Training Bulletin

Flow

TB/FLOW–001 Issue 1

PowerTools

Flow Training Program, 2004

ABB Limited launches a new PowerTools Training Program, giving the customer **11 unique courses** to choose from. All courses are held in the training facility at the ABB Stonehouse site, UK.

Each course has been designed to fit the needs of users in the field who are using ABB flow measuring equipment. Individual product training covered in the program include:

- **AquaMaster**
  Full bore and insertion meters
- **MagMaster**
  Full bore and insertion meters
- **Aquaprobe**
  Insertion flow meters
- **CalMaster**
  Meter verification system

Each successful participant receives a certificate of competence plus all presentation material and manuals used during the course.

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Course 1 – Flow Basics

This course is aimed at the engineer who has little or no experience of the intricacies of flow. It assumes no previous knowledge and covers the basics, including:

- Terminology – get to know the jargon, it really helps
- Reynolds number – what it is and what it means
- Flow profiles – what they are, how to use them and when you need them
- Flow disturbances – what causes them, the effect they have, and how to estimate the extra errors they will introduce into your measurement
- Flowmeters – how they work, what types are available, where to use each type and, more importantly, where they should not be used

Course Duration $^{1}/_{2}$ Day

Course 2 – Flowmeter Installation

All flowmeters are affected to a greater or lesser degree by the way they are installed. To obtain the best possible performance, users must select their flowmeter with care, bearing in mind many factors such as the type of fluid they need to measure and the installed location. This course is used in conjunction with Course 5 – Flowmeter Selection to give the user a real appreciation of what is involved in getting a good and reliable flow measuring installation.

Electromagnetic flowmeters are fast becoming a commodity item in today's high tech world and slogans such as 'Fit & Forget' are commonplace. However, if a user wants to get the best possible performance out of an installation there are certain rules to be followed. This course is aimed at the engineer who is tasked with installing these devices and wants to get the ultimate performance and reliability from them.

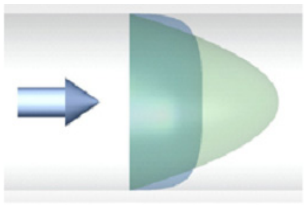
The course covers such things as:

- Disturbance effects (with a software package, written by the course author, that enables estimation of the effects of different common disturbances)
- Earthing (grounding) – a constant source of misunderstanding and consequent problems
- Part-full pipes

…and much more.

Course Duration 1 day

Course 3 – Flow-profiling Theory and Practice



Pipe flow-profiling is a fundamental technique that enables the skilled user to accurately measure exactly what is happening inside the pipe and make any correction necessary to a given measuring point. It allows the effects of any disturbance or combination of disturbances to be determined and is an invaluable tool in the calibration verification field.

However, it is not as simple as it appears and, in untrained hands can give seriously misleading information, which requires expert help to unravel. Those who attend this course will become competent in the flow-profiling field after the theoretical training which forms the first part of the course and the 'Hands On' actual profiling that forms the second part.

Course Duration 1 day

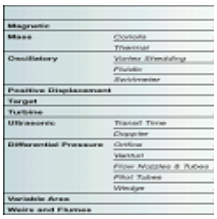
Course 4 – Flowmeter Verification Techniques

In these days of increasing costs and regulations, long-term flowmeter performance is increasingly important. When flowmeters are new they are usually delivered with a wet-calibration certificate that guarantees their performance. But after 1 or 2 years how does an engineer know whether the meters are still performing correctly; has the calibration shifted?

This course teaches the student the time-honoured methods of checking meters both in situ and when removed from site. It also explains in detail the new electronic methods that are currently changing the approach to flow meter verification.

Course Duration ½ Day

Course 5 – Flowmeter Selection



There are many different methods of measuring fluid flow – which is useful, but can be very confusing. The objective of this course is to unravel some of the mysteries and teach the student how different flowmeters work – and when and when not, to use them.

Course Duration 1 day

Course 6 – Flowmeter Calibration

This course is designed for those who wish to understand the implications of flow calibration, and the different methods of calilbrating flowmeters. It gives the student a detailed understanding of the methods used in international flow calibration facilities and the efforts the managers of these facilities make to ensure that all global facilities remain, as far as possible, in synchronisation with each other.

ABB is a world leader in flow calibration techniques. The course is held at the UK's flow calibration facility in Stonehouse and there are many interactions between the classroom and the flow calibration rig itself.

Course Duration 1 Day

Course 7 – AquaMaster

Day 1 begins with an overview of the AquaMaster product range, including sensor design. This is followed by a detailed examination of the transmitter menu structure, both by presentation and demonstration, including configuration via PC and/or Psion Organiser and an explanation/demonstration of both standard and ‘fast’ programming techniques. Finally there is a short section covering the diagnostic alarms and basic troubleshooting techniques

Day 2 involves each student building a flowmeter, following the meter through the JIT production process, including calibration and completion.

Course Duration 2 Days

Course 8 – MagMaster

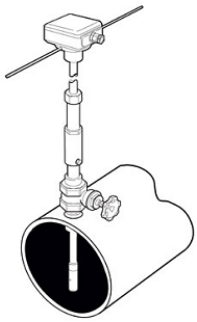
This course gives an overview of the whole MagMaster product range with emphasis (if appropriate) on the part of the range most suited to the industry sector of the students.

This is followed by a detailed examination of the transmitter menu structure, both by presentation and demonstration, including configuration via PC and/or Psion Organiser and an explanation/demonstration of both standard and 'fast' programming techniques.

Finally there is a short section covering system alarms and basic troubleshooting techniques.

Course Duration 1 Day

Course 9 – AquaProbe & AquaProbe 2



This course begins with an overview of the difference between full-bore and insertion electromagnetic flowmeters, followed by flow profiles and the effect on them by upstream disturbances.

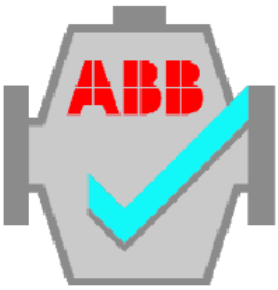
This is followed by a short discussion on flow-profiling and installation techniques. Where appropriate, and if not already covered in previous courses in this program, a detailed examination of the appropriate transmitter menu structure follows – both by presentation and demonstration, including configuration via PC and/or Psion Organiser and an explanation/demonstration of both standard and 'fast' programming techniques. For calculating correction factors there is a link to the ABB utilities software (ToolKit).

Finally there is a short section covering the diagnostic alarms and basic troubleshooting techniques. If appropriate, a demonstration of the use of the ABB Flow-Profiling software will follow.

Note. This course is normally undertaken in conjunction with Course 3 – Flow-profiling Theory and Practice. If both courses are booked together, a discount of £150 is applicable.

Course Duration 1 Day

Course 10 – CalMaster In Situ Verification System



CalMaster training is aimed at the user of the device. All CalMaster users must be registered in order to obtain support from ABB CalMaster Help Line and Help Desk. In addition, regulatory bodies may insist on all users being registered.

The training covers all aspects of the use of CalMaster including a 'Hands on' session when students will be expected to verify flowmeters here in our training school. More and more customers requesting CalMaster training lack sufficient experience of MagMaster field service and problem solving. Therefore part of the CalMaster training involves a detailed examination of the transmitter menu structure, both by presentation and demonstration, including configuration via PC, Psion Organiser or PDA devices and an explanation/demonstration of both standard and 'fast' programming techniques.

Finally there is short section covering system alarms and basic troubleshooting techniques.

Course Duration 1 Day

Course 11 – ScrewDriver Diagnostic Software

Screwdriver is the very latest diagnostic and support software for MagMaster, AquaMaster and AquaProbe. It enables data collection both locally and remotely, digital data logging backup, etc. It is intended to help the engineer with a number of meters to both maintain and trouble-shoot them and the process.

Course Duration 1 Day

Training Program Diary, 2004

2004 Training Program Diary									
	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Saturday		1							
Sunday		2			1				
Monday		3			2			1	
Tuesday		4	1		3			2	
Wednesday		5 **4**	2 **7**		4	1 **7**		3 **7**	1
Thursday	1	6 **11**	3 **7**	1	5	2 **7**		4 **7**	2
Friday	2	7	4 **8, 5**	2	6	3 **8, 5**	1	5 **8, 5**	3
Saturday	3	8	5	3	7	4	2	6	4
Sunday	4	9	6	4	8	5	3	7	5
Monday	5	10	7	5	9	6	4	8	6
Tuesday	6 **7**	11	8	6	10	7	5	9	7
Wednesday	7 **7**	12	9 **10**	7	11 **10**	8	6 **1, 2**	10	8 **10**
Thursday	8	13 **10**	10	8 **10**	12	9	7 **4**	11	9
Friday	9	14	11	9	13	10	8 **11**	12 **10**	10
Saturday	10	15	12	10	14	11	9	13	11
Sunday	11	16	13	11	15	12	10	14	12
Monday	12	17	14	12	16	13	11	15	13
Tuesday	13	18	15	13	17	14	12	16	14
Wednesday	14	19	16	14	18	15	13	17	15
Thursday	15	20	17	15	19	16 **3**	14 **10**	18	16
Friday	16 **10**	21 **1, 2**	18	16	20	17 **9**	15	19	17
Saturday	17	22	19	17	21	18	16	20	18
Sunday	18	23	20	18	22	19	17	21	19
Monday	19	24	21	19	23	20	18	22	20
Tuesday	20 **11**	25	22	20	24	21 **11**	19	23	21
Wednesday	21	26	23	21	25	22	20	24	22
Thursday	22	27	24 **11**	22	26	23 **10**	21 **6**	25	23
Friday	23	28	25	23	27	24	22	26	24
Saturday	24	29	26	24	28	25	23	27	25
Sunday	25	30	27	25	29	26	24	28	26
Monday	26 **3**	31	28	26	30	27	25	29	27
Tuesday	27 **9**		29	27	31	28	26	30	28
Wednesday	28 **8, 5**		30	28		29	27		29
Thursday	29			29		30	28		30
Friday	30			30			29		31

1	Flow Basics	4	Flowmeter Verification	7	AquaMaster	10	CalMaster
2	Flowmeter Installation	5	Flowmeter Selection	8	MagMaster	11	Screwdriver 6
3	Flow Profiling Theory and Practice	6	Flowmeter Calibration	9	AquaProbe & AquaProbe 2		