printer. 110-230 V, 50-60 Hz, 1 ph.

82-P0172/1

Serial cable for connection of 82-P0172/M printer

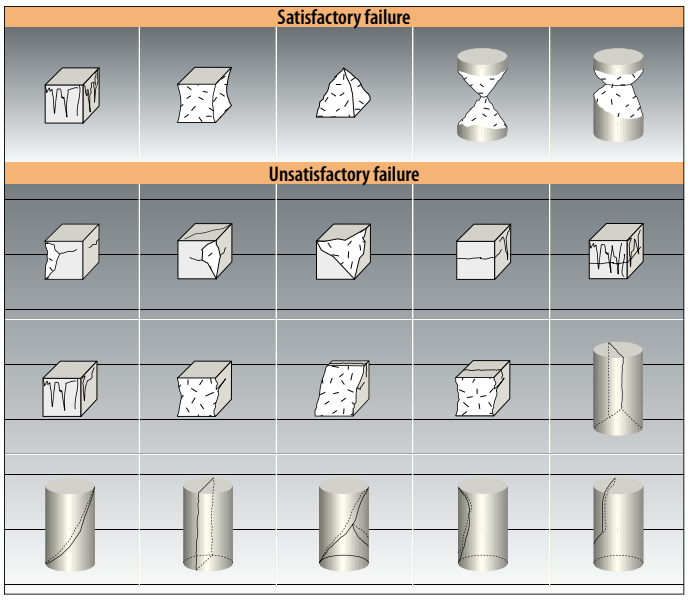
82-Q0800/3

RS 232 serial cable and RS 232 to USB adapter

Importance of the verification of force transfer

The result of a compression test on a cube or cylinder specimen is affected to a considerable extent by a non- uniform application of load on the surface of the sample – this results in an exceptional force being applied to the material causing premature failure. For this reason the calibration certificate for the force measurement instrument mounted on the machine does not guarantee the accuracy of the strength result.

Usually a non-uniform application of load leads to unsatisfactory failures, as shown below, which cannot be related to a known loss of strength. EN 12390-4 includes a testing procedure which verifies the self-alignment of machine components and the restraint on movement of the upper platen using a special strain gauged column (e.g. 82-E0105/1) connected to a suitable data acquisition and processing system (e.g. 82-P0804/E).



Force verification and calibration apparatus

Standards EN 12390-4 | EN ISO 376 | ASTM C39 | ASTM E4

The procedures detailed in these Standards can be performed with the following equipment:

- Load cell, to be selected according to the maximum capacity of the compression and/or flexural tester. See models 82-E0100/L5 to 82-E0100/500.
- Digital tester for force verification. See model 82-P0801/E with optional accessories.

Load cells

These high performance cells have been specially designed to meet the stringent requirements of EN, ISO and ASTM standards for calibration of compression testing machines. The cells must be connected to a suitable Digital tester such as the Digimax Plus (82-P0801/E).

Load cells connected to the Digital tester can be supplied complete with an official or traceable calibration certificate.

Specifications

- Accuracy: Class 1 EN ISO 376
- Linearity: ≤ ± 0.05% F.S.
- Hysteresys: ≤ ± 0.05% F.S.
- Repeatability: 0°, 120°, 240°: ≤ ± 0.145% F.S.
- Reversibility: ≤ ± 0.240% F.S.
- Zero: ≤ ± 0.030% F.S.
- Zero balance: ≤ ± 1% F.S.
- Supply voltage: 10 V
- Material: stainless steel
- Connector type: MIL-C-5015 7 poles male

Model	Capacity kN	Dimensions, mm (dia. x height)	Weight approx., kg
82-E0100/L5	5	57 x 117*	1.5
82-E0100/L30	30	82 x 149*	4.2
82-E0100/5	50	82 x 149*	4.2
82-E0100/10	100	82 x 149*	4.2
82-E0100/30	300	129 x 200	10
82-E0100/50	500	129 x 200	12
82-E0100/100	1000	129 x 200	14
82-E0100/200	2000	129 x 200	16
82-E0100/300	3000	129 x 200	18
82-E0100/500	5000	168 x 200	35

**Including spherical loading head*

Ordering information

82-E0100/L5
Load cell, 5 kN capacity, complete with spherical loading head and carrying case.

82-E0100/L30
Load cell, 30 kN cap., complete with spherical loading head and carrying case.

82-E0100/5
Load cell, 50 kN capacity, complete with spherical loading head and carrying case.

82-E0100/10
Load cell, 100 kN capacity, complete with spherical loading head and carrying case.

82-E0100/30
Load cell, 300 kN capacity, complete with carrying case.

82-E0100/50
Load cell, 500 kN capacity, complete with carrying case

82-E0100/100
Load cell, 1000 kN capacity, complete with carrying case.

82-E0100/200
Load cell, 2000 kN capacity, complete with carrying case.

82-E0100/300
Load cell, 3000 kN capacity, complete with carrying case.

Load cells from 5 kN to 100 kN complete with spherical loading head

82-E0100/500
Load cell, 5000 kN capacity, complete with carrying case.

82-E0100/SIT1
Official ACCREDIA (ex SIT) calibration certificate for load cell 30 to 1000 kN capacity, connected to the relevant Digital tester.

82-E0100/SIT2
Official ACCREDIA (ex SIT) calibration certificate for load cell 2000 to 5000 kN capacity, connected to the relevant Digital tester.

82-E0100/SIT3
Official ACCREDIA (ex SIT) calibration certificate for load cell 5 kN capacity, connected to the relevant Digital tester.

82-E0100/TRC
Traceable calibration certificate for load cells from 5 kN to 5000 kN capacity, connected to the relevant Digital tester.

Note: *Load cells of other capacities are available on request.*

Load cells from 300 kN to 5000 kN

Digital tester for force verification

This system, when connected to any strain gauge load cell, provides data for the force verification of the testing machine. Data can be printed by a standard serial printer such as our model 82-P0172/M, using a serial cable (82-P0172/1, see accessories). Alternatively, data can be downloaded to the PC for processing and, using the relevant MS Excel template (82-P0804/E4, see accessories), for producing a test certificate conforming to the relevant Standard; for example the EN 12390-4 or ASTM C39 for concrete compression testers.

The tester, connected to one of our load cells 82-E0100/L5 to 82-E0100/500 (see Load cells), can be supplied complete with an official or traceable calibration certificate. See ordering information. Each cell must be calibrated separately and the certificate refers to one cell only.

Main features

- High effective resolution: 256,000 points (less than 0.05% of full scale)
- Large graphic display: 240 x 128 pixels
- Language selection
- Large permanent memory
- Two RS 232 serial ports for PC and printer
- Remote control
- MS EXCEL Template available for producing calibration certificates
- Clock calendar chip
- Dimensions: 250 x 220 x 150 mm
- Weight approx.: 2 kg

Load cell (from 300 kN up to 5000 kN), digital tester 82-P0801/E and printer 82-P0172/M

Ordering information

82-P0801/E

Digimax Plus, calibration tester, for use with load cells or transducers, 256,000-point effective resolution. 230 V, 50-60 Hz. 1 ph.

82-P0801/EZ

Same as above, but 110 V, 60 Hz, 1 ph.

Accessories

82-P0172/M

24-column serial printer. 110-230 V, 50-60 Hz, 1 ph.

82-P0800/C

Carring case for DIGIMAX Plus and printer

82-P0172/1

Serial cable for connection of 82-P0172/M printer

82-Q0800/3

RS 232 serial cable and RS 232 to USB adapter

82-P0804/E4

Force calibration verification MS Excel spreadsheet

Automatic calibration and force verification procedure

In order to perform automatic calibration of our compression machines, our external digital readout units (P0801/E or 82-P0804/E) can be directly connected on one side to the serial port of the PC controlling the machine via DATAMANAGER software and on the other side to a suitable reference load cell. The software displays the true force both in divisions (bits) and in engineering units (kN). The operator may enter a sequence of load levels and, once the true force levels are reached by reading on the dedicated software window, the corresponding electronic value in divisions will be saved, thus filling automatically the calibration table and creating the calibration curve.
In addition, once the calibration is performed, it's also possible to carried out the calibration verification. For the Automax E-Modulus control console, by editing a table of load target values, the machine will reach them automatically and will store all the corresponding values in divisions calculating the errors in comparison with true force. This operation can be repeated for up to three cycles so that a complete calibration certificate will be ready to be print out being saved in Controls excel format.


CONTROLS

MACCHINA A COMPRESSIONE - Taratura della forza
COMPRESSION TESTING MACHINE - Force calibration

RISULTATI DI TARATURA - CALIBRATION RESULTS

Reliability of strength test results

Full traceability of concrete, starting with a batch fresh from the ready-mix plant and ending with the hardened specimens tested in a compression machine, is a growing demand from contractors, consultants and inspectors. Their aim is to maintain continuous control of the whole process and gain evidence that the initial construction material designed with the ready-mix supplier is exactly the same as the one cast on-site.

Traceability of concrete, through production, transportation, sample picking, identification and testing, is a difficult task; a long process involving several participants working in different locations and at different times.

Control of the phases from the ready-mix plant through to the on-site sample picking is typically achieved using systems, software and technologies developed by specialized companies such as ELETTRONDATA SRL (www.elettrondata.it).

Traceability through the subsequent phases, from sample picking through to laboratory testing, requires full integration of the testing machines into the system; therefore CONTROLS is fully involved. In partnership with ELETTRONDATA S.R.L. we are developing an integrated system, based on ED-CUBE technologies, designed for this purpose.

Layout of a complete system for concrete traceability

ED-CUBE system

(it is a CONSYSTECH patent, developed and distributed by ELETTRONDATA)

The system is based on a tiny micro-chip (LF technology) which is cast into the fresh concrete specimen during the preparation phase, which means that it can't be removed later when specimen is hardened.

Micro-chip (LF technology) cast into the fresh concrete

Micro-chip (LF technology) is permanently locked inside the hardened concrete specimen

This chip is detected from the outside with a special RFId antenna and provides unique identification numbers. ED-CUBE software manages all the phases of the process, such as the association of the specimen with corresponding ID numbers (in the picking phase) and, after the strength test is performed, it creates a permanent link between the specimen ID and the compressive strength result.

Compression machine software and firmware (embedded software) provide complimentary functions, communicating with the ED-CUBE software, giving notification when a new test is started, ensuring that the specimen can't be removed after a test has started, transmitting full test results with encrypted protocol, etc...

Contact us for detailed information about the ED-CUBE System and to evaluate compatibility of your CONTROLS compression machine with the ED-CUBE systems.